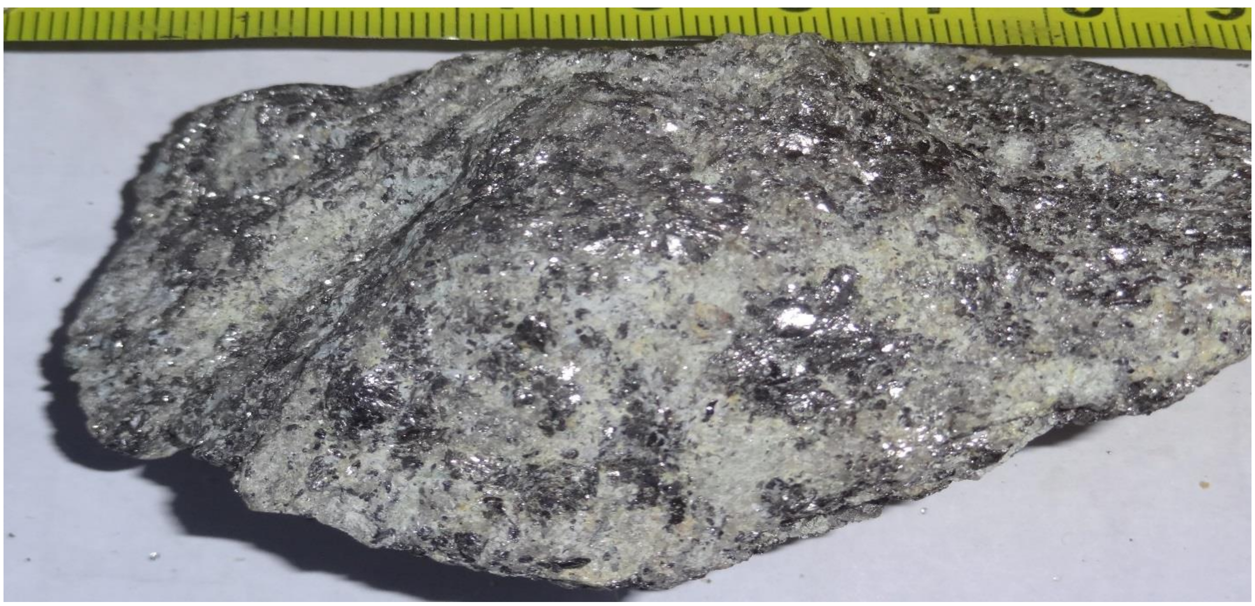
SOOTEXMINERAL INVESTMENT LIMITED

REPORT ON GEOLOGICAL EVALUATION OF GRAPHITE MINERALIZATION POTENTIALITY IN PL9906/2014, PL 9994/2014, PL10703/2015, PL 10809/2016 & PL10810/2016

LOCATION: RUANGWA, SOUTH EAST OF TANZANIA



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SUMMARY

The geological mapping was conducted in the five (5) Prospecting Licenses (PLs) which were PL99062014, PL9994/2014, PL10703/2015, PL10809/2016 and PL10810/2016 for SOOTEXMINERAL INVESTIMENT LIMITED in Ruangwa District from January to April 2019 with the aim of delineating areas potential for developing graphite operations.

Several flake graphitic hosting outcrops were encountered with different strike lengths varying form 0.1km to 5km striking NE-SW with thickness ranging from 0.5m to 60m. The prominent graphitic hosting rocks that had been encountered were graphitic gneiss and Graphitic Quartzite. The graphite found in those rocks were observed to be crystalline flake graphite sized from coarse to very coarse flakes. The graphite occurrences in all PLs contain flakes were observed to be more than 0.15 mm in size, which is regarded as the best quality large flake graphite.

During mapping 18 prominent graphite outcrops were detected and most of them were from NW PLs. The Total Graphitic Carbon (TGC) grade ranging from 1.8 to 19.9% were analysed and 92.7% of these assay results were grading above 3%. Strike length of each prominent graphite hosting rock was tested and turned out with grade above the average cutoff grade of 3%.

Based on the graphite extension, TGC grade and flake size the project area is potential for graphite mineralisation. EM, trenching followed by drilling activities was following up exploration methods that were suggested to delineate graphite mineral resources of the project.

The NW PLs has been deduced to have manganese (Mn) potentiality as assayed samples turned up with grades greater than 5%. Also Iron, Nickel and Chromium were found in their proper hosting rock and collected samples turned up with elevated values from their background values. These results and field observation suggest further follow up for these metals.

1.0 INTRODUCTION

1.1 General Introduction

The report was prepared for Ally Mbarak Mohamed on behalf of SOOTEXMINERAL INVESTMENT LIMITED in five (5) Prospecting Licenses (PLs) covering the area of 258.6km^2. The PLs include PL 9906/2014, PL 9994/2014, PL 10810/2016, PL 10703/2015 and PL 10809/2016 was evaluated for graphite mineralisation potentiality and other economic minerals. Field geological mapping was done from January 31 to April 21, 2019. Geological mapping was conducted following the planned traverse lines which were running from SE to NW crossing the main foliation of the area.

A total of 116 samples were collected from those five PLs and analysed in the GST laboratory in Dodoma. The percentage of Total Graphitic Carbon Content (TGC) were analyzed by Thermo gravimetric method, samples for collected base metal analysis were analysed by XRF method and gold were analysed by Fire assay with AAS finish.

1.2 Location and Accessibility

The geological mapping was conducted within the three (3) Districts of Lindi region in South Eastern Tanzania. These Districts are Ruangwa, Kilwa and Lindi Rural. The main graphite potential area that has been revealed by the current conducted geological mapping is located in two wards of Nanjilinji and Nambiranje. This area is in NW of the tenement and is crossed by Mbwemkuru main river (**Fig.1 & 3**).

The project area is located some 210km NW of Mtwara port. A distance of 144km is bitumen road B6 from Mtwara to Nanganga (Fig.1 & 2) while 66km is well maintained gravel road from Nanganga junction to site via Ruangwa Township. It is about 4hour driving form Mtwara port to site. There are networks of track roads leading to each PL (**Fig.3**). As usual accessibility is a bit challenge during rainy season which starts from March and ending on May.

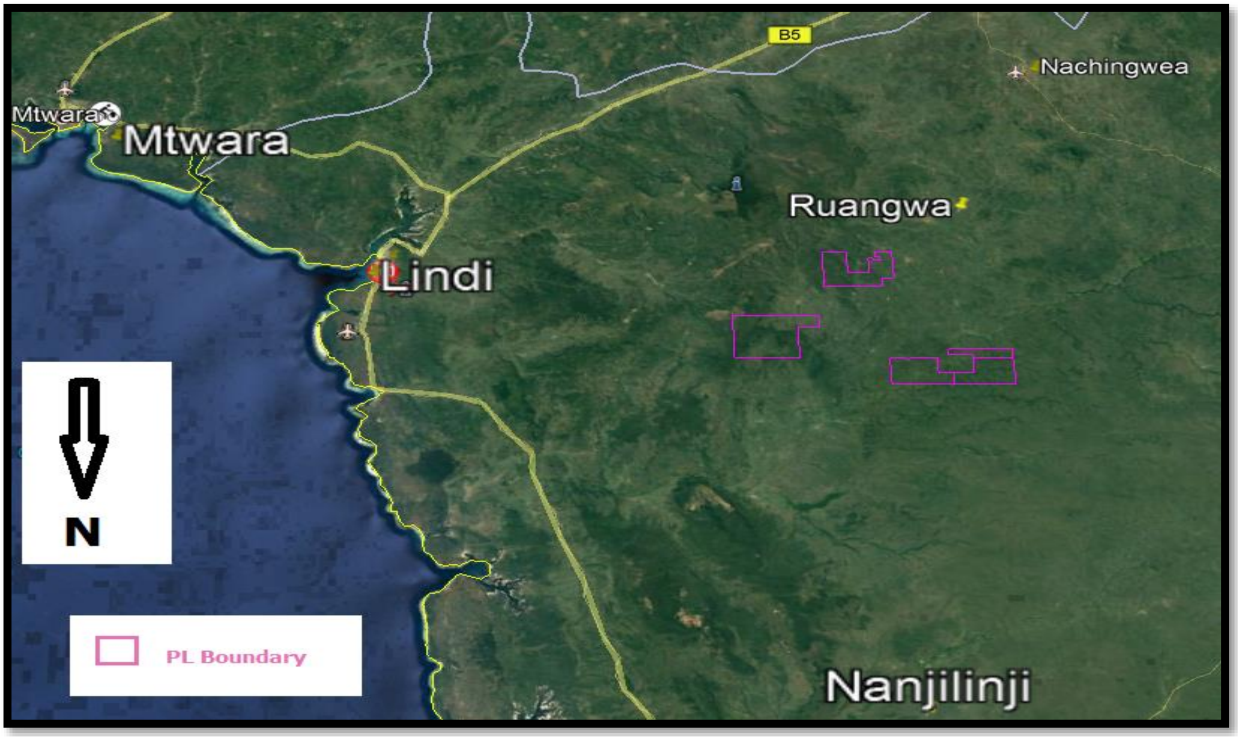

Figure 1: A map showing the Sootex PLs (in purple lines) Location with respect to the major municipalities of Mtwara and Lindi and other township of Southern East Tanzania.

Figure 2: Photos showing access to the project area. A and B well maintained bitumen road of southern corridor connecting Mtwara port to project area.

1.3 Graphite Mineralisation

Graphite is the natural occurring crystalline carbon (C). It has both metal and non-metal properties (Simandl, 2009). Graphite is formed by graphitization of organic matters preserved in sediments during regional or contact metamorphism that is syngenetic or precipitation of C-O-H fluids during retrograde metamorphism that is epigenetic (Bullock & Morgan, 2015). Syngenetic process results into flake or microcrystalline graphite while epigenetic form vein or lump type graphite (Moss, 2016). In the project area, only in Lindi the crystalline flake graphite are recognized to exist (GST, 2015). Crystalline flake graphite can be processed into grapheme that can be used to make expensive electronic goods for the modern generation (Olson, 2015).

Flake type graphite, also known as crystalline, contains ordered graphite crystals that are disseminated in the host rock. Flake graphite can be further divided on the basis of crystal size into: Coarse Flake 150 to 840 micrometers; fine flake 44 to 150 micrometers and ultrafine flake 5 to 44 micrometers (Moss, 2016). Due to its unique chemical and physical properties makes graphite a major industrial raw material for fuel cells, lithium-ion batteries, aircraft wings, nuclear industries and green energy production (Rosing-Schow et al., 2017).

According to Olson (2015) the world natural graphite production was estimated at 1.17 million tonnes in 2014 with most of it originating from China (67%), India (15%) and Brazil (7%). Recently, due to its rarity, unique chemical and physical properties, its use in high technologies and green energy initiatives, graphite has been listed as one of the twenty strategic minerals by the United States of America (USA) and European commission (Commission, 2014; Sunkari & Zango, 2018).

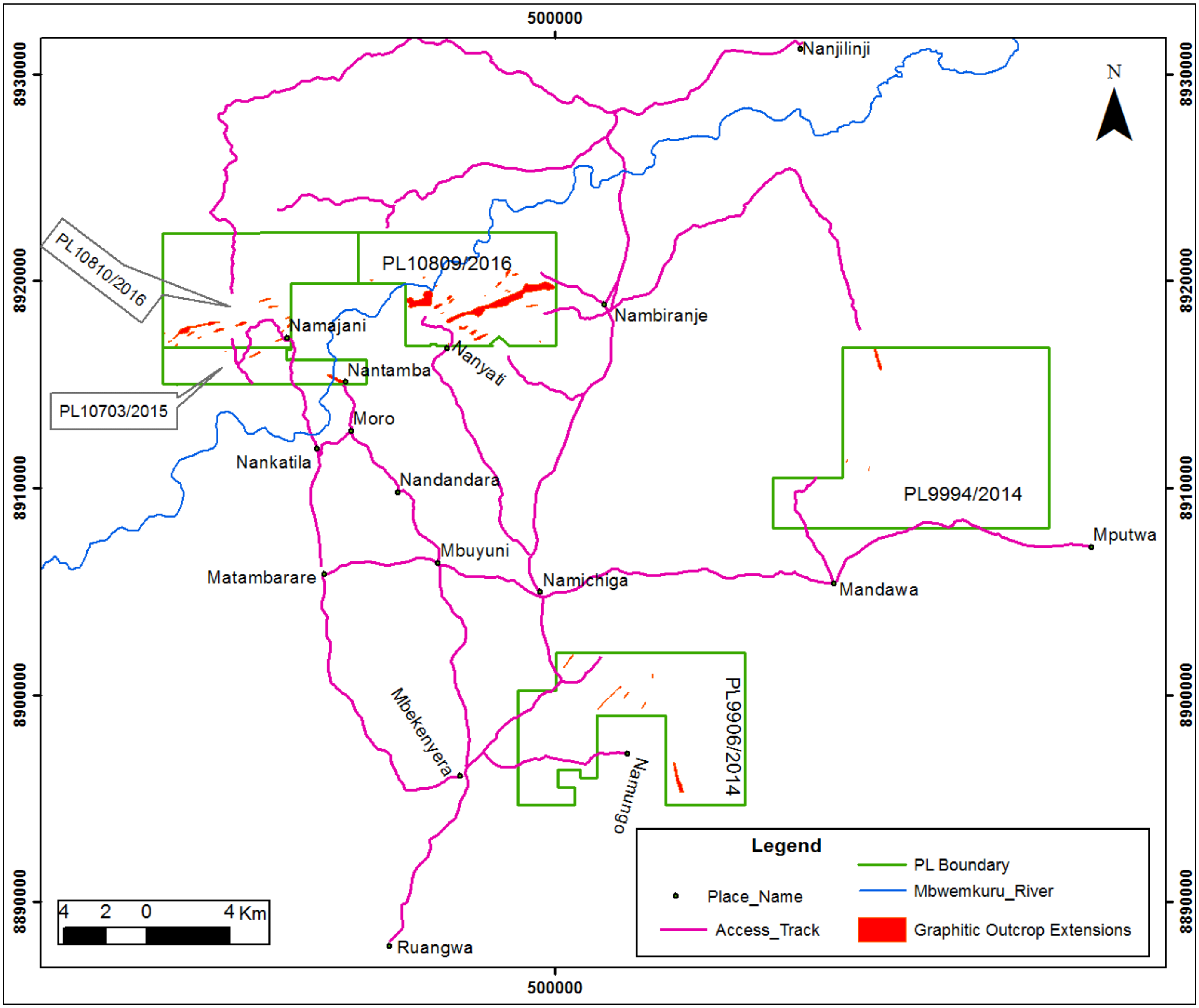

Figure 3: Project map showing access to the PLs

1.3 Regional Geology

The study area is within two QDSs of QDS 282 and QDS 283. The main lithologies are of metasedimentary rocks of Neoproterozoic Mozambique Mobile Belt (NMMB). In the West and central part and Cretaceous sandstones to the East (**Fig. 6, 7, 8, 9 &10**). Sandstone is barren for graphite mineralisation as they are still sedimentary rocks.

NMMB also known as East African Orogen (EAO) (Kroner et al., 2003; Thomas et al., 2014; GST, 2015). The EAO represents the East African part of composite Pan-African orogenies (Kroner et al., 2003) that stretches from the Arabian Nubian Shield (southern Israel, Sinai and Jordan) down to East Antarctica through East Africa, Madagascar, south India, and Sri Lanka (Stern, 1994; Jacobs et al., 1998; Pinna et al., 2004; Fritz et al. 2013; GST, 2015). This orogeny formed following the southward closure of the Mozambican Ocean by collision between East and West Gondwana crustal blocks at around 630 million year ago(Ma) (Feneyrol et al, 2013; Thomas et al., 2014; GST, 2015). The EAO is comprised of two major belts in the Northern and Southern part which are Arabian Nubian Shield (ANS) and Mozambique Mobile Belt (MMB) respectively.

MMB also known as the ‘Pan-African Gems or Graphite Belt (Dissanayake & Chandrajith, 1999) is essentially consists of medium- to high-grade gneisses and voluminous granitoids. It extends southwards from the Arabian-Nubian Shield into southern Ethiopia, Kenya and Somalia via Tanzania to Malawi, Mozambique, Madagascar and Antarctica continent (Kröner & Stern, 2005).

In Tanzania NMMB is divided into two domains which are Western Granulite Domain (WGD) and Eastern Granulite Domain (EGD) based on their protolith type. Both domains were subjected to the same tectonothermal event at around 640 Ma (GST, 2015). The WGD are comprised of older protolith of Meso to Neoarchean while the EGD granulites are comprised of Meson to Neoproterozoic protoliths also including juvenile lithologies.

According to Thomas et al (2014) the project area is within the EGD. The EGD is dominantly comprised of granulites and apart from granulites are marbles, quartzite, gneiss, schist, and graphite bearing gneisses as well as post orogenic granites and gemstone bearing pegmatite (GST, 2015).

1.4 Geology of the Project Area

The study area is covered by crystalline basement or metasedimentary rocks that form part of Neoproterozoic Mozambican Mobile Belt (BMMB) also known as East African Orogen (Thomas et al, 2014.). Main foliation of the area is NE-SW (Phinna et al., 2004; Thomas et al., 2014). The metasedimentary units include Quartz feldsparthic gneiss+/-garnet and Biotite gneiss +/-garnet; these two rock units are forming the main lithologies of the project area. Graphitic quartzite +/- blue kyanite, Graphitic gneiss and graphitic marble, Amphibolite gneiss with +/-garnet, Quartzite and Marble and igneous parentage include Pyroxenite and Peridotites.

The sedimentary sandstone of cretaceous is mostly encountered in the Eastern parts of PL9906/2014 and PL9994/2014.

The foliations of the area are almost the same as all the lithologies striking NE-SW also noted by (Pinna et al, 2004; Thomas et al., 2014). The dip amount is shallow, moderate and steep with NE to SW striking.

2.0 METHODOLOGY

2.1 Geological Mapping

During geological mapping execution traverse lines were planned oriented to NW-SE to cross the main lithologies in the project area (**Fig.4**). The line intervals were 1km apart. According to Thomas et al (2014) the foliation of the area is striking NE-SW so these traverse lines were crossing as many lithologies as possible. Walking was done following the plan of the day traverse line by zigzagging but not exceeding 0.5km from both side of the traverse line.

Outcrops encountered during mapping were recorded on the field note book on site and then in the Excel file in the camp. Inevitable items that were noted down were: rock type, texture, and visual graphitic grade in percentage if any, extension of the graphite outcrop if well observed, outcrop attitude(dip amount and dip direction), sample number if sample was decided to be taken (Table 1). Samples of about 1kg each were collected for TGC determination, XRF and Fire assay from the outcrop with thickness 2000mm and above.

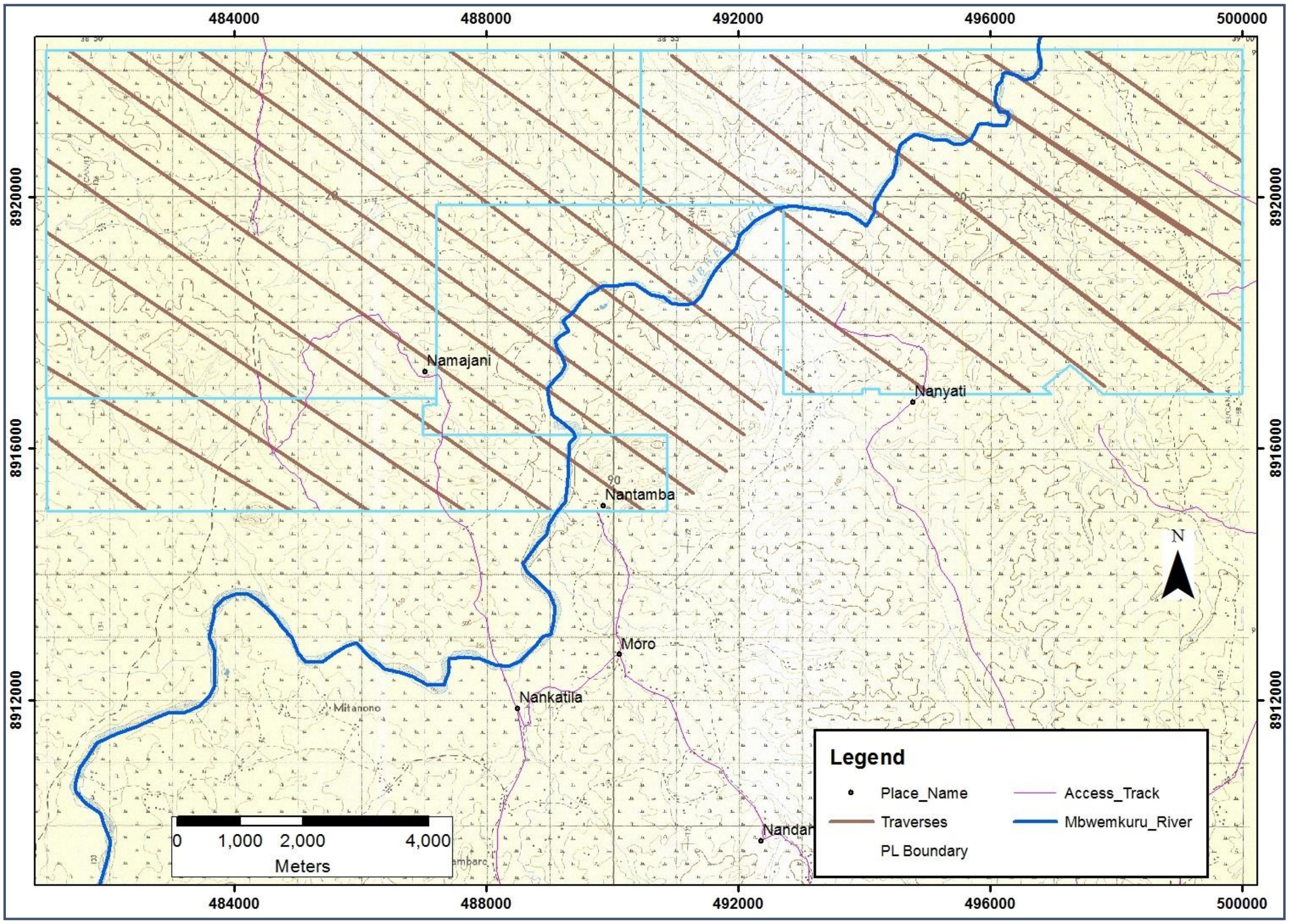

Figure 4: Map of the NW PLs showing traverse lines

2.2 Laboratory Analysis

A total of 116 original rock samples were taken for analysis at the GST laboratory. Nighty two (92) samples were for TGC analysis in which 82 samples were original samples and ten were quality control and quality assurance (QC/QA) samples. Thirteen (13) samples were for base metal analysis by X-Ray Fluorescence (XRF). Five (5) samples were for gold analysis by Fire assay with Atomic Absorption Spectroscopy (AAS) finish. Six (6) samples were taken to the petrographic analysis to determine graphite flakes size and mineral content and characteristics.

For QC/QA) five (5) blank samples and five (5) duplicate samples were added in the sample regime. Graphite sample were analysed by Thermo gravimetric method also known as Loss on Ignition (LOI) method. The results were presented in terms of percentage (%) grades of Total Graphitic Carbon (TGC) (**Table 1).** XRF samples came up with two units which were percentages (%) for major elements and parts per million (ppm) trace elements **(Table. 2).**

3.0 RESULSTS AND INTERPRETATION

3.1 Types of Rocks Encountered

Different types of rocks were observed and recoded during geological mapping. The most emphasize was done on the graphitic outcrops. Three (3) graphitic rocks were encountered, different metasedimentary rocks were observed, intrusive rocks observed in the project area were ultramafic. Lateritic regolith was observed in PL 10703/2015. Sedimentary rock units of the cretaceous were chiefly observed in the eastern part of the project area (**Fig.6, 7, 8, 9& 10**).

Graphite lithology: Three (3) graphitic lithologies with coarse flake graphite were encountered during geological mapping exercises. These graphitic lithologies are: Graphitic quartzite with more or less blue kyanite minerals (**Fig.5**), Graphitic gneiss and graphite bearing marble. The two lithologies that are graphitic quartzite and graphitic gneiss are of high grade and forming large extension up to 60m and 5km tick and strike length respectively on the project area (**Table 1** and **Fig. 6, 7, 8, 9& 10**). Some of these two prominent graphite rock that is graphitic quartzite and graphitic gneiss form pinnacles and small hills parallel to the main foliation which is NE-SW in the project area particularly in PL10809/2016 (**Fig.7**). The flake graphite bearing marbles are of low grade less than 2% (**Table 1**).

Ultramafic rocks: Two types of intrusive ultramafic lithologies were found in the project area by mapping conducted which were pyroxenite (Px) and peridotite (Per). These rocks were sampled for base metals such as iron, nickel and chromium. The results for base metals are presented in **Table 2**. The surface extension and assay results for sampled rocks are encouraging further follow-up stage (**Table 2 & Fig.6 &7**). They are prominently found in PL10703/2015 and PL10810/2016.

Cretaceous Sandstone (SS): These were mostly observed in the eastern part of the project area. They are deprived of graphite mineralisation as they are young sediments and unmetamorphosed. They occupy large portion of PL9906/2014 and almost 80% of PL 9994/2014 **(Fig.9 & 10**).

Country Rocks: These are the barren rocks in terms of graphite and base metal as per field observation made. These rocks were named as Quartz feldsparthic gneiss (QFg), Biotite gneiss

(BGn), White quartzite (QTz) and Marble (MB) (**Fig.6, 7, 8, 9 &10**). They form topographic frame work and cover largest portion of the area.

Figure 5: Photo graphitic quartzite with kyanite minerals (green circles) lead black coloured is graphite minerals

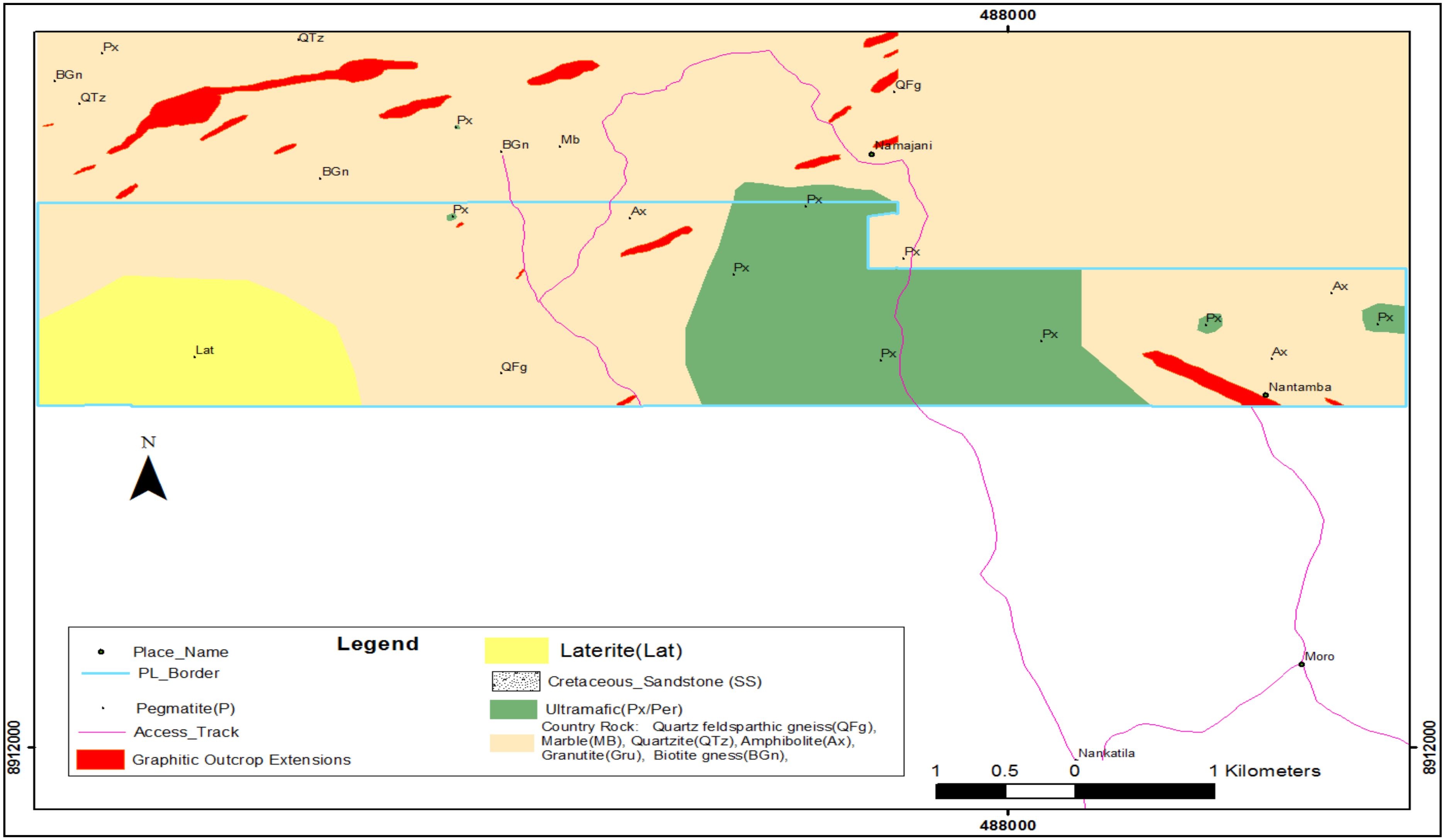

Figure 6: PL10703/2015 showing different rock units observed during geological mapping

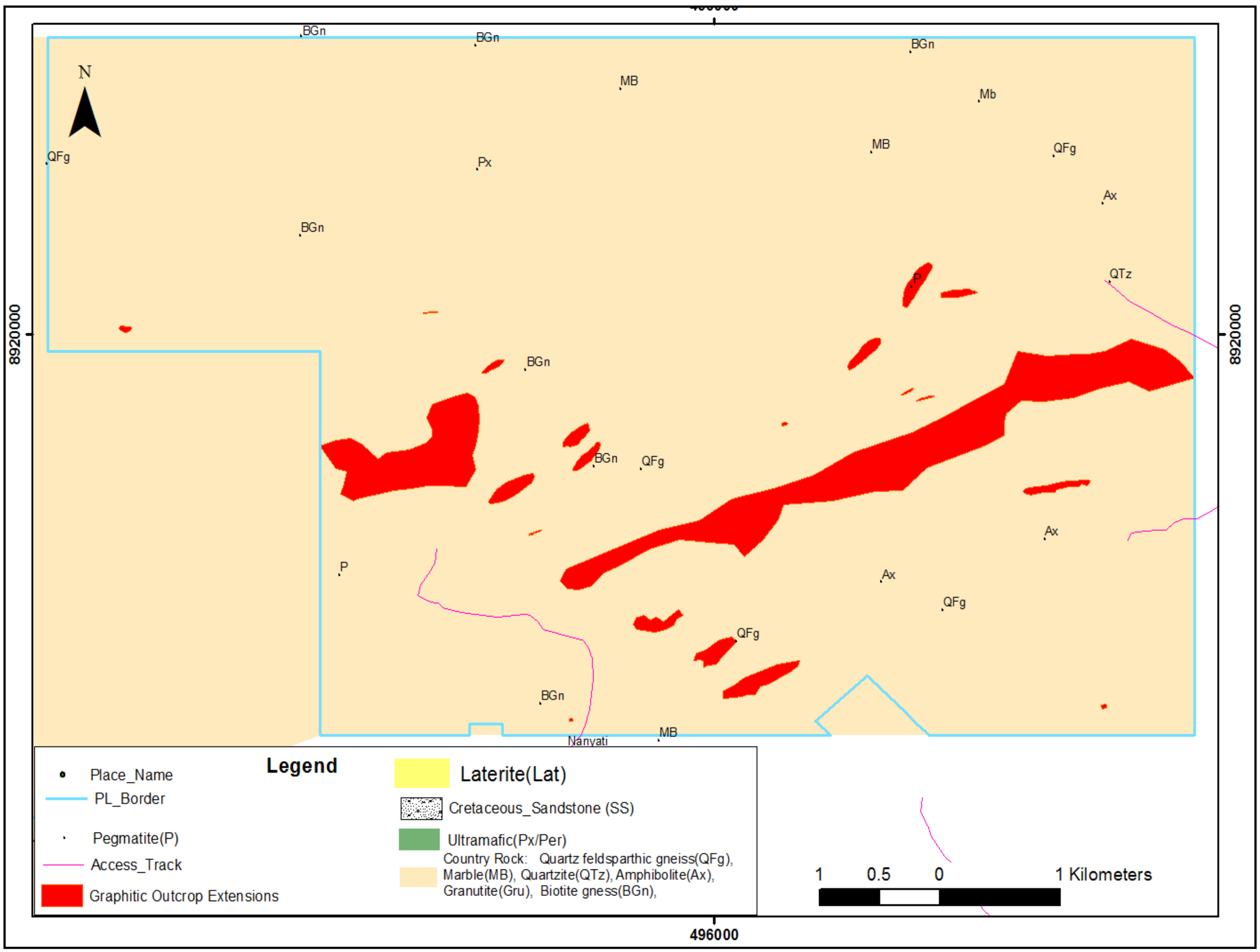

Figure 7: PL 10809/2016 map different outcrop extension on the surface

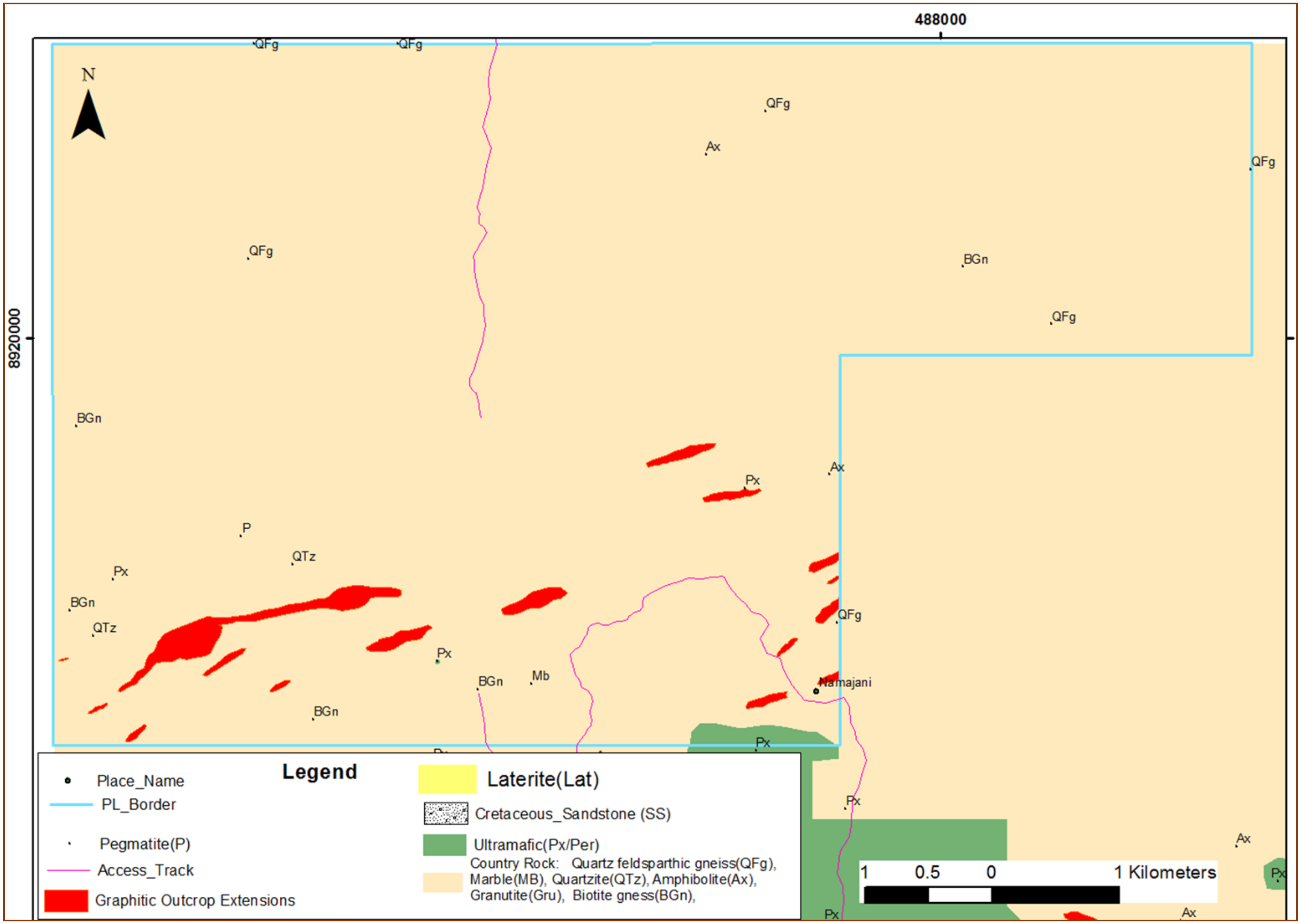

Figure 8: PL10810/2016 showing graphitic rocks and other rocks

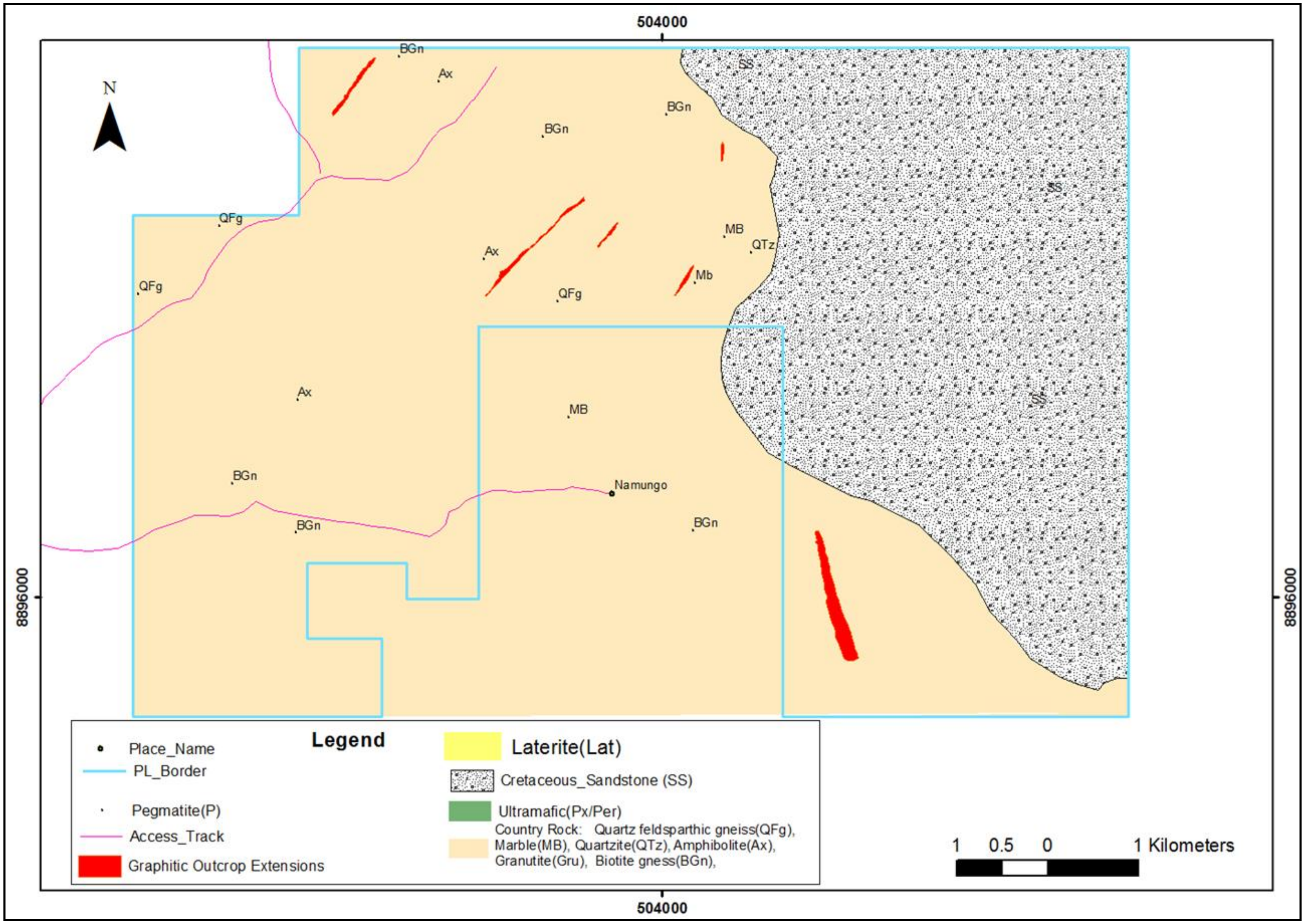

Figure 9: PL9906/2014 showing graphitic rocks and other rocks

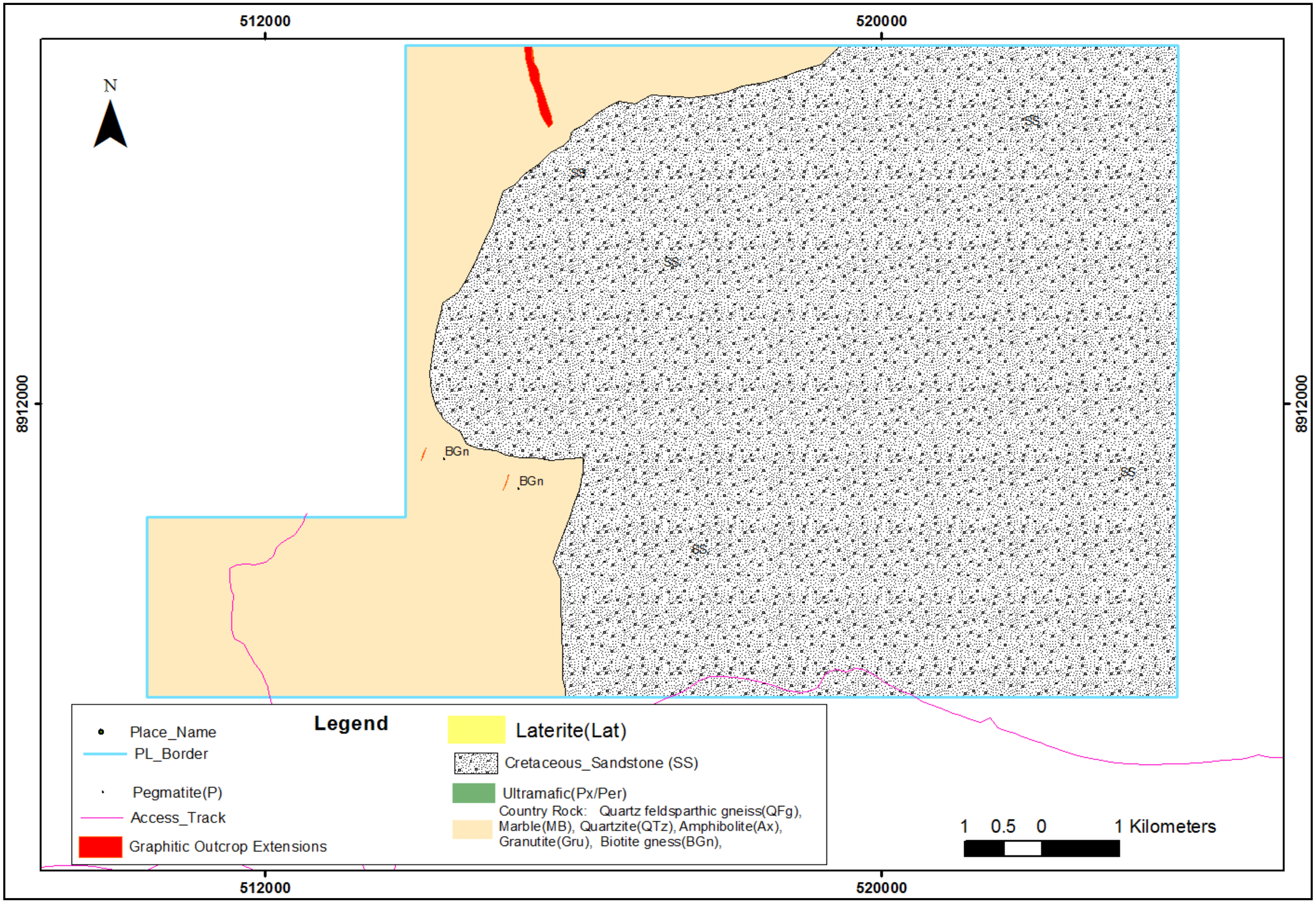

Figure 10: PL9994/2014 showing graphitic rocks and other rocks

Table 1: Graphite Assay laboratory analysis results with their respective field visual graphite grade

Stop	X	Y	Z_m	Rock_code	Thickness	Vgrade_%	Strike	Dip_dir	Dip_Amount	Sample_NO	Grade(%)	Analysis
45	505762	8896495	503	GrGn	4	6				MD009	9.67	TGC
52	504659	8900946	348	GrGn	3	5	0	90	30	MD010	7.47	TGC
72g	504268	8899511	361	GrGn	5.7	4				MD011	4.94	TGC
77	504358	8899349	388	GrGn		5				MD012	1.84	TGC
80	503435	8900016	362	GrQ	10	7				MD013	5.19	TGC
83	502900	8900209	365	GrGn	4	5	30	120	15	MD014	4.83	TGC
92	500657	8901722	373	GrGn	11	8				MD015	8.19	TGC
139b	515121	8910928	359	GrGn	1.6	3	15			MD016	3.7	TGC
143	514059	8911321	361	GrGn		6	15			MD018	1.72	TGC
195B	498121	8921859	166	MB		1				MD019	31.58	TGC
201A	498010	8920321	186	GrGn		8	90	180	15	MD020	5.8	TGC
204	499999	8919656	194	GrKy		6				MD021	11.65	TGC
205	499822	8919653	188	GrKy		6				MD022	4.68	TGC
206A	499481	8919835	172	GrMn		2	180	270	90	MD023	7.42	TGC
220	497647	8920371	178	GrGn		10		175	35	MD025	7.88	TGC
224	498769	8918790	193	GrGn		8	88			MD026	8.64	TGC
226	498268	8919135	190	GrGn		6				MD027	8.21	TGC
228A	498108	8919327	200	GrQ		3				MD028	4.18	TGC
230	497745	8919496	183	GrKy		3	75	165	39	MD030	4.37	TGC
231	497606	8919546	186	GrGn		5				MD031	4.66	TGC
232B	497230	8919829	166	GrGn		10				MD032	9.23	TGC
239	494813	8916980	213	GrGn		4	90			MD034	6.99	TGC
249c	493096	8918908	162	GrQ	60	4	78	168	26	MD035	3.18	TGC
251	493788	8918989	185	GrKy		4				MD036	6.18	TGC
255	494249	8918759	163	GrQ		5				MD037	8.37	TGC
258A	494509	8918446	181	GrQ	60	5	35	205		MD038	4.39	TGC
259	494926	8918127	188	GrGn		5				MD039	5.1	TGC
263C	495579	8917745	191	GrKy		7	90			MD040	5.37	TGC
264B	496040	8917533	198	GrGn		6				MD041	6.36	TGC
265	496306	8917241	208	GrGn		4				MD042	4.83	TGC
273A	496288	8918394	188	GrGn		6				MD043	12.99	TGC
273D	495991	8918487	176	GrGn		6	90			MD044	7.83	TGC
278A	494920	8919012	172	GrGn		8	90			MD045	8.27	TGC
278B	494851	8919165	169	GrGn	50	5	80			MD046	6.01	TGC
279	494143	8919745	145	GrKy	10.2	5	85	175	35	MD047	6.29	TGC
322A	485962	8919080	195	GrKy	Boulders	5				MD048	7.52	TGC
324	486375	8918768	227	GrGn		5				MD049	8.26	TGC
327	487150	8918252	202	GrGn		10	85			MD050	10.36	TGC
328	487150	8918087	204	GrQ		4				MD051	3.28	TGC
329A	487150	8917887	210	GrGn		5				MD052	6.2	TGC
334A	487164	8917331	193	GrGn		5				MD055	8.07	TGC
336	486788	8917578	205	GrGn	1.5	3	335	65	10	MD056	3.38	TGC
347	484808	8917919	240	TGC		5	70	160	35	MD057	4.38	TGC
349	485404	8917519	223	SChGr		3	65	155	22	MD058	1.9	TGC

Stop	X	Y	Z_m	Rock_cod	Thickness	Vgrade_%	Strike	Dip_dir	Dip_Amou	Sample_N	Grade(%)	Analysis
352A	486606	8917133	194	GrGn		5				MD059	4.8	TGC
356	484355	8917233	245	MB		1				MD060	36.07	TGC
359	483790	8917621	234	GrGn		5				MD062	7.22	TGC
360A	489696	8915074	173	GrGn	18	6	95	185	35	MD063	5.66	TGC
360B	489625	8915132	172	GrGn		4				MD064	4.65	TGC
362	490370	8915032	183	GrGn		7				MD065	6.23	TGC
373	484489	8916160	238	Grky		4				MD069	3.85	TGC
378	484047	8916593	218	GrGn		5				MD071	4.69	TGC
383	482807	8917270	231	GrQMn		2				MD072	3.12	TGC
384	483724	8917637	233	GrKy		5				MD073	3.67	TGC
386A	483340	8917925	241	GrQ		4				MD074	4.59	TGC
386B	483311	8917943	242	GrKy		5				MD075	3.69	TGC
386C	483255	8917965	235	GrGn		10	65	155	44	MD076	3.67	TGC
397A	482382	8917462	241	GrGn		10	75	165	30	MD077	2.98	TGC
397C	482194	8917579	251	GrKy		5				MD078	7.43	TGC
397E	482027	8917711	250	GtGn		6				MD079	6.32	TGC
404	481097	8917471	233	GrQ		4				MD080	2.73	TGC
405	481365	8917085	229	GrQ		5				MD081	5.73	TGC
407	481667	8916884	226	GrGn		5				MD082	5.11	TGC
416	485525	8916452	219	GrGn	20	7				MD084	10.39	TGC
432	485266	8915061	215	GrGn		4				MD085	8.46	TGC
445	499248	8917087	203	GrGn	20	5				MD086	8.33	TGC
451A	497462	8918839	181	GrGn		6				MD088	7.55	TGC
451B	497468	8919044	181	GrGn		5				MD089	6.44	TGC
452B	497220	8918765	180	GrGn		5				MD090	3.67	TGC
452D	497120	8918931	180	GrGn		7	72	162	31	MD092	19.92	TGC
453A	496579	8919299	170	GrGn		6	73	163	32	MD093	8.82	TGC
457A	498750	8919705	178	GrKy		5				MD095	8.28	TGC
457B	498893	8919608	182	GrGn		6	80	170	30	MD096	8.09	TGC
464A	494753	8921664	160	MB		T				MD097	17	TGC
467A	496116	8922120	154	GrGn	2.5	3	35	125	25	MD098	2.71	TGC
467B	496084	8922170	153	MB		T				MD099	28.04	TGC
472B	493623	8920169	148	GrGn		5	70			MD100	8.43	TGC
477	493721	8919349	180	GrQ		4				MD101	4.67	TGC
493	491087	8920049	183	GrKy		6				MD102	9.07	TGC
504A	502223	8899548	395	GrGn		7				MD104	11.07	TGC
508	505943	8895778	450	GrGn		7				MD105	3.51	TGC
515C	515459	8916774	251	GrGn		8				MD106	7.87	TGC
Code	Description											
GrGn	Graphitic Gneiss											
GrKy	Kyanite bearing Graphitic Gneiss											
GrQ	Graphitic Quartzite											
GRQMn	Manganese bearing Graphitic Quartzite											
MB	Marble											
SChGr	Graphite bearing Schist											
Vgrade	Visual graphitic grade											
Dip_Dir	Dip Direction											
Z_m	Elevation in metre											

3.2 Structural Measurements

Structures that were encountered and measured were foliation of the metamorphosed rocks of the area. Foliations encountered were dipping to SE and S with moderate to shallow dip amount but including some few exceptions (**Fig.11, 12, 13, 14 &15**).

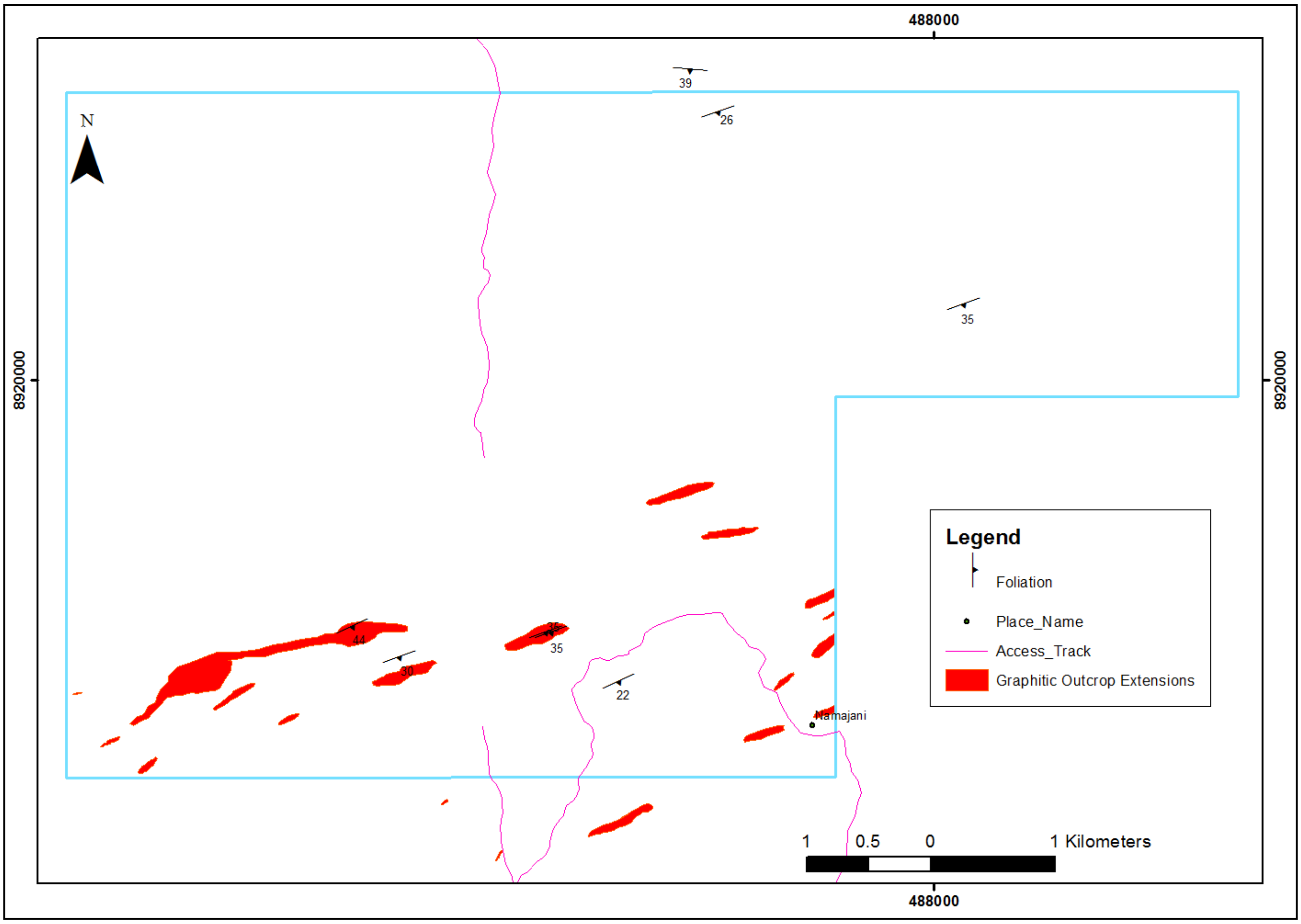

Figure 11: PL10810/2019 map showing foliations measured

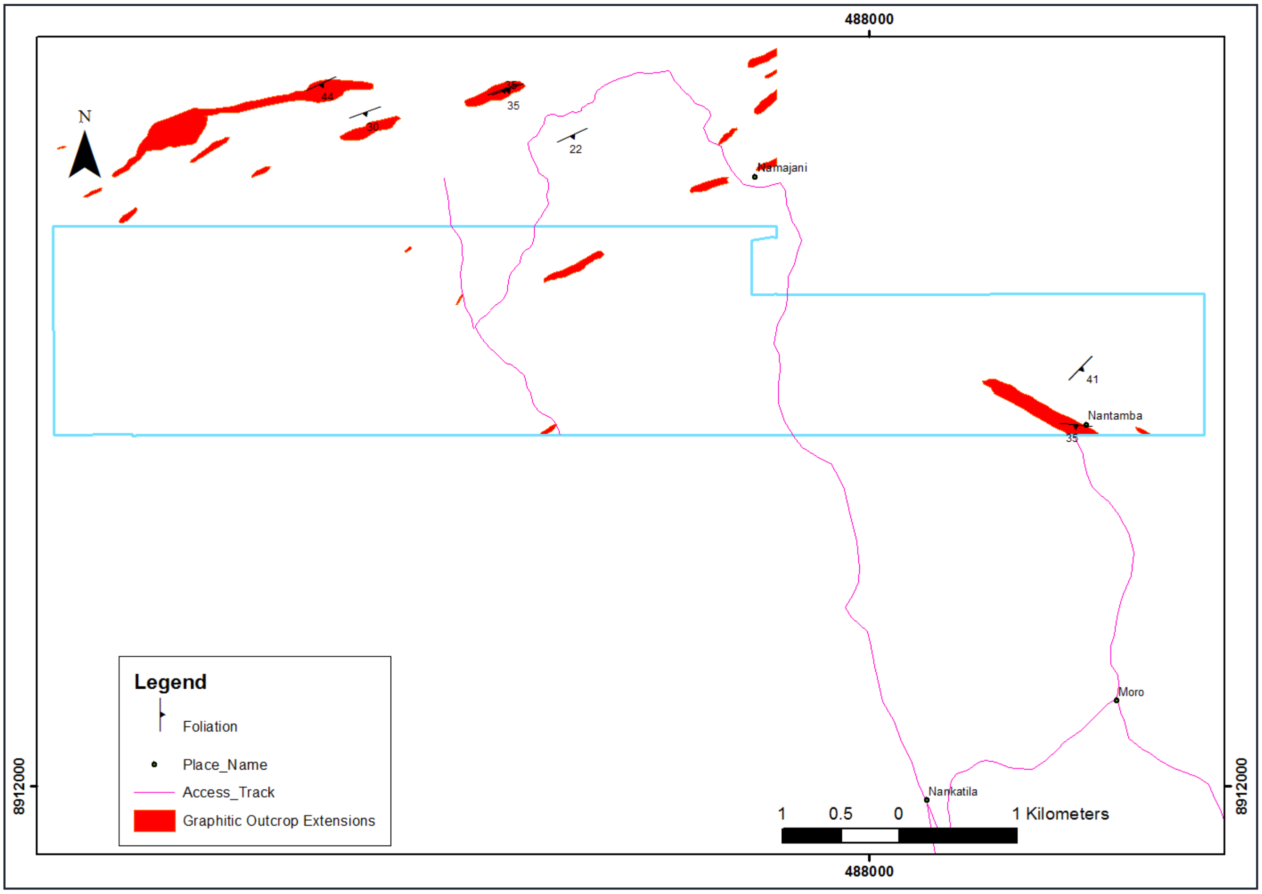

Figure 12: PL10703/2019 map showing foliations measured

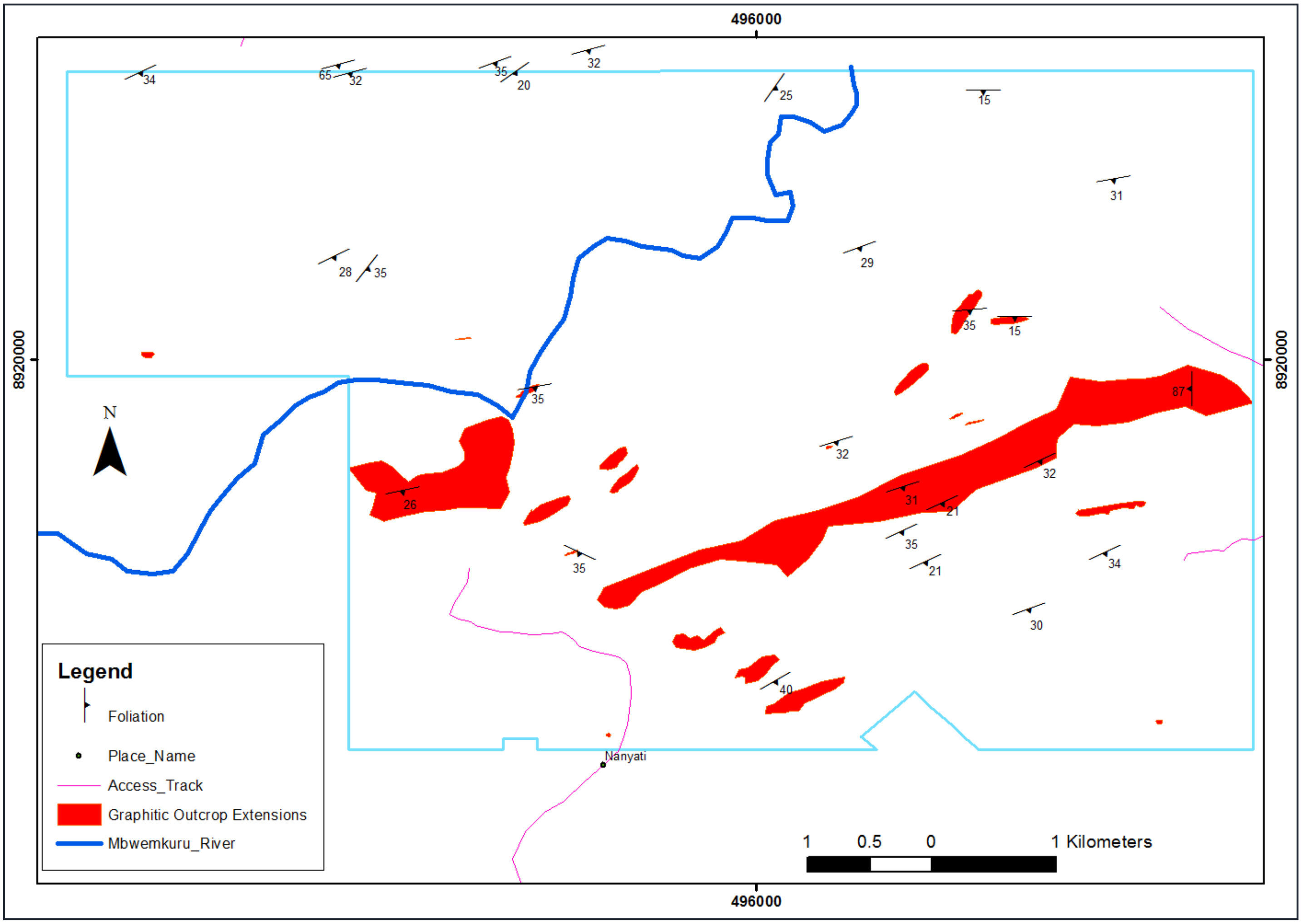

Figure 13: PL10809/2016 map showing foliations measured during geological mapping.

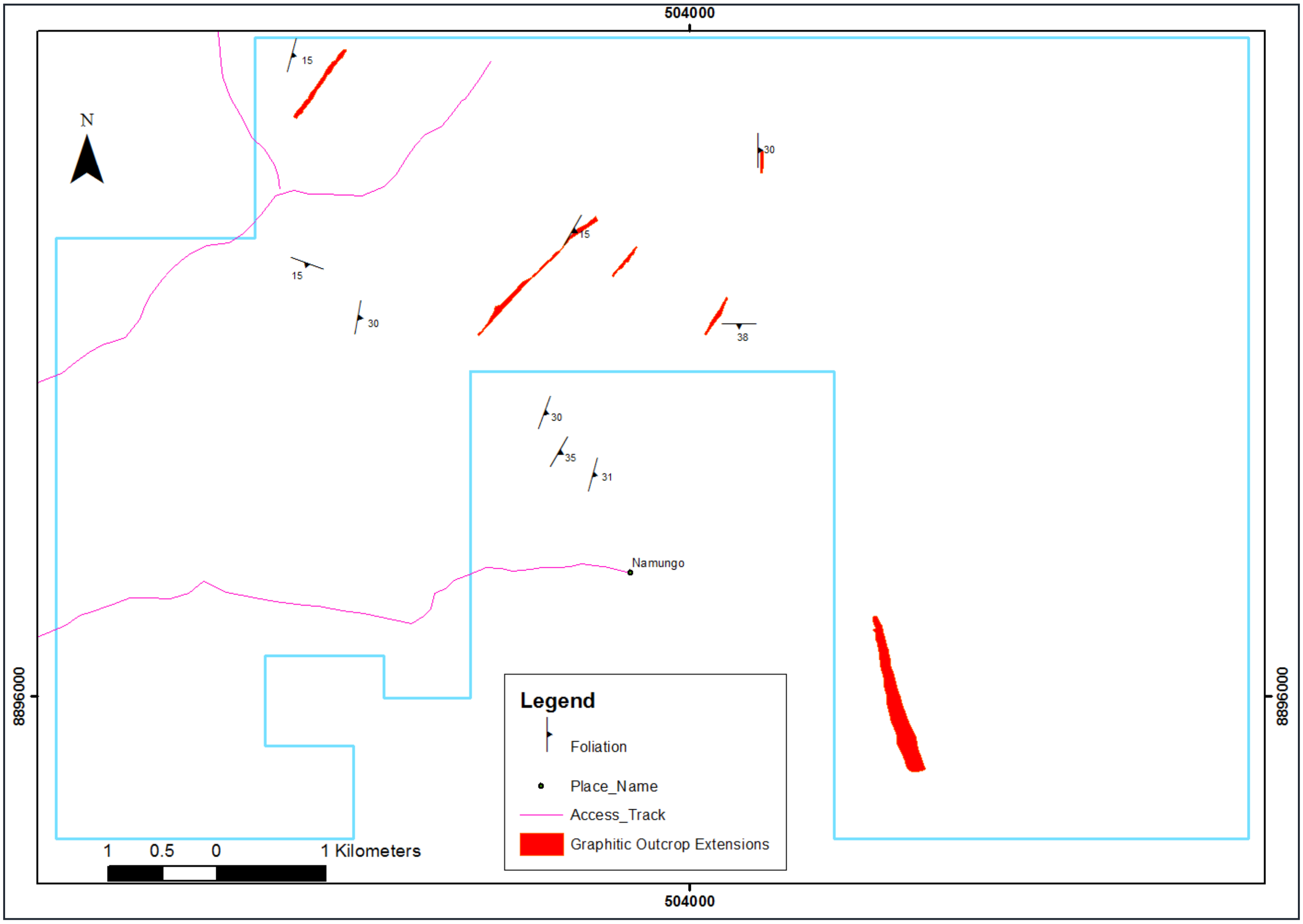

Figure 14: PL9906/2014 map showing foliations measured

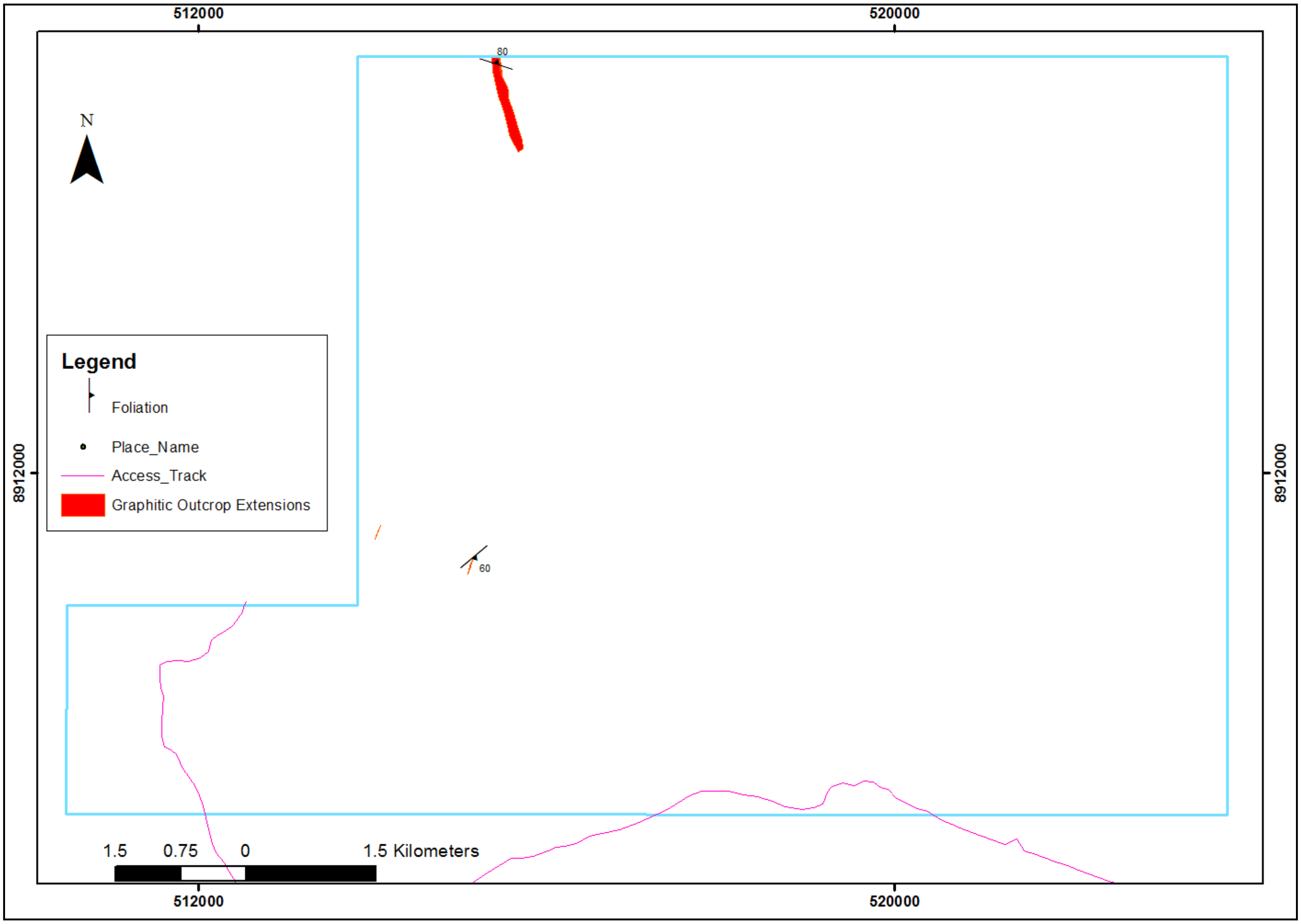

Figure 15: PL9994/2014 map showing foliations measured

3.3 Laboratory Results

Total graphitic carbon content (TGC) grades were given in terms of percentages (%) as they were analysed by GST Laboratory (**Table 2**). The Laboratory results turn out with grades ranging from 1.72 to 19.92%. Out of 82 original samples submitted to the Laboratory 76 that is 92.7% were greater than 3%. The other six (6) samples that are 7.3% were grading from 1.72% to 2.98%. Laboratory results were presented on the map of each of the five (5) PLs on their respective graphitic outcrops extensions (**Fig.16, 17, 18, 19 & 20**).

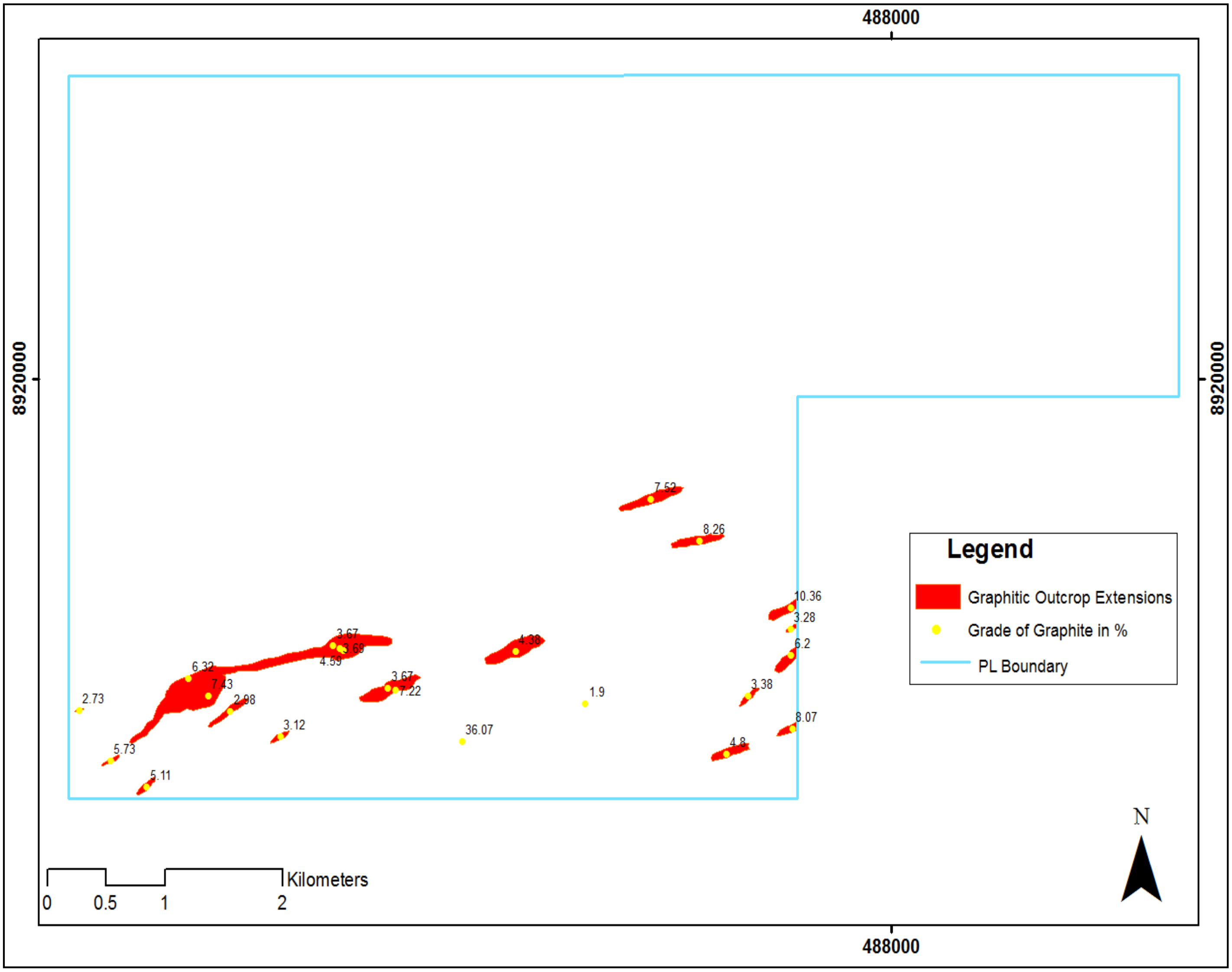

Figure 16: PL 10810/2016 map showing laboratory results of TGC grades in percentages (yellow dots with number) on their respective graphitic outcrops.

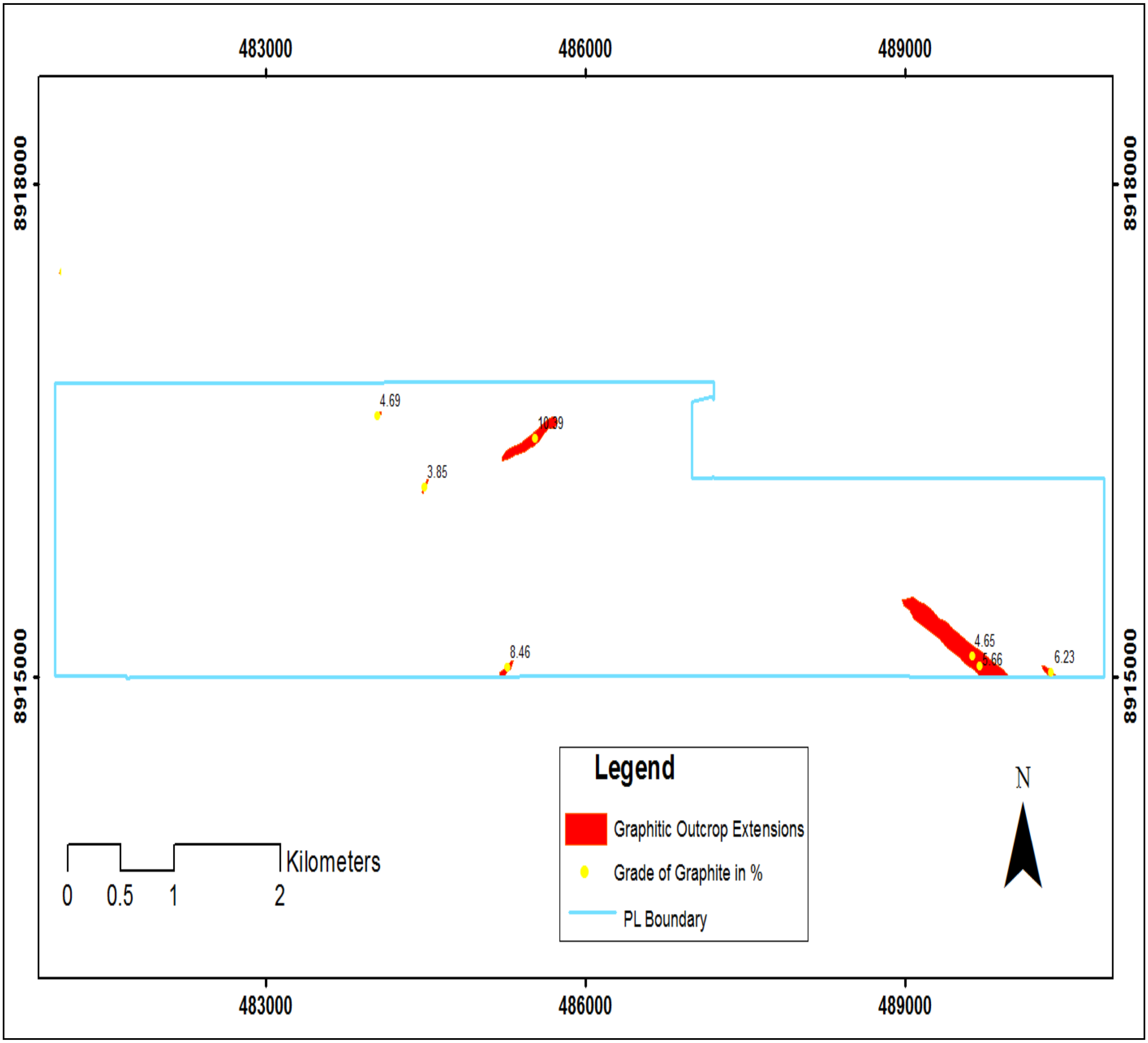

Figure 17: PL 10703/2015 map showing laboratory results of TGC grades in percentages (yellow dots with number) on their respective graphitic outcrops.

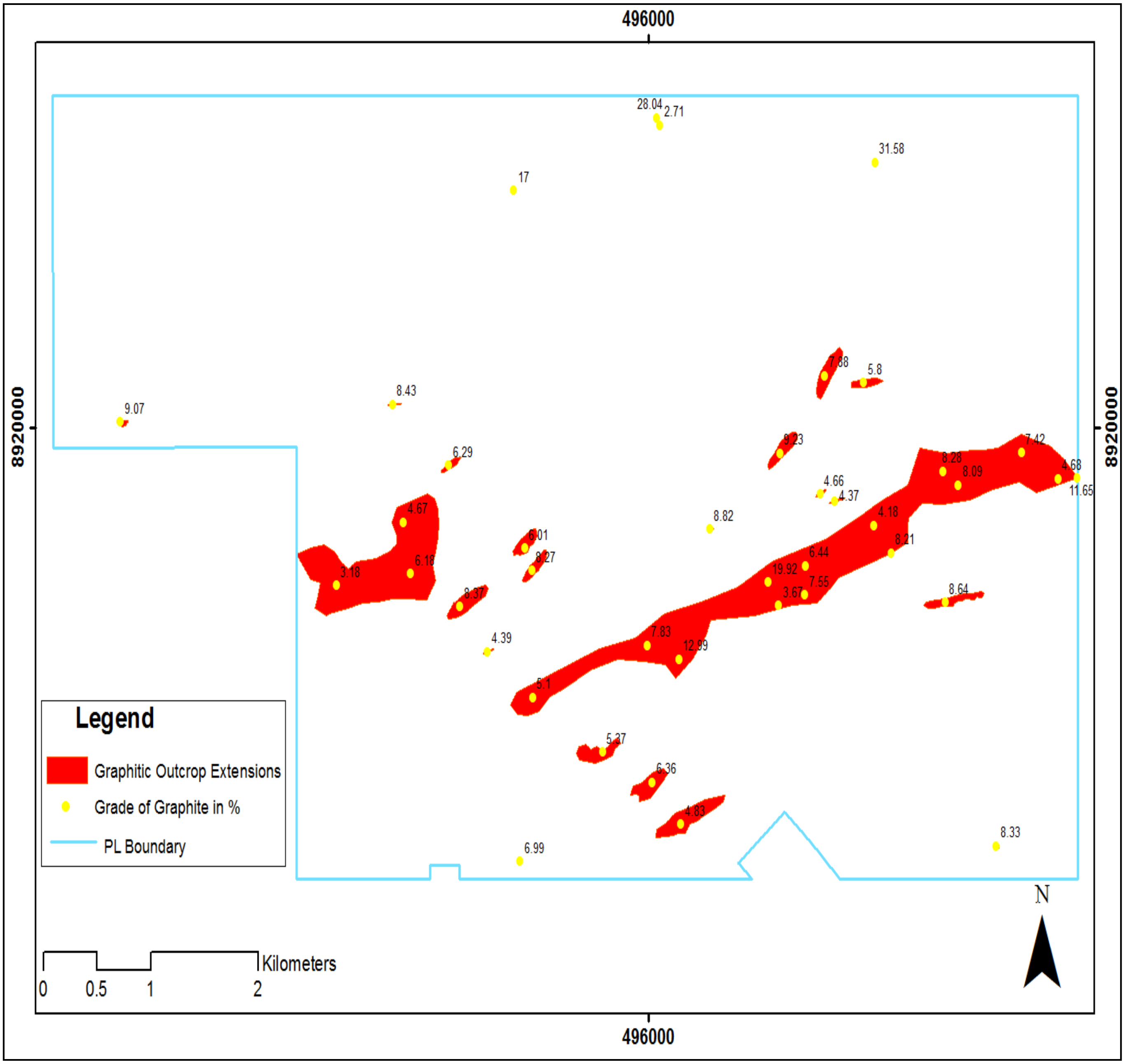

Figure 18: PL 10809/2016 map showing laboratory results of TGC grades in percentages (yellow dots with number) on their respective graphitic outcrops.

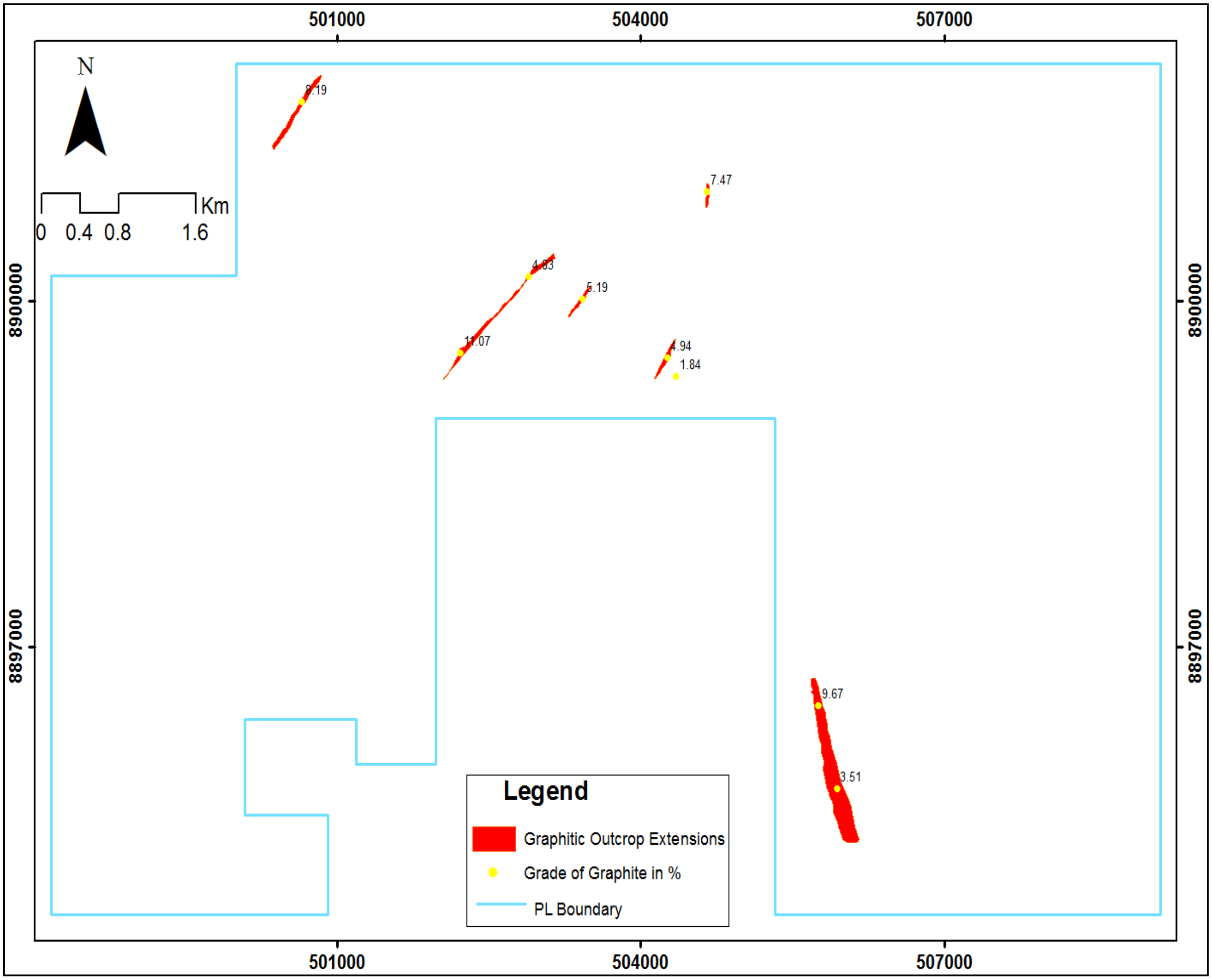

Figure 19: PL 9906/2014 map showing laboratory results of TGC grades in percentages (yellow dots with number) on their respective graphitic outcrops.

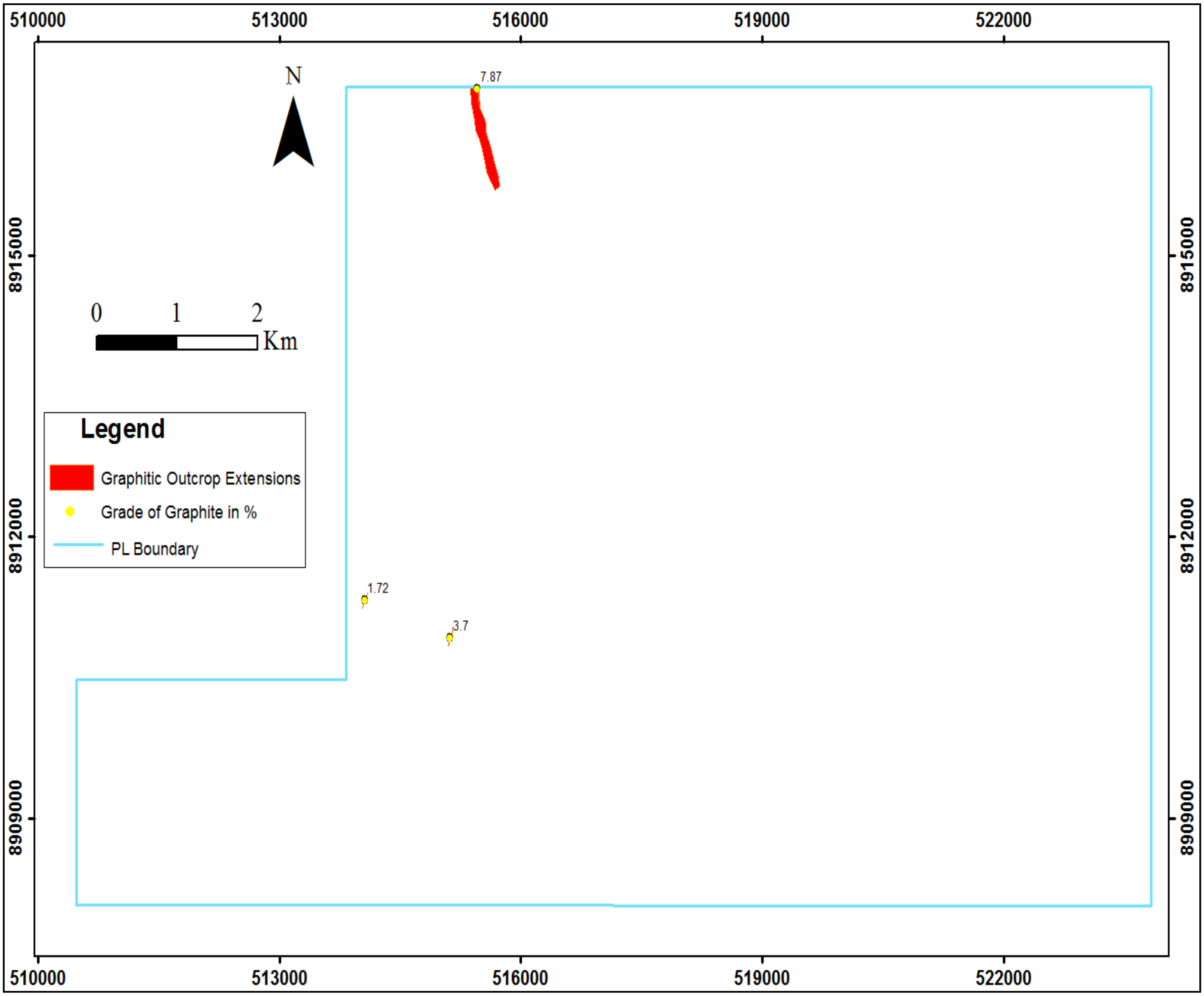

Figure 20: PL 9994/2014 map showing laboratory results of TGC grades in percentages (yellow dots with number) on their respective graphitic outcrops.

3.3.1 QA/QC Samples

The reliability of the assays results from the GST laboratory was determined by QA/QC samples inserted in the sample regime. In this case the blanks and duplicates were tested. The accuracy, sensitivity and precision of the laboratory were tested by these QA/QC samples. The detection limit of the instrumentation used was 0.5%. The blank samples turn out with results less than 0.5%

(**Fig.16**). Duplicate samples were plotted against their original samples and were observed to fall on the same zone (**Fig.21**).

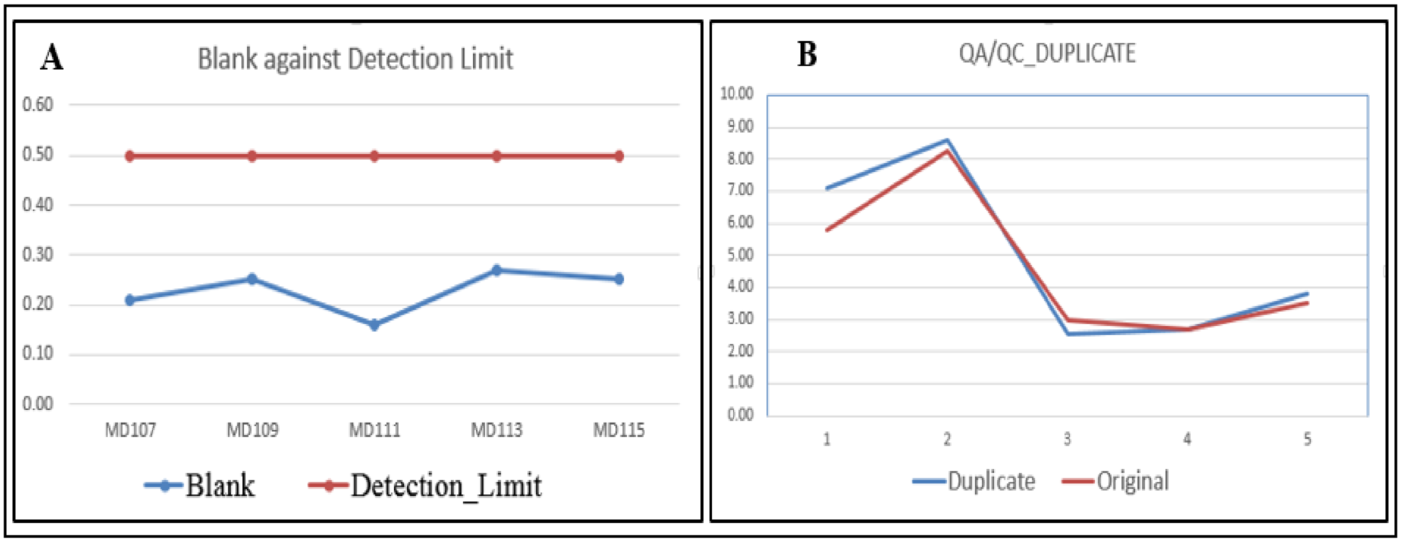

Figure 21: Graphs showing: A Blank against Detection limit and B duplicates against original samples.

3.4 Other Economic Potential Minerals Apart from Graphite

During mapping other metals of interest were detected and their representative samples were taken for laboratory analysis. These metals were **Manganese, Iron, Nickel and chromium**. Their results are of elevated values above their back ground values and hence encourage further follow up stages (**Table 2**; **Fig. 22, 23, 24 & 25**).

Manganese was among the economic potential minerals that were revealed in the three (3) NW PLs (**Fig.22**). Laboratory assay results turn out with elevated grades that are greater than 0.1% (**Fig.22**). This metal was detected in the matrix of dirty quartzite most of them in the vicinity of the graphitic outcrops (**Fig.22**). All seven (7) samples taken for manganese analysis were sampled from quartzite turned up with grades greater the 5% (**Fig.22 & Table 2**).

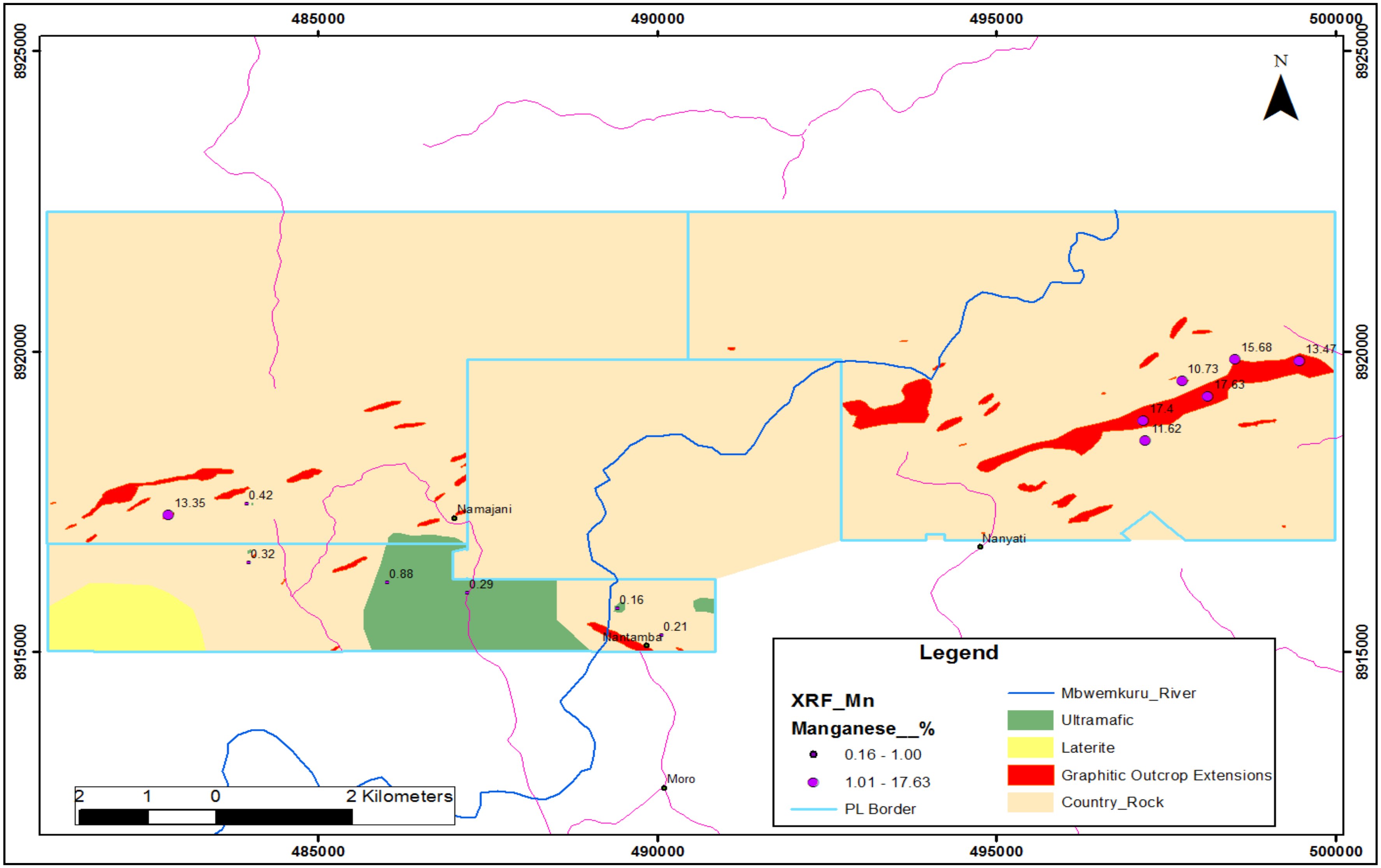

Figure 22: Three NW PLs map showing assay results for manganese grade in terms of percentages

Table 2: Laboratory results for Iron, Manganese (Mn), Nickel (Ni) and Chromium (Cr)

Sn	X	Y	Z	ID	Code	Iron_%	Mn_%	Ni_ppm	Cr_ppm	Analysis
206B	499481	8919835	172	MD024	Mn/Gr	8.85	13.47	311	218	XRF
228B	498128	8919248	192	MD029	Mn	5.00	17.63	263	114	XRF
230	497745	8919496	183	MD030	GrMn/GrKy	12.03	10.73	315	262	XRF
332	487198	8915971	196	MD053	Serp	26.07	0.29	9666	2592	XRF
358B	483951	8917457	235	MD061	Iron stone	78.60	0.42	263	569	XRF
363B	490071	8915273	206	MD066	PX	10.80	0.21	412	2836	XRF
366	489424	8915712	181	MD067	PX	9.01	0.16	311	771	XRF
377	483982	8916474	215	MD070	Px	11.76	0.32	2728	2524	XRF
383	482807	8917270	231	MD072	GrQMn	9.26	13.35	320	112	XRF
414	486027	8916156	212	MD083	Px	16.26	0.88	366	2176	XRF
449	497201	8918509	179	MD087	Mn	15.81	11.62	124	361	XRF
452C	497173	8918838	180	MD091	Mn	19.70	17.40	170	546	XRF
456	498525	8919864	178	MD094	Manganese	5.21	15.68	353	170	XRF

Code	**Explanation**
GrGn	Graphitic Gneiss
GrKy	Kyanite bearing Graphitic Gneiss/Quartzite
GrQ	Graphitic Quartzite
GRQMn	Manganese bearing Graphitic Quartzite
MB	Marble
SChGr	Graphite bearing Schist
PX	Pyroxenite
Mn	Manganese
Serp	Serpentinite
Ni	Nickel
Cr	Chromium

Iron: Laboratory results shown that there are two site that needs follow up as they had elevated values of 26% and 78% (**Fig.23 and Table 2**)

Nickel (Ni) and Chromium (Cr): The samples were taken from the ultramafic rocks that encountered in the NW PLs which were mostly Pyroxenite variety (**Table 2**; **Fig.24 &25**). The results came up with the elevated values that encourage further explorations for these metals.

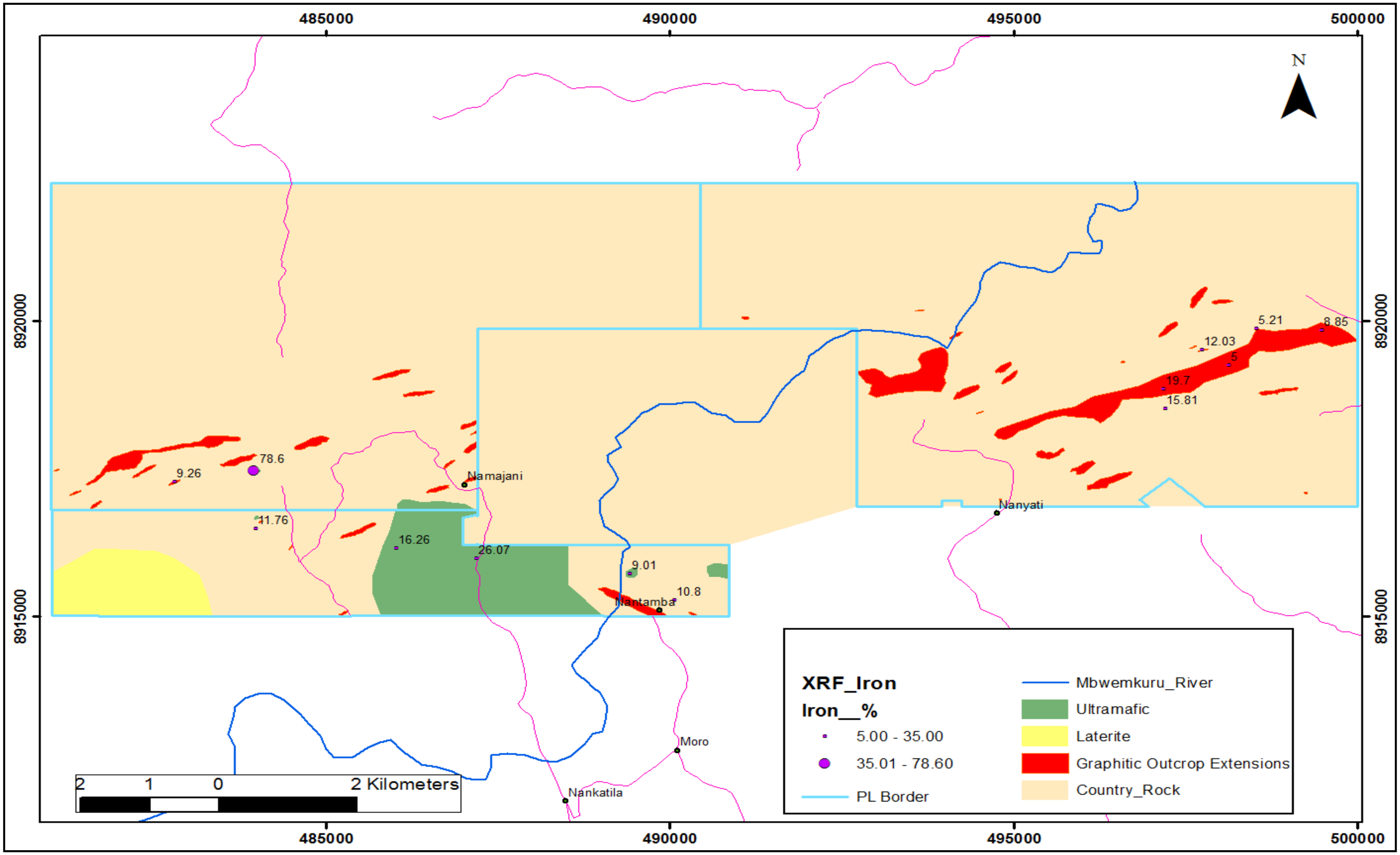

Figure 23: A map showing the laboratory assay results for Iron in percentages.

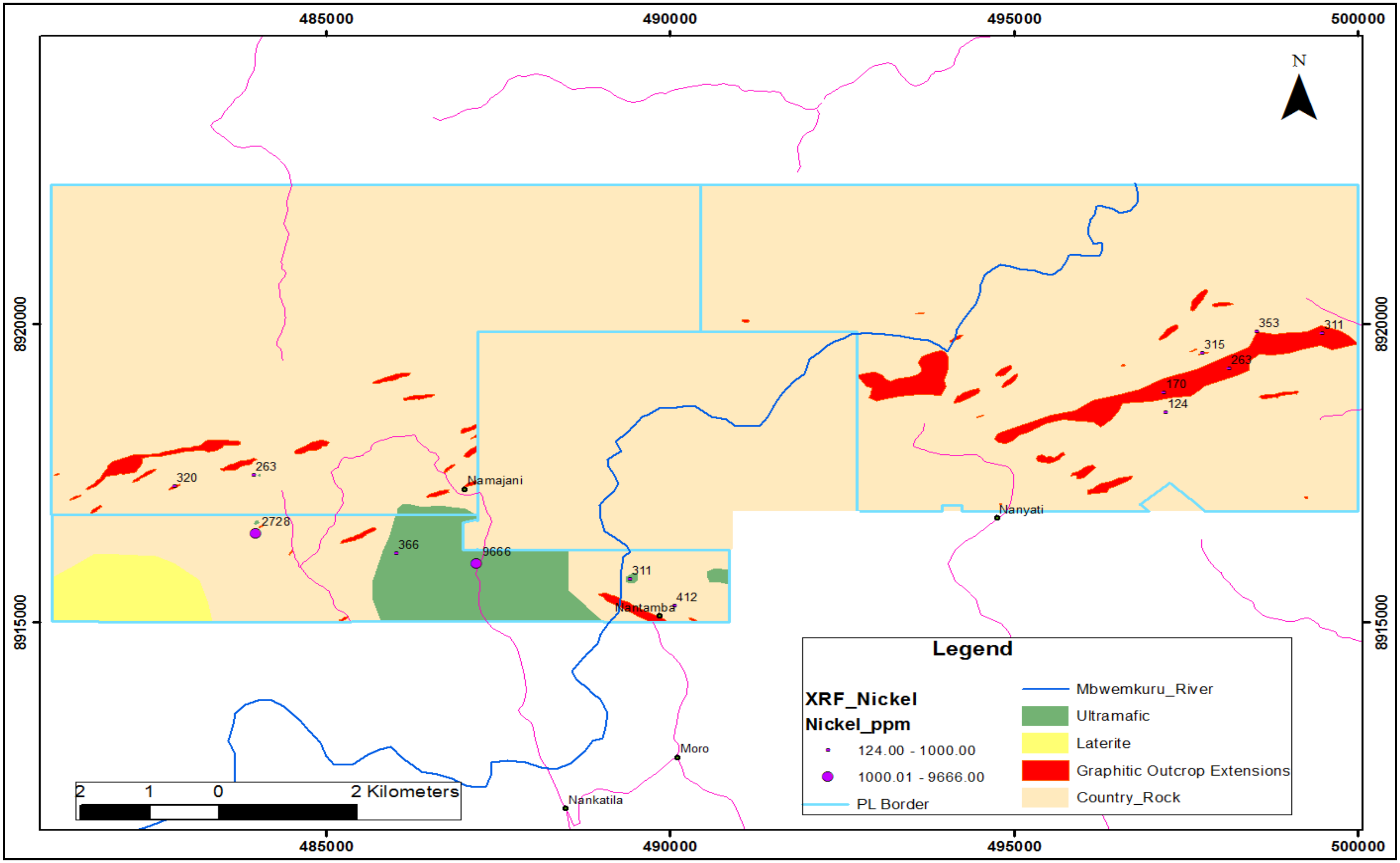

Figure 24: A map showing Nickel assay results in NW PLs.

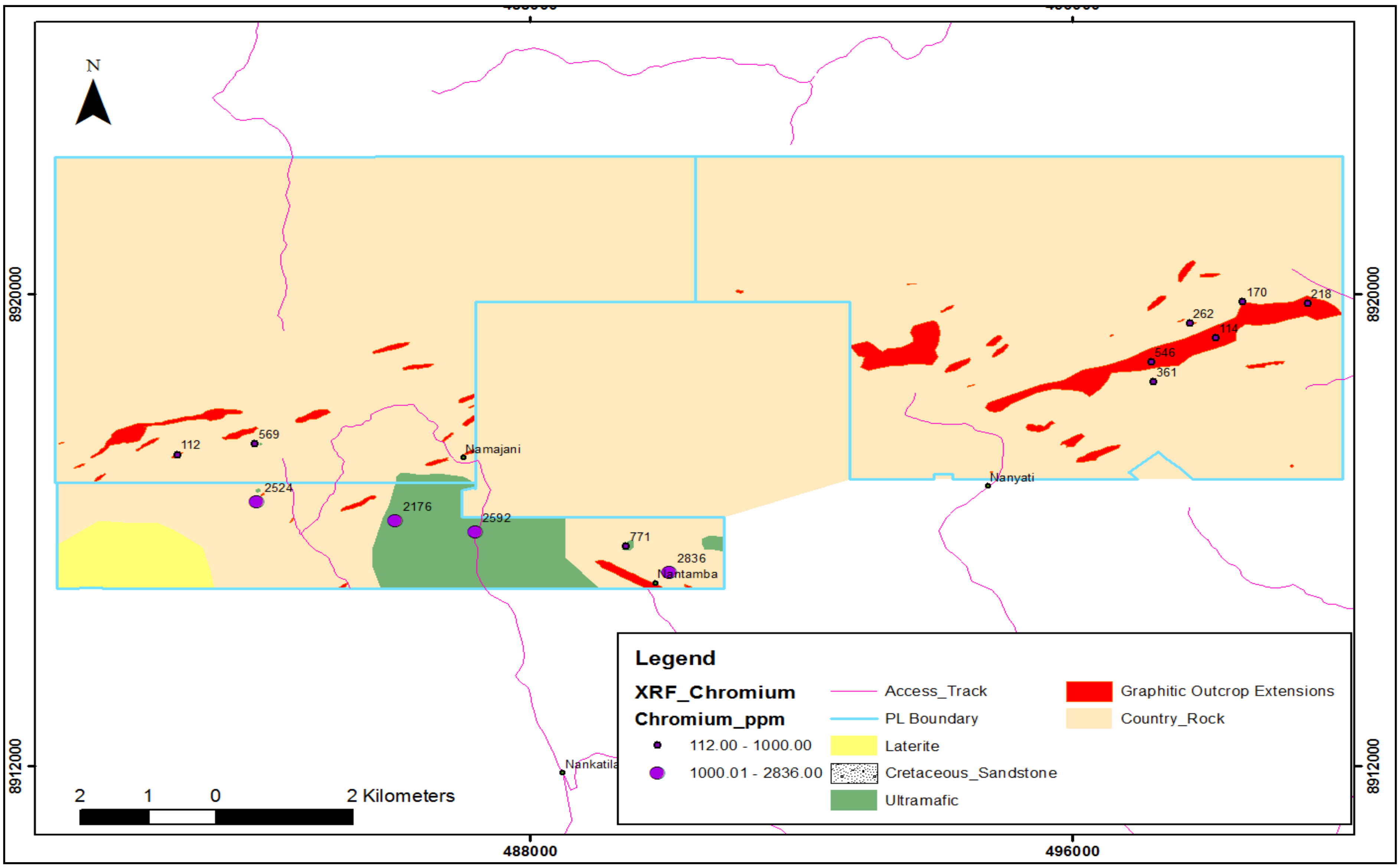

Figure 25 : NW PLs map with the Chromium assay results in ppm with elevation on the ultramafic rock. (Green polygons)

4.0 INTERPRETATION AND DISCUSSION

4.1 Graphite mineralisation

Two prominent graphitic lithologies that are graphitic gneiss and graphitic quartzite had high grade and large extension over the four (4) PLs (**Fig. 16, 17, 18, 19 & 20**). The thickness is from 0.5m to 60m and the strike length up to 5km. The laboratory TGC grade was from 1.8% to 19.9% (**Table.1** and **Fig. 16, 17, 18, 19 & 20**).

All graphitic outcrops encountered on the project were of flake or crystalline graphite disseminated in host rock. Based on the field observation the flakes sizes were up the 2mm thick in the long axis (**Fig.26**). The larger the flake sizes the more its demand it become. The flake or crystalline form of graphite consists of many graphene sheets stacked together that make it of high demand (Olson, 2015).

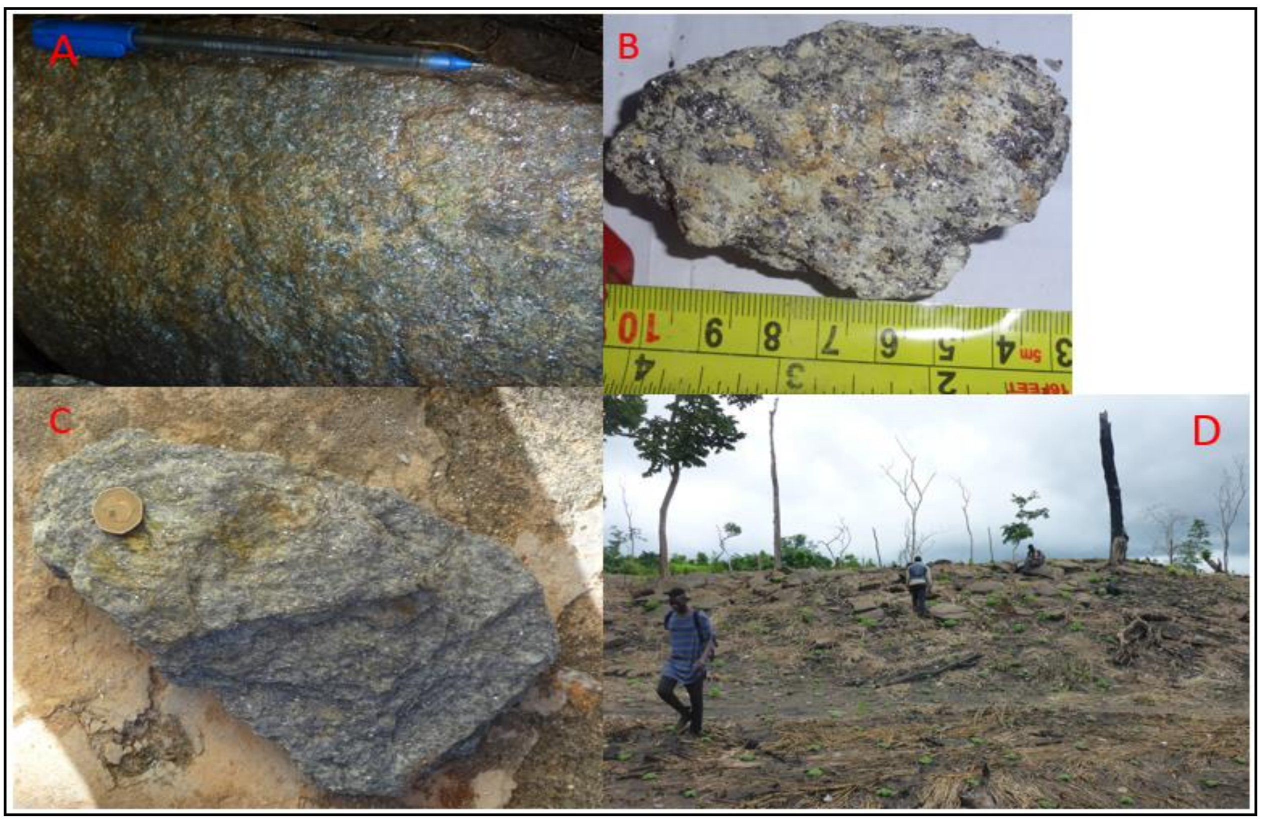

Figure 26: Flakes/crystalline graphites (A.B and C) and D showing hill covered by graphitic gneiss

According to Pohl (2011) and Simandl et al, (2015) economic mineable grade for graphite is 3%. Hence 92.7% of the assay results turned up with grade greater than 3% the minium mineable ore grade for graphite (**Table 1** and **Fig. 16, 17, 18, 19 & 20**).

The combination of grade, flake size and the extension (with and length of graphite ore body) were used to determine graphite mineral economic potential zones. The highest grade and tonnage of graphite were prioritised for further follow up stages as they were deduced to be graphite mineralisation potential zones (**Fig.27, 28 and 29**).

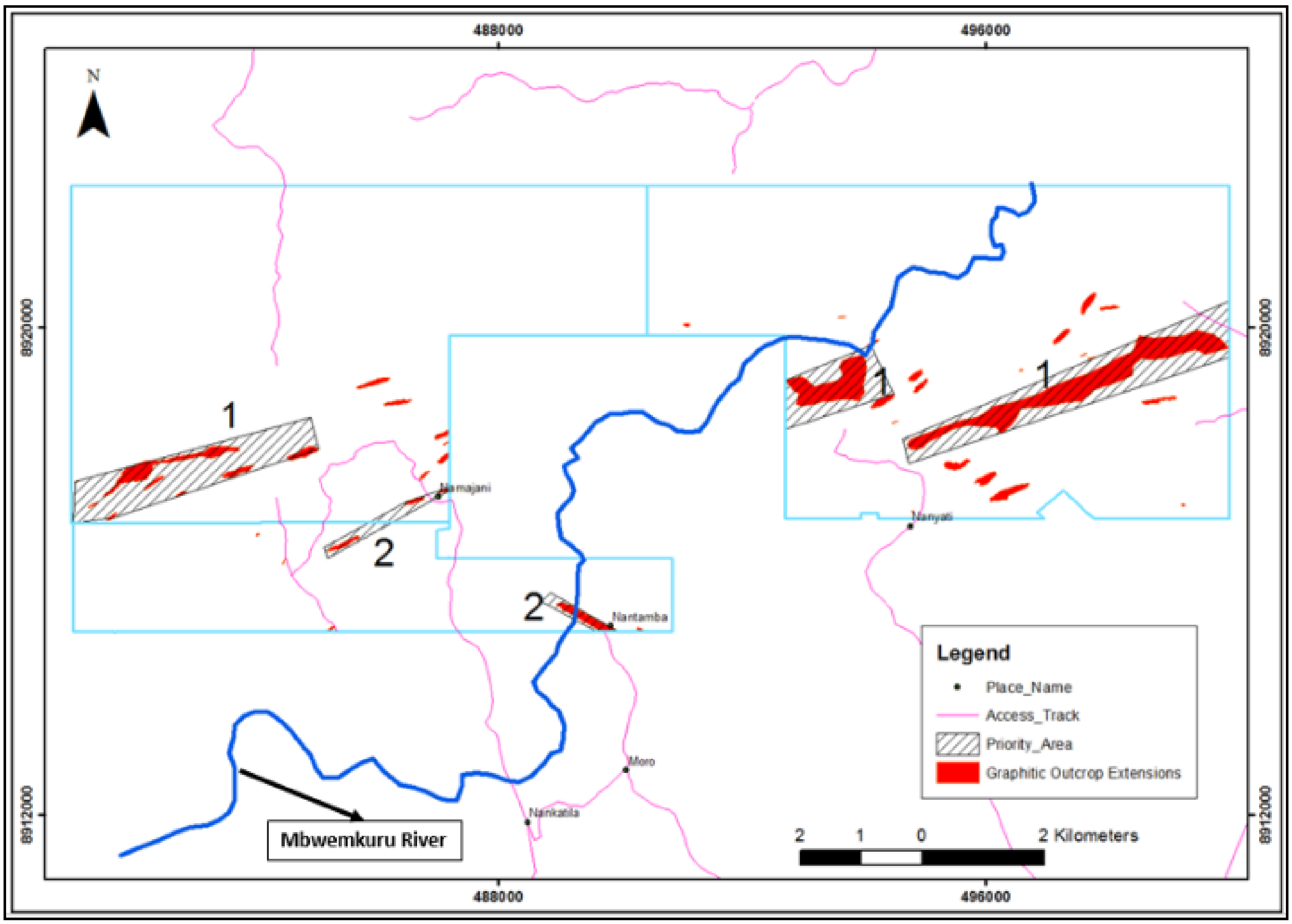

Figure 27: Three NW PLs showing priority areas for graphite mineralisation. Number 1, 2 & 3 indicate priority with decreasing emphasize.

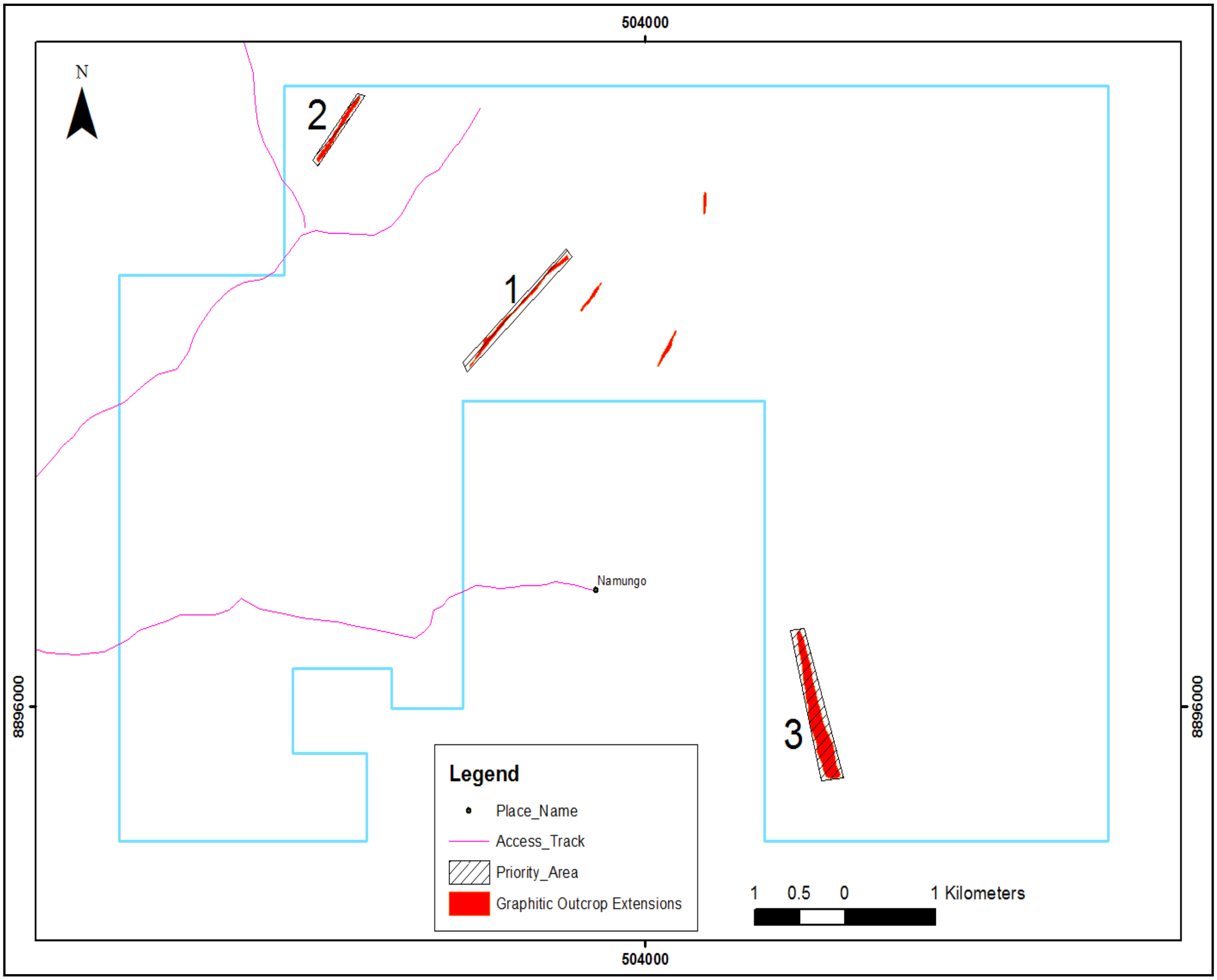

Figure 28: PL 9906/2014 map showing priority areas for graphite mineralisation. Number 1, 2 & 3 indicate priority with decreasing emphasize.

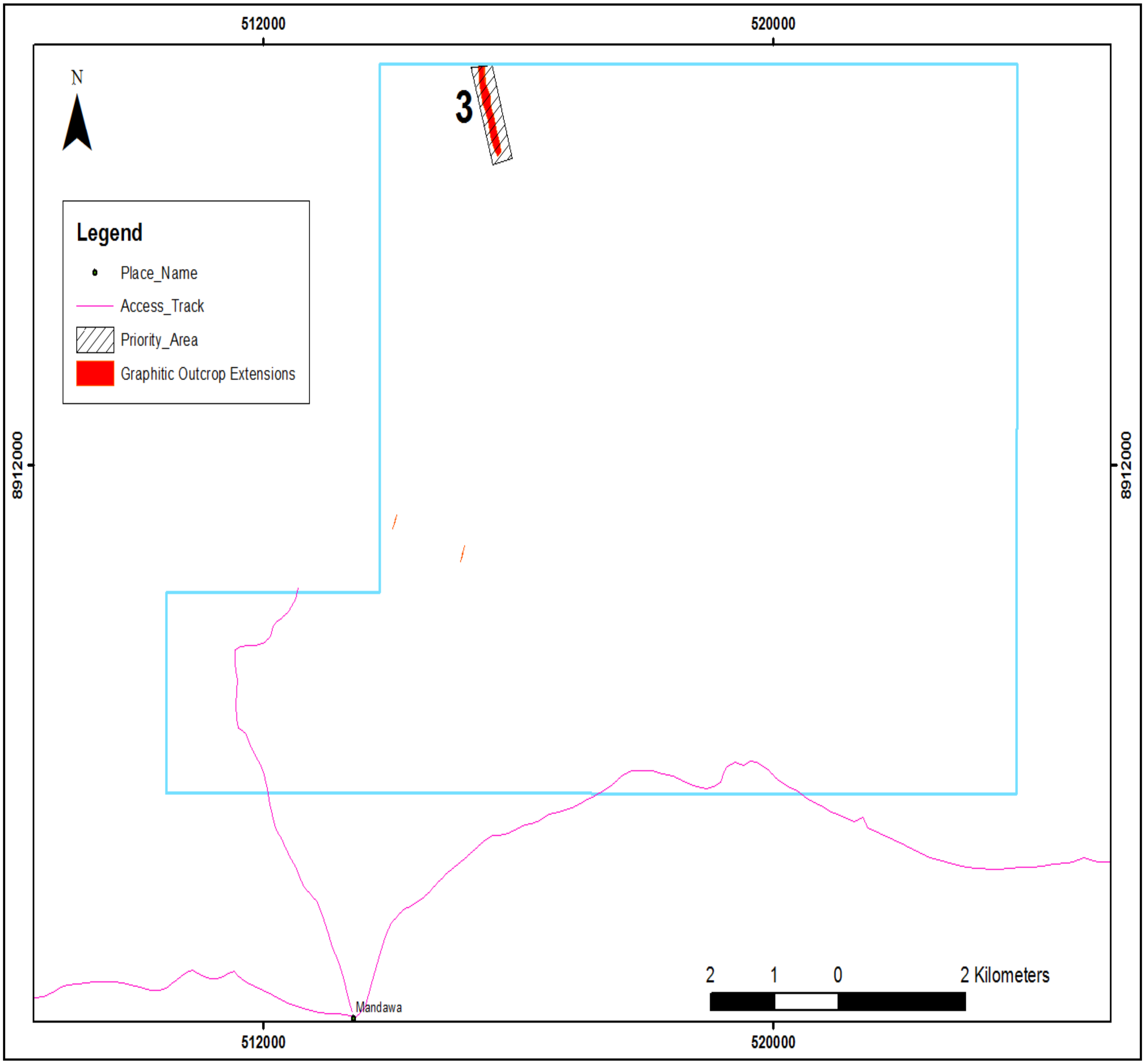

Figure 29: PL 9906/2014 map showing priority areas for graphite mineralisation. Number 1, 2 & 3 indicate priority with decreasing emphasize.

4.2 Manganese Mineralisation

According to Ridley (2013) back ground grade for manganese is 0.95% and the grade should be above 5%. All of the assays analysed for the manganese grade came out with the results greater than the minimal mineable grades of 5% (**Table 2** and **Fig. 22**). The manganese observed not to be a coating/stains on the quartzite but rather it is in the matrix costitute (**Fig.30**) Based on these results, the sampled areas are potential for Manganese and encourage further follow up.

Figure 30: Photo showing the manganese (Pyrolusite) gray black in colour in the Quartzite rock yellow circled A & B.

4.3 Nickel and Chromium Mineralisation

Nickel and Chromium had elevated values from their crustal abundant values which are 75ppm and 100ppm respectively (**Table 2** and **Fig.24 and 25**) (Ridley, 2013). Mineable nickel and chromium grade is 1% and 5% respectively (Ridley, 2013). The assays were collected from their proper hosting rocks of ultramafic with reasonable extension. Based on the results and field observation, Nickel and Chromium are worth for next and proper exploration stages.

4.4 Iron Mineralisation

Back ground values for Iron is 5% and mineable ore grade is 60% (Ridley, 2013). Assay results come up with one sample that was above the mineable grades while other assays were above the background values (**Fig.23** and **Table 2**). These highest values and the other elevated values encourage further investigation on the metal.

5.0 RECOMMENDATION AND CONCLUSION

5.1 Recommendation

- Electromagnetic survey (EM) should be conducted on the prominent graphitic outcrop extensions as highlighted in figure 27 and 28. EM is the best method as graphite is the best conductor and the anomaly will be the highest conducting body. The detected graphite mineralisation zones on the surfaces need to be confirmed of their continuation in both lateral and vertical extensions by EM. Figure 27 and 28 suggests the priority areas to start with particularly number one (1) priority on the named maps.
- Trenching should be done on the EM anomalies that found to overlap on the graphitic outcrop extension to get clues on structural orientation, thickness and grade before embark on drilling.
- The confirmed graphitic anomalies by both trenching and EM method should be developed by drilling starting with Reversed circulation then followed by Diamond drilling to get measure graphite resources.
- For manganese mineralisation soil sampling, trenching and pitting should be done on the areas where high values of assays had been taken to get the proper grade and extension of this metal.
- Proper sampling and emphasize on the base metal exploration in the areas with elevated values for Nickel, Iron and Chromium.

5.2 Conclusion

The project area is economically potential for graphite mineralisation based on the geological mapping conducted. Mapping has encountered several crystalline flake graphites outcrops ranging from 0.5m to 60m and from 0.1km to 5km width and strike length respectively. 92.7% of the samples that were analysed for TGC turned up with grades greater that economically mineable grade of 3%. The grades were ranging from 1.8% to 19.9%. All graphitic rocks encountered were observed to be comprised of coarse flake graphite.

The area is also potential for manganese, nickel, Iron and chromium. These metals had shown the elevated values from their back ground values when they were analyzed.

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