Geochemistry Data Review

Migori Project, Kenya

Special Prospecting Licences (SPLs) 122 and 202

December 2013

Contents

1. Introduction

A desktop study of all geochemistry data collected since the 1990s was undertaken between Q1 and Q3 2013. This audit aimed to integrate all historical and recent surface data with other geological and geophysical information to create a transparent and robust dataset. Specific aims of the exercise were to:

- o identify areas of interest for further and advanced regional exploration
- o identify areas of interest for expansion of the existing resource base
- o delineate and quantify existing regional targets
- o improve understanding of mineralisation in a regional context
- o use new insight to construct a block ranking to prioritise regional exploration

The initial exercise consisted of a first-pass audit of the historical surface data covering soil, hand grab and trench samples.

Work had focussed on the immediate vicinity around the prospects, which had not been properly delineated or quantified. In order to further the regional exploration at Migori, and understand how effectively surface geochemical sampling could be applied as an exploration tool, it was necessary to first delineate each prospect and to view it in a regional context. In doing so it was possible to better understand the regional controls on mineralisation and from that attempt to identify areas with similar features with future exploration potential.

A statistical study of Au in soil and grab samples was conducted by lithology with the aim of defining background and anomalous values for individual rock types. MapInfo plots of the results have been used to define a new structural model for the Mikei Shear Zone (MSZ) and to characterise a number of other prospects outside of the MSZ.

2. Methodology

In the initial analysis, assay and locational data was exported from the company's Access database and grouped by sample type into grab, trench, soil and air core. Initial work was focused on the auditing and validation of the Migori surface database bringing it to a level that could be relied upon for detailed regional analysis. A comprehensive review of the surface database, containing historical data from all major past operators was scrutinised. Duplicated data were removed and data gaps were bridged were possible.

Also, different sampling programmes were analysed (at the time of sampling) for different elemental suites: consequently the number of samples differs for each element pair as not all samples were analysed for the full suite (Au, Ag, As, Cu, Pb, Zn and Sb).

Following statistical analysis (section 3.1), themed maps were drawn in MapInfo using a percentile scale calculated in Excel. The thematic maps for each element (Au, Ag, As, Cu, Pb and Zn) were

plotted together and superimposed on a 1:25,000 scale geological map of the Migori greenstone belt (Thornett, J. (1998); Multi Metal Consultants Pty Ltd (DJM)) (figure 1).

In subsequent analysis, nearly 15,000 surface samples were analysed with the aim of characterising the surface Au anomaly patterns across SPL122 and SPL202. As some rock compositions are more amenable to hosting Au, it was expected that background levels of Au would be higher in certain lithologies (i.e. mafic vs. felsic units) than others. This could create problems during interpretation, because an anomalous result in one lithology could represent the background grade of another. Similarly, because soil samples represent homogenised material, an anomalous soil grade could potentially be several orders of magnitude lower than even the background grade of a grab sample of the same rock type.

There also tends to be a sampling bias; soil samples have historically been carried out in a grid pattern, whereas grabs are more likely to be selected for reasons of geological interest from areas known to contain mineralisation. Consequently grab samples more often return high Au grades.

In order to address these issues and obtain statistically meaningful background and anomaly grades, the surface dataset was analysed by lithology and sample type. A simplified geological map was created in MapInfo, with five principal lithology types identified.
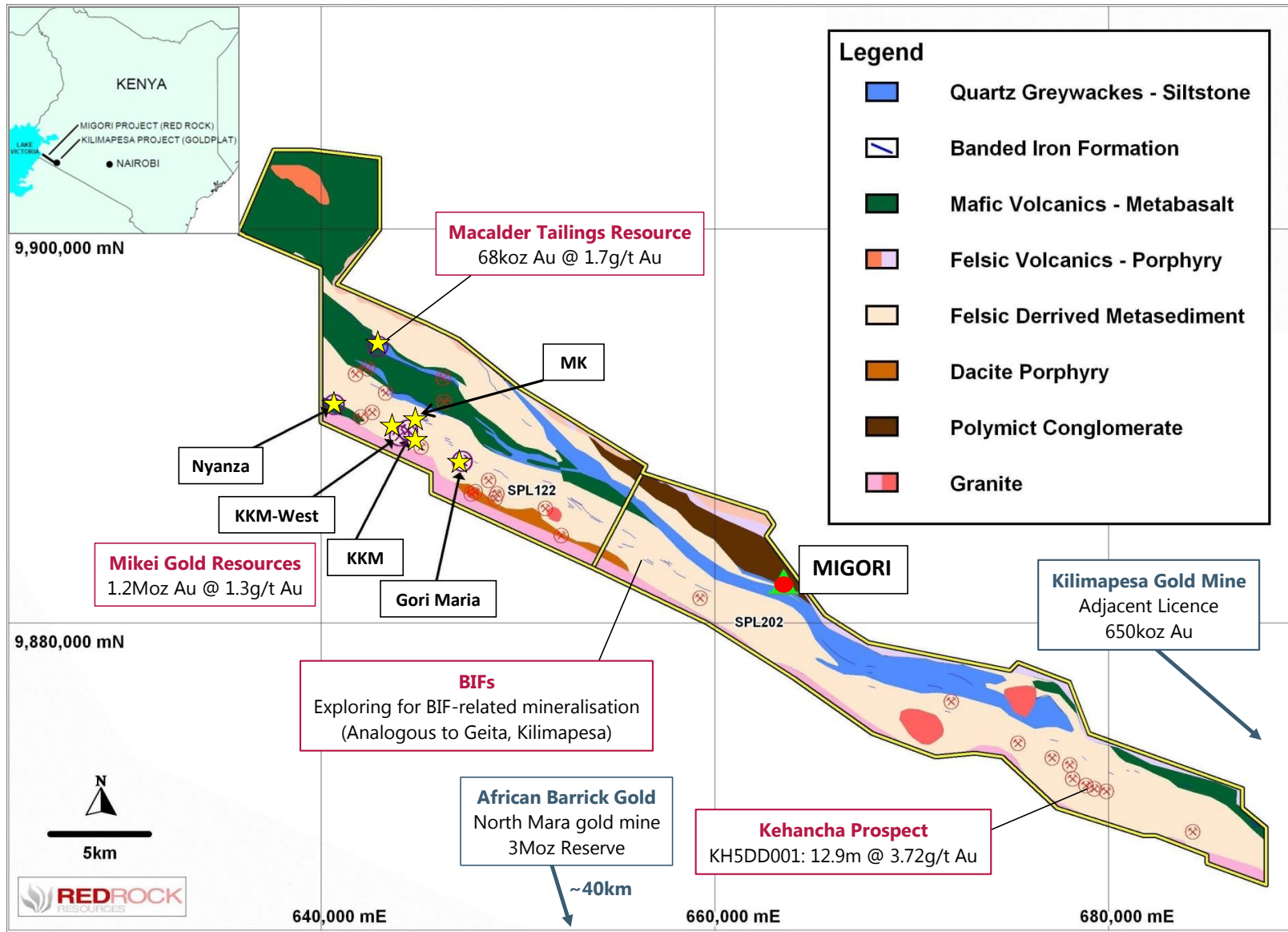
Figure 1 Map showing SPLs 122 and 202 (yellow boundary)

3.1   Statistical Analysis

Up to 96.3% of the surface samples (soil, grabs and trench) listed in the database are associated with location data. Correlation coefficients, rank and percentile were calculated for the resultant data population (where those samples without location data were excluded), in order to discern Au background and anomalous values for each sample group. Since Au in soil tends to be present in low concentrations, analysing sample types separately prevented **anomalously high Au concentrations in soil** being masked by **background grades in other sample types**, in particular grabs.

The data analysis tool was used to create a descriptive statistical summary for each lithology in the soil and grab spreadsheets. Representative Au grade intervals were used to create 'bins' from which histogram plots of grade vs. no samples with cumulative percentage curves were drawn. XY scatter plots of grade vs. no. samples were also drawn to complement the histogram. From this data, the minimum and maximum background grade and minimum anomalous grade was defined for each lithology group.

This exercise has currently only been carried out for Au assays. Future work will do the same for Ag, As, Cu, K, Pb, Sb and Zn. Work will also be focused to learn about which elements are useful pathfinders in the Migori Greenstone belt.

3. Results

Background results were defined as grades that lie within the 'primary' curve, whereas anomalous results were defined as assay grades that lie completely outside of this curve. In a number of instances the gradient of the 'primary' curve would lessen towards higher grades, reflecting a smaller number of samples with an Au grade too small to reflect an anomalous result but enriched relative to the rest of the background. This bracket is termed the 'elevated background' and is expected to represent a zone of enriched soils surrounding an anomalous zone (figure 2).

Regarding the statistical analysis, rough plots of Au vs. Ag (for soil samples) returned a strongly positive correlation (correlation coefficient 0.86), however the small sample set (67 samples) and sporadic geographical distribution limits the application of this relationship in regional exploration.
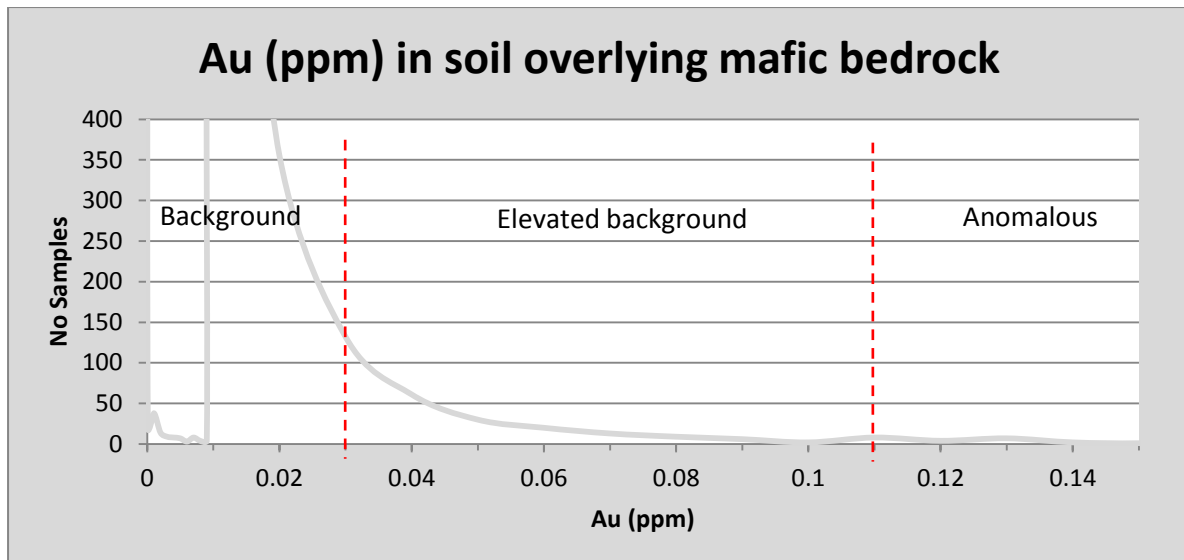
Figure 2 Au vs. no samples plot showing the spread of background, elevated background and anomalous data (the full range of anomalous grades has been excluded from this plot to improve resolution in the mid-range).

Using these plots the following background Au grades are proposed for soil and grab samples.

Lithology Group	No. samples	Mean Average Grade (ppm)	Highest grade (ppm)	Minimum Background (ppm)	Maximum Background (ppm)	Anomalous (ppm)
Granite	381	0.01	1.02	0.01	0.03	>0.04
Felsic	1089	-0.01*	7.65	0.01	0.05	>0.15
Intermediate	8071	0.02	9.36	0	0.03	>0.10
Mafic	2510	0.02	3.84	0.01	0.03	>0.11
BIF	113	0.02	0.64	0.01	0.03	>0.10
Silicified units	1	0.10	0.10	n/a	n/a	n/a
Q-rich sediments	946	0.48**	359.11	0	0.05	>0.10

Table 1 Summary of non-weighted background and anomaly Au in soil sample data

*Data in <u>red</u> represents a dataset where the mean average sample returns grades below the analytical detection limit

**Data in <u>blue</u> reflects a non-weighted mean average has been excessively biased by anomalous data

Lithology Group	No. samples	Mean Average Grade (ppm)	Highest grade (ppm)	Minimum Background (ppm)	Maximum Background (ppm)	Anomalous (ppm)
Granite	52	0.04	0.39	0	0	>0.02
Felsic	27	4.68*	54.75	0.04	4	>5
Intermediate	245	1.16*	29.94	0.01	6	>7
Mafic	132	0.89	32.11	0.01	6	>10
BIF	52	0.13	1.02	0.01	0.11	>0.14
Silicified units	23	1.32*	20.58	>0.01	>0.01	>0.01
Q-rich sediments	91	1.91*	24.75	0.02	3	>5
Schist	9	0.01	0.03	0.01	0.02	>0.03

Table 2 Summary of non-weighted background and anomaly Au in grab sample data

*Data in <u>blue</u> reflects a non-weighted mean average has been excessively biased by anomalous data

Statistical analysis of all dataset yielded a highly skewed dataset (figure 3), with the vast majority of samples returning assays at or near the lower detection limit for that sampling programme. Some complexity was noted at very low Au grades however this is deemed to be a factor of the different detection limits used by different operators, rather than reflecting real differences in the background Au grades.
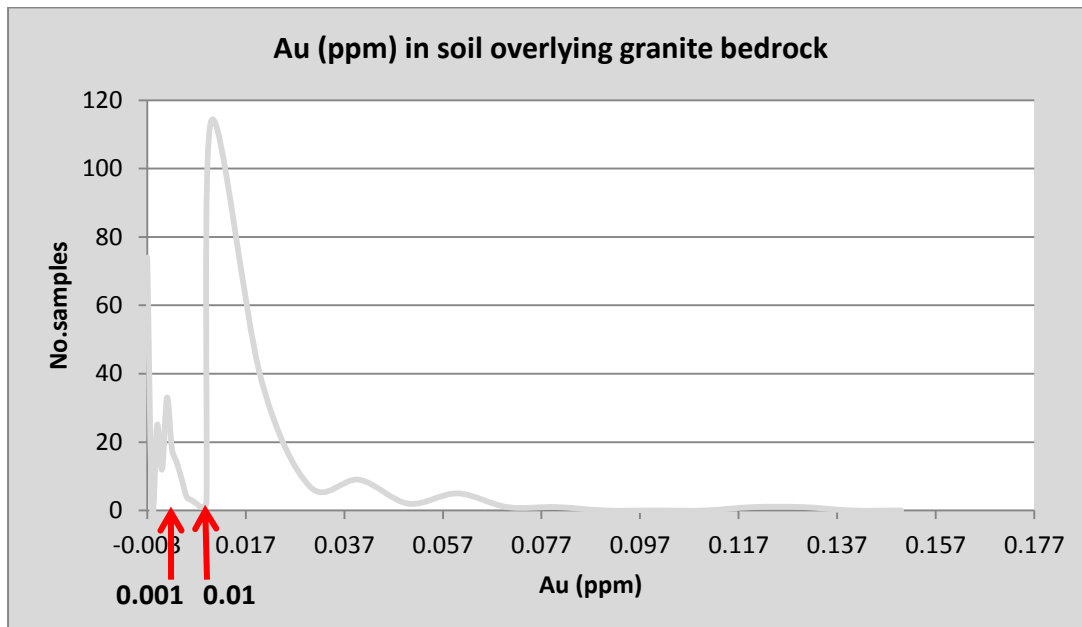

Figure 3 Au vs. no. samples plot showing the effect of variable detection limits* (DL) on background Au grades

* The majority of samples were analysed with a DL of 0.01ppm Au, however a small subset of the data was analysed using a DL of 0.001ppm Au. Anomalous grades have been excluded in this plot to highlight the complexity in the background.

4. GIS Interpretation

Thematic maps for each lithology were drawn in MapInfo using the data given in Tables 1 and 2. In addition to defining sub-background, background and anomalous ranges, an elevated background range was also plotted to account for the difference between the maximum background and the minimum anomalous grade.

The line sampling pattern used by the AuVista soil sampling highlighted a number of areas with anomalous or elevated background, most of which are sited over known exploration targets. In a number of instances (typically the resource areas or the higher ranked regional targets), a linear soil anomaly was also accompanied by a trail of anomalous grab samples, enabling the rough estimation of prospect extent. **However soil anomalies have also been identified in areas that have not been subject to a grab sampling programme; these areas are recommended for future ground truthing**. Similarly the study also highlighted anomalous (or elevated background) trails that project into areas with no existing sample set. These areas are also recommended for sampling programmes. The following section discusses the key areas of interest identified by the integrated soil/grab sample analysis.

5. Targets

5.1   Mikei Shear Zone (MSZ)

The mineralisation zones associated with the MSZ have the best-defined soil/grab sample anomalies in the licence areas. As expected the Resource areas generally show an increased concentration of Au in soil.

For the purposes of this report, the MSZ is divided into three sections; East, Central and West (figure 5).
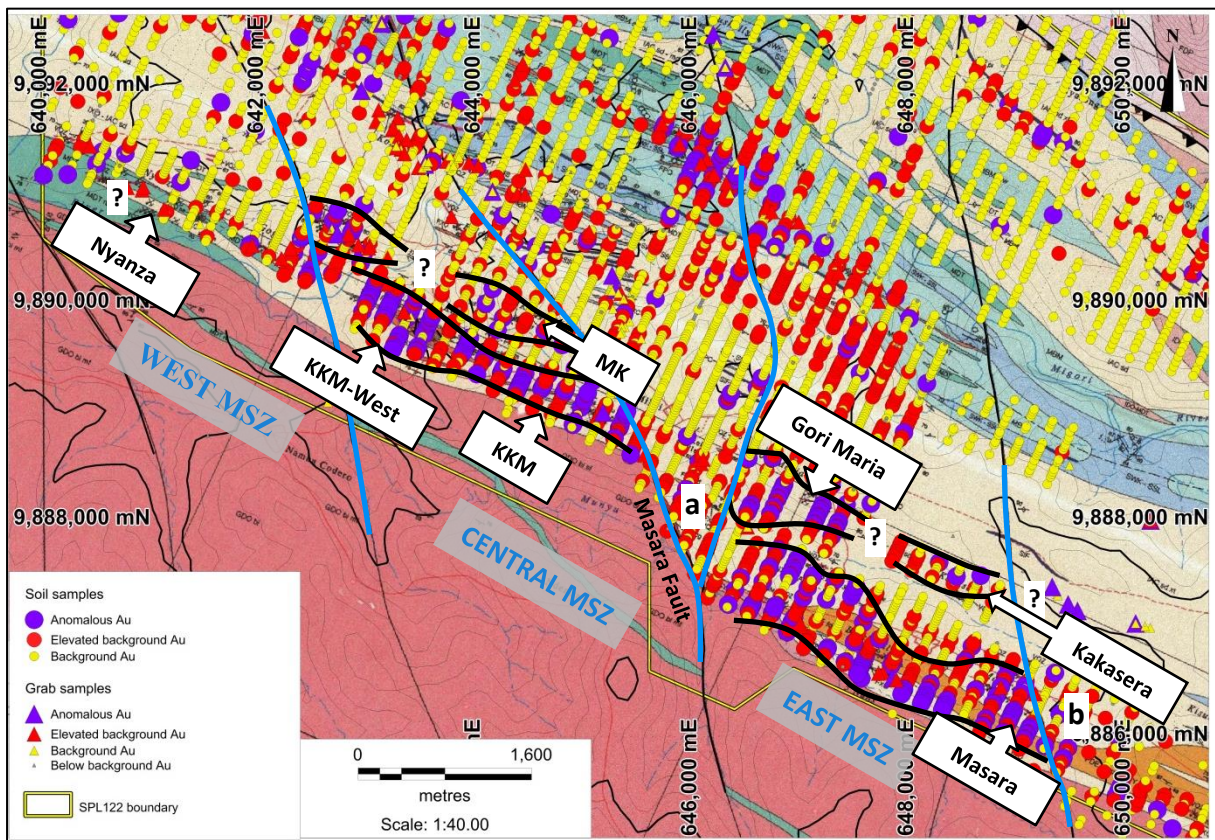

Figure 5 Combined soil/grab anomalies in the MSZ. The shear zone has been divided into West, East and Central segments whose boundaries are defined by the regional NNW trending faults (blue lines). Mineralisation in the MSZ defines two distinct, parallel zones.
Target a - elevated background Au bounded by two faults and intersecting in the Migori granite
Target b – structural setting similar to that of the Main zone (section 5.1.1)

5.1.1   Central MSZ- including MK, KKM and KKM-West resource areas

This area includes the MK, KKM and KKM-West Resource areas and Kowere regional target (figure 6). As you can see from figure 6, the main anomalous zone within the central MSZ area forms two distinct bands;
1. Main Zone (figure 6 (a)) and;

9

2. North Zone (figure 6 (b)).

The Main Zone is a linear belt that strikes parallel and adjacent to the Migori granite. It is a continuous zone of anomalous Au in soil over a strike length of approximately 3.5km and is 600m wide at its thickest point. The main zone envelopes both the KKM and KKM-West Resource areas. The presence of such a defined Au anomaly over the existing resource areas demonstrates the effectiveness of the soil exploration programme and the statistical methods used in this study.

The North Zone runs parallel to the Main Zone for approximately 2.7km but is discontinuous. The North Zone encompasses the MK Resource area and the Kowere regional target.
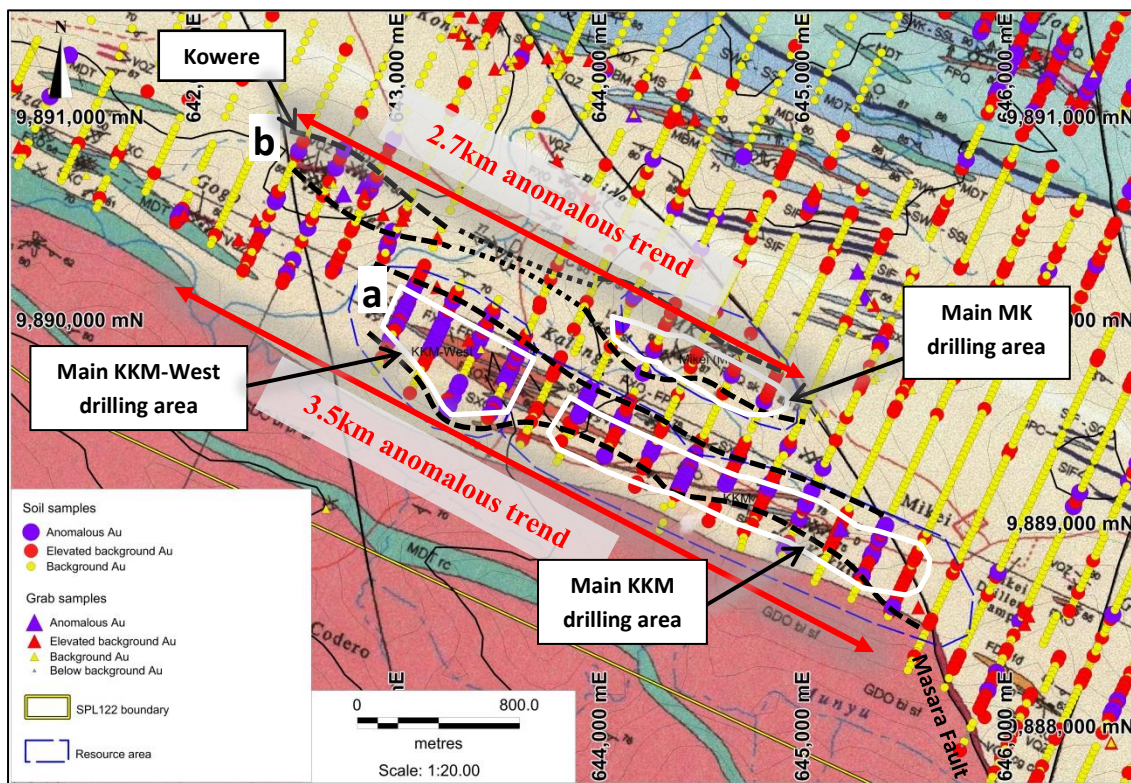

Figure 6 Central MSZ showing the Main Zone (a) and North Zone (b) – 2 bands of anomalous soil geochemical results bounded by black dotted lines.

This exercise confirms Kowere regional target as high priority for further exploration. In addition to promising trench and core intersections (trench samples up to 32 g/t), Kowere shares a similar structural setting to MK; both form part of the North Zone of mineralisation in the MSZ and are situated immediately adjacent to a NNW-trending fault.

5.1.2   East MSZ- Gori Maria resource area and surrounding regional targets

This area includes the Gori Maria Resource area and the Steels-Kakasera and Three Nuns-Blackhalls-Masara regional targets (figure 7). As with the Central MSZ, anomalous Au values occur in two distinct bands and can be correlated laterally with the Main and North Zone anomalies identified at Central MSZ. Unlike the anomalies identified in the Central MSZ, the Au anomalies within the

Eastern MSZ area do not encompass RRR's existing defined JORC mineral resource areas, apart from Gori Maria.

The presence of this 3.5km Au anomaly over areas which does not currently have definition drilling is extremely significant for RRR's regional exploration programme, and follow up mapping and trenching sampling is recommended to locate and define the source.

Applying this new understanding of the MSZ supports further examination of the Steels and Three Nuns-Blackhalls-Masara regional targets, as they can now be placed within the context of the licence's principal Au source (structural setting).
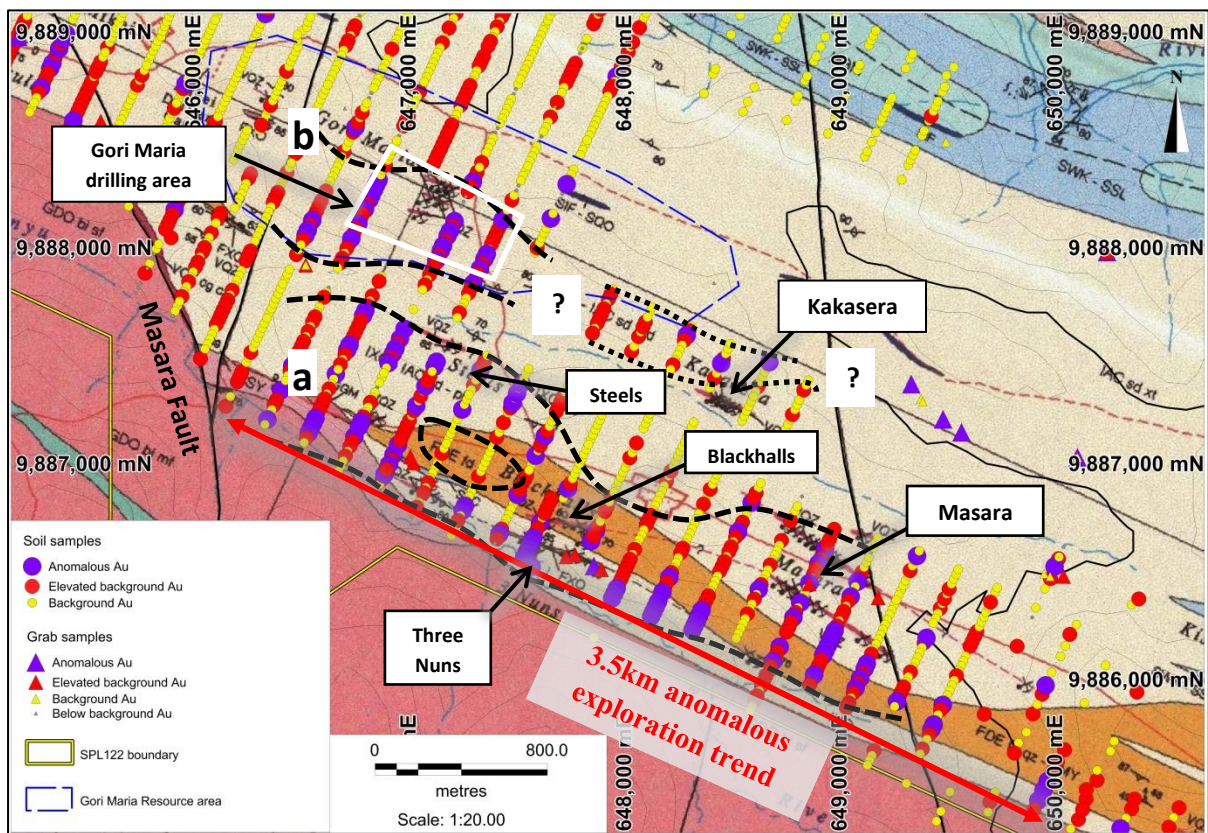

Figure 7 Soil and grab anomalies in the East MSZ continue to show the Main and North Zones of mineralisation, although lateral continuity to the east or Gori Maria is uncertain due to the small sample set in this area.

5.1.3   West MSZ- Nyanza resource area

Nyanza (NZ) is unusual in the licence area, in that it is the only defined Resource area lacking an overlying soil anomaly halo. Part of the reason for the lack of a defined soil anomaly halo over Nyanza is the fact that the soil data set stopped short of the main Nyanza resource area. It is not known why sampling was stopped short, but is most likely due to the historic workings being present at the time of the soil survey. Even when considering that the centre of the Nyanza resource area was not soil sampled, the soil samples taken in close proximity to it, within 200m, do not present elevated or anomalous Au values in soil.

The lack of an extensive Au soil anomaly surrounding the licence's most prospective resource area could imply one or more of the following:

1. Soil transportation features on mafic rocks is very localised compared to other lithologies studied
2. The mineralisation style is different at Nyanza; perhaps narrower (this is supported by drilling - Nyanza is narrower and higher grade than the other resource areas and presents a brittle-ductile structural setting)

Of significant note there is a cluster of anomalous soil and grab samples on the western end of the Nyanza Resource area, directly along strike of the mapped quartz vein (figure 8 (a)). The location of these samples could help direct near resource exploration at Nyanza and should be investigated.
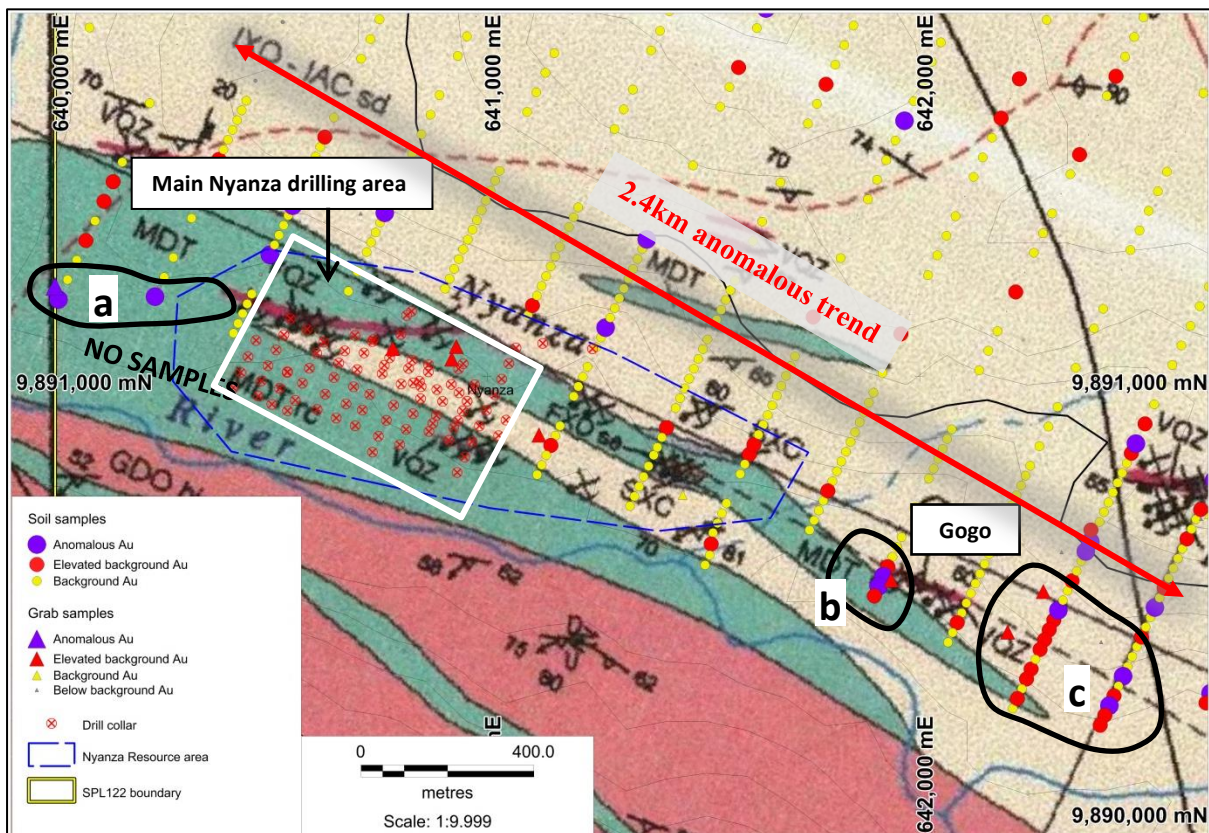

Figure 8 Soil/ grab anomalies at West MSZ, showing an anomalous sample trend west of the NZ vein (a), anomalous samples at Gogo (b) and increased Au in soil grade east of Gogo moving towards KKM-West (c)

6. Conclusions

The main findings of the surface sample analysis exercise can be summarised as follows:

- Different lithologies return differing values of background and anomalous Au. Lithologies should be initially analysed in isolation to determine appropriate background/anomalous grades before being interpreted as a whole dataset

- Mineralised areas will often have a core of anomalous material directly overlying the mineralised zone. This core is surrounded by a 'halo' of material with elevated background, caused by localised Au mobility and mass movement processes

- Mafic and felsic soils tend to have the highest minimum anomalous grade, but background levels tend to be broadly similar throughout the lithologies

- If greater resolution is required on the controls of lithology on background vs. anomalous grade, it is recommended that the soil logs from the AuVista dataset are reanalysed; the current process of allocating lithologies using MapInfo assumes regional heterogeneity that may not bear out on the scale of sample programmes

- Au and Ag show a strongly positive correlation, with a correlation coefficient of 0.86

- The presence of defined Au anomalies over all the resource areas demonstrates the effectiveness of both the soil sampling programmes carried out by RRR and previous companies and the statistical methods used to plot the information

- A new improved trend is proposed for the Mikei Shear Zone, which identifies two parallel zones of mineralisation:
    - The Main Zone, containing KKM and KKM-W Resources in addition to the Steels and Three nuns-Blackhalls-Masara known regional targets
        - Total Main zone Au anomaly length is 10.6km, over 2 sections
    - The discontinuous North Zone contains the Mikei and Gori Maria Resources, and possibly extends east to include the Kakasera vein, also another known regional target
        - Total North zone Au anomaly length is 5.5km

- 12 new exploration targets were identified from this preliminary study, and will form the basis of future regional exploration work
    - Four of these targets are identified within the MSZ and represent potential extensions to the existing Resources
    - Six targets are located in SPL122 and show moderate-high Au anomaly intensity. (one is in an area where potential Riedel Shearing exists)
    - Two other low-moderate intensity Au anomalies are located in SPL202 and may represent extensions around known regional targets

13

- o 15 existing regional targets reprioritized after anomalous and background values were determined according to major lithologies across the licence areas, including a 3.5km Au anomaly over an area with scarce exploration to date

7. Future Work

The following work is recommended to further investigate zones around the identified anomalous areas.
- o Mapping of three new and two existing high priority regional targets
- o Infill soil/grab sampling: West of Nyanza, between Gogo and KKM-West, Kowere and MK, Gori Maria and Kakasera
  - o Extend soil samples over Nyanza to determine a baseline Au level over a known mafic mineralised area
  - o Consider extending soil sample grid @ the western MSZ further south to the granitic mafic contact
  - o Consider infill sampling over mafic lithologies to constrain anomalous grades
- o Trenching/drilling;
  - o Firstly trench, and if successful drill: two of the new regional targets identified in SPL122 (where faulting or potential Riedel shearing is apparent); Francis regional target in SPL202 where historic drilling has been carried out but the mineralisation not intersected; and three of the known regional targets in SPL122 where very high anomalies have been identified or historic production has taken place.
  - o To be conducted over the soil and grab sample Au anomaly on the western extension of Nyanza with a view to increase existing resource
- o Expand geochemical analysis to include other key pathfinder elements including, Ag, As, Cu, K, Pb, Sb and Zn.
  - o Seek correlations between Au and elements to determine path finders for Au in Migori
- o Further interpretation of existing geochemical work is required to improve confidence and usefulness of the data as a tool for future exploration across the greenstone belt