



HWANGE NATIONAL PARK



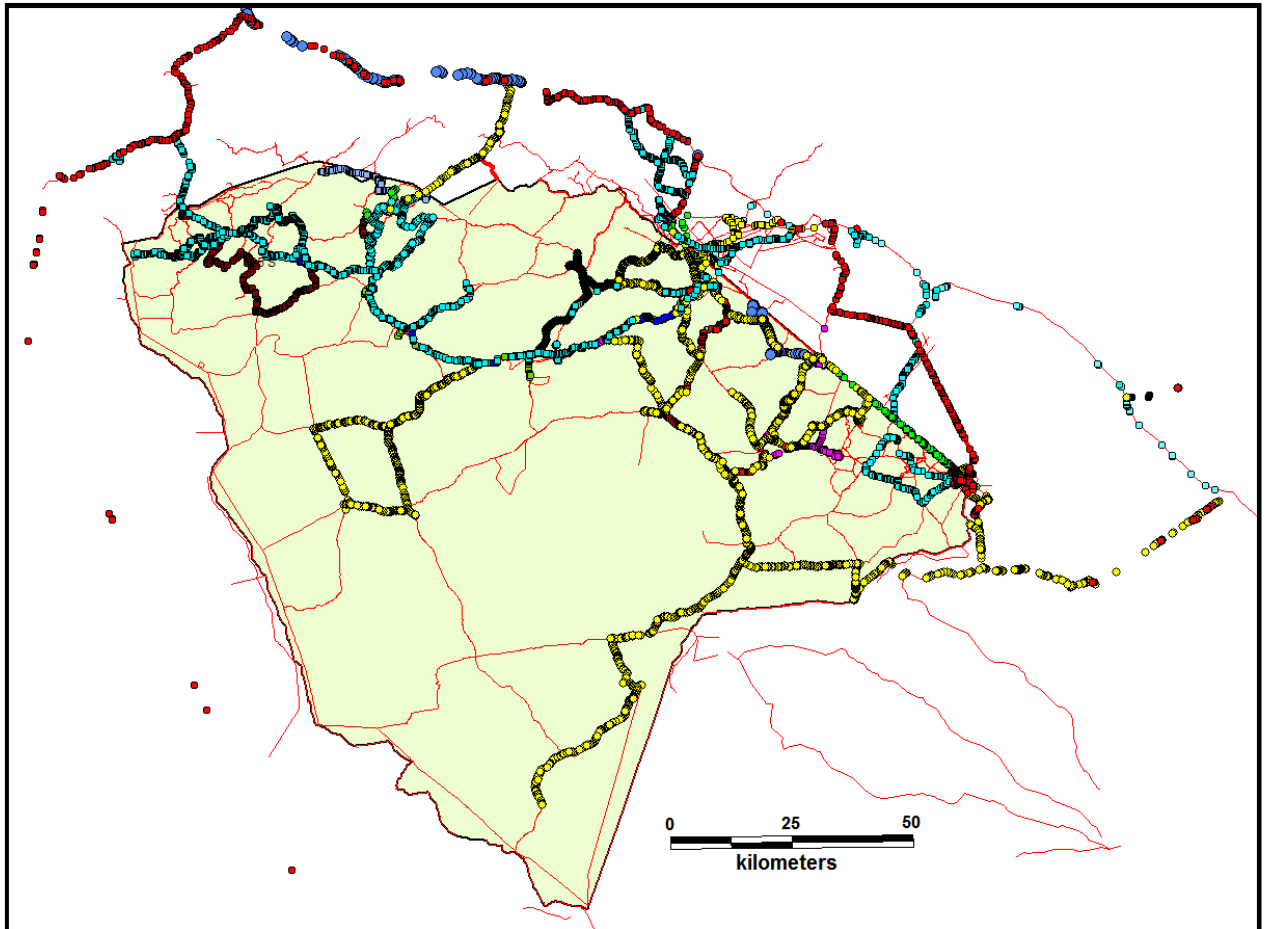
**GENERAL MANAGEMENT PLAN
PART 3: ANNEXES
November, 2015**

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ANNEX 1: GEOREFERENCED PHOTOGRAPHY

During the preparation of the revised management plan approximately 20,000 georeferenced photographs were taken. These helped to inform the process and the locations of the photos are shown below.



ANNEX 2: HISTORY AND ARCHAEOLOGY

This section is taken from the 2003 Management Plan as it was dealt with in some detail in this documentation. Much of the material is from an earlier publication – Martin, D. 1997. Hwange. Elephant Country. African Publishing Group. Harare

1.1 EARLY HISTORY

The first known Bantu-speakers in the Hwange area were the Kalundu group whom the earliest archaeological evidence indicates inhabited the area between AD 400 and 500 with their occupancy peaking around AD 800.

Occupations by a series of groups followed with the Tonga moving south from Zambia into North-western Zimbabwe in search of perennial water in the 11th and 12th centuries.

Tonga movement southwards was halted by the northerly migrations and conquests of Shona groups causing the Tonga to withdraw into the Zambezi Valley and southern Zambia where they live today. Another group originating in Zambia, the Leya, occupied much of the area in which Hwange is now incorporated. Although no specific date has been established for their arrival, they initially settled in the Victoria Falls area before expanding their influence to the south and South-East.

Thereafter the history of the area becomes more detailed. Early in the 18th, Dende, one of the three sons of the Rozvi Changamire (king or leader), broke away from his father to establish himself as an independent ruler in present-day North-western Zimbabwe.

Dende's actions are said to have infuriated the Rozvi Changamire who gave orders that his son be captured and killed.

Dende's actions in this period strongly suggest he felt in danger. He swiftly moved ever further away from his father, stopping briefly in several places, and strengthening kinship ties through leaving behind sisters who married Tonga men.

Three times he changed his name - from Dende to Sawanga and finally to Wange (said to be an abbreviation of his previous name) which became the hereditary dynastic title.

Dende, and his followers, a patrilineal people of the soko (monkey) totem who were later known as Nambya, entered the Leya territory via Lower Gwayi, settling in the Bhale area between the Gwayi, Nyantuwe and Lukosi rivers. Here they assimilated some of the Leya who had not resisted their incorporation into the Nambya State.

On top of a strategic hill named Shangano (deriving from the Nambya word shangana meaning "meet") they built a stone-walled enclosure which became the first capital of their State. The Nambya are believed to have moved from Shangano to the Bumbusi area in the upper Deka valley during the reign of the fifth Wange, Shana (1834-60). In large measure the move appears to have been dictated by the greater suitability of the wetter soil at Bumbusi for bulrush millet, sorghum and maize which were Nambya staples.

The new capital was sited on a rocky promontory beneath two large baobab trees which still stand. The stone-walled enclosure was about 55metres long and two metres high and the royal dwellings were located within this complex.

A well organised economic and social structure existed among the Nambya well before the Ndebele raids of 1850 and after, the south-wards advance of the tsetse fly which made cattle keeping impossible in the area, the introduction of firearms, the importation of European goods, and intensive hunting from 1860.

Agriculture followed by animal husbandry, hunting, gathering, fishing and manufacturing, underpinned the society.

The crops grown, and the techniques used to grow them, ensured the area was more or less self-sufficient and provides a salutary lesson to those who today talk about resistant crops to combat drought.

Cattle, once a social asset, a source of protein, a manifestation of wealth used in marriage transactions (lobola), and an item to barter during periods of deficit, inevitably diminished in importance after the arrival of the tsetse fly in the area.

Hitherto, cattle had been at the core of Nambya culture as was the case with several other groups. If the importance of cattle disappeared then part of the culture was lost.

The Nambya now turned to smaller stocks such as sheep and goats to barter or combat crops deficits. Goats in turn brought environmental degradation.

Hunting, gathering (insects, fruits, leaves, roots wild grasses and honey) and fishing were subsidiary pursuits yet they provided additional insurance in times of shortage. The hunting of big game, a dangerous pursuit, was usually a village or communal pursuit while smaller game was hunted by individuals.

Nambya hunters were noted as skilful trackers who would variously employ bows and arrows, spears (the Nambya tipped their spears with a poison drawn from a bulb chenyami), and traps to catch their prey.

The second half of the 19th century brought considerable changes for the Nambya people. Broadly these changes were brought about by two quite different factors, one resulting from the mfecane (a Zulu word literally meaning "the crushing") and the other by the arrival of European traders and settlers.

These two events radically changed the political, economic and social structure which existed in Nambya society.

The first group of European traders to reach the area are thought to have been Portuguese and their African agents, the Chikunda, who originated in Mozambique. These Portuguese were involved in the slave and ivory trade and, hitherto, had been thought to have reached the area by canoe from the east up to the Zambezi Valley from Quelimane in Mozambique via Kariba.

There is, however, reason to believe that the earliest Portuguese reached the area from the Atlantic coast through Angola and the Ovimbundu areas of today's southern Angola and northern Namibia. Their arrival, some historians now argue, pre-dated 1850 and brings into doubt the contention that Dr David Livingstone was the first white man to see the Victoria Falls.

The Portuguese purchased large numbers of young Nambya men and women who were exported as slaves. This trade seriously depleted the Nambya population and following the abolition of slave trade, the Nambya began purchasing slaves back from the Portuguese with ivory, as a means of replenishing their population.

The demand for ivory, and its growing scarcity south of Limpopo River, drew South African hunters to the area from around 1860. They brought with them an alternative source of European goods including, increasingly, guns to barter.

Between 1871 and 1878 the trade took on a more permanent nature with establishment of a trading post to Pandamatenga by George Westbeach, an expert hunter and trader. This, and other subsequent trading stations, sowed the idea of migrant labourers working in South Africa's mines for money which could be converted into items hitherto only obtainable from the slave-and-ivory-and-trading-caravans.

The loose Nambya hegemony and comparative peace was shattered by the Ndebele arrival. Their then Chief Wange, Lusumbami, according to oral accounts, was skinned alive by the Ndebele.

His followers fled, dispersing into smaller family units occupying inaccessible parts of the mountainous country south of the Zambezi River or crossing into Zambia only to return between 1888 and 1893, the latter date marking the defeat of the Ndebele by the British South Africa Company (BSAC) in the Anglo-Ndebele war.

The Nambya were the group most seriously affected by the Ndebele raids, losing their remaining cattle and agricultural lands as well as their Chief and hundreds of their people.

They however managed to retain their cultural identity and government, and the hereditary dynastic title of the Nambya rulers, established over 200 years ago by Dende, continues today with the present Chief Wange being the thirteenth in the line.

1.2 COLONIAL AND POST-COLONIAL

As shown in the previous section, the true pioneers of white occupation were in fact the Portuguese who traded in slave and ivory, as well as missionaries such as Livingstone, Robert and Moffat, and hunters like Frederick Courtney Selous.

They were responsible for the rumours of extensive gold deposits in Zimbabwe, and Rhodes' "Pioneer" Column in 1890 merely followed their footsteps searching for El Dorado.

The Nambya who had returned from Zambia, and those who had emerged from their sanctuaries in the hills south of the Zambezi River, were totally deprived of their southern land by the settlers 1910. In 1893 a German, Albert Giese, had heard about "black stones that burn". Two years later he pegged 1,036 square km of the southern Nambya in the Bambusi area as a coalfield.

When development of the coal concession began in 1903 all Nambya living in the area were resettled in the east in the Lukosi and Inyantue areas.

Between 1904 and 1909 the land was surveyed for European farming settlement and by 1910 a total of 3,383,800 acres of the best Nambya land, representing 45 percent of Wankie District's total, had been taken for the colliery, railway and white farmers.

By 1925, of the total land in Wankie District, five per cent had been set aside for Nambya reserves, 45 percent was alienated (already taken) and 50 percent of the area, or a little over 5 million acres, unalienated. This was soon to change for the worse for the Nambya.

In 1928, a total million acres, just over 93 per cent of the unalienated land, was resigned for the Wankie Game Reserve. Nambya, still living in this area, were forcibly removed to the reserves. The villages of those who resisted were burnt by the Southern Rhodesian police.

Of the remaining 286 000 acres of unalienated land, most was subsequently declared a forest reserve, thereby leaving the Nambya landless outside the three reserves (later reduced to two).

The depopulation of the area, and the alienation of large areas for the Wankie Game Reserve and for forestry, was to make the North West of Southern Rhodesia a difficult area for guerrillas to operate in when they began the second Chimurenga (war for liberation) in the 1960s.

While the Nambya had been comparatively inactive during the first Chimurenga against the white settlers in 1896 (most of them had been driven from Hwange District by the invading Ndebele), they were to play a much greater role during the second Chimurenga.

In August 1967, in one of the most publicised and epic battles of the Zimbabwean liberation war, a force of 80 guerrillas fought for several days with the Southern Rhodesia security forces. Seven members of the Southern Rhodesian forces were killed and 13 wounded against 30 guerrillas killed, a security force communique claimed.

The Wankie battle, as it became known, appropriately brought together African guerrillas from Zimbabwe and South Africa in a battle symbolising unit against white settlers.

Psychologically, therefore, the Wankie battle was of great importance. As the war of liberation escalated, tourist facilities in the area became increasingly inaccessible and dangerous. Peace returned to the area when Zimbabwe became independent in 1980.

1.3 ARCHAEOLOGICAL SITES

1.3.1 Introduction

The Hwange environment is dynamically changing. The main goal of a management plan is to anticipate as much as possible what future changes will occur in the ecosystem and to plan how to deal with them. Yet it is absolutely impossible to predict the types of future changes to be expected if we do not know the basic details about the Hwange landscape's prehistoric past, especially the prior types of changes that have occurred in climate, flora, and fauna. These changes have left us with clear evidence of their duration and range, and this evidence now provides the only available information about the variations to be expected in Hwange National Park's future changes.

An essential part of the study of past changes in the Hwange ecosystem involves examining the human presence and the influences that prehistoric human activities have had on the system's flora and fauna. Research into Hwange National Park's prehistory is at an early stage, but some important results are already available and they should have significant implications for the management plan. The research program has two dimensions. First, it involves an ambitious search for archaeological sites in (and around) the Park. Second, it involves a study of paleoenvironmental changes that have occurred in the Hwange district over the long span of time when humans have influenced the ecosystem.

In this abbreviated and preliminary report, archaeological sites are listed and described, along with recommendations for their future treatment by the National Parks Department. As made clear by the Management Plan, one main mission of the Park is to protect archaeological, historical, and palaeo-ecological sites within it. This task is made doubly important because there is a tremendous richness and diversity in the Park's archaeological resources, and they have never before been studied. The task is also made important because there are so many potentially damaging processes that adversely affect these sites and thereby forever remove scientific knowledge about Hwange's past.

1.3.2 Archaeological Resources in Hwange National Park

The attached Table lists archaeological sites that we have discovered and studied in and around Hwange National Park. The list is up to date through January 1998. The sites discovered in the National Park are numerous and were created by human groups who used the local resources in all parts of the district. The earliest phase of human occupation of the Park is called the "Early Stone Age" (ESA), and is characterized by very mobile and small groups of archaic Homo sapiens, who manufactured stone tools at a few localities in the Park's northern portion. The dating of this phase is tentative, but it probably began before 250,000 years ago, and came to an end around 200,000 years ago. The succeeding phase of human occupation is termed the "Middle Stone Age" (MSA), beginning 200,000 years ago and continuing until about 40,000 years ago. The last phase of the stone age sequence is termed the "Later Stone Age" (LSA), spanning the time period from 40,000 years ago to just a few hundred years ago.

Each one of these phases is characterized by different stone-tool-making technology, different subsistence and settlement patterns, and very distinct ways of using the landscape and its resources. Early Stone Age hominids mainly oriented their movements and encampments towards high-quality toolstone sources which were found where small streams drained through the contact zones between different bedrock types. The preferred stone for tool-making was quartz, but also used were quartzite and cherts that had been secondarily formed in Kalahari sand calcrete deposits. Middle Stone Age hominids differed in that they no longer were "tethered" to the same specific sources of quartz toolstone, but instead made their stone tools from the smaller chert nodules that were found more widely in calcrete exposures. The Middle Stone Age hominids seemed to prefer foraging at larger pans and along sluggish stream courses, where they hunted (or scavenged) large game animals such as alcelaphines and suids. Neither Early nor Middle Stone Age hominids ventured very far into the Kalahari sands, but restricted their movements to the northern hills of the Park and the central interior

basins where the calcrete savannahs are found today. However, by the time of the Later Stone Age, human groups were widely dispersed into all parts of the Park, including the remotest Kalahari sands region, where their subsistence was very similar to that of the hunting-gathering “bushman” or San peoples whose way of life has been ethnographically recorded in Botswana and Namibia.

These LSA foragers hunted large and small game animals, gathered nuts and berries, and also ate mussels and snails. Their tools and artifacts were made of stone, bone, wood, and plant fibers, evidenced by archaeological remains found in scattered rockshelters in Hwange National Park. They gathered honey in remote parts of the Park area, and hunted large, medium, and small game animals around at least 50% of the pans located in the furthest reaches of the Park’s Kalahari sands region.

Some time after 2,000 years ago, human groups possessing a very different economic orientation appeared in the northern part of the Park. Their appearance — first discovered in the Kapula vlei near Sinamatella — marks the beginning of the so-called Early Iron Age phase in the region. The people of this phase manufactured a distinctive style of pottery, planted domesticated crop plants, and probably kept livestock, primarily cattle. They also hunted large and medium-size game animals such as kudu, possibly relying on wild meat for about a third of their diet. They did not fully oust all the Later Stone age hunting-gathering peoples in the Hwange district, but their practices of woodland-clearing for fields and pastures undoubtedly did affect the lifeways of the foragers, who nevertheless continued to co-exist in the Park area alongside the iron-using farmers and pastoralists.

Some paleoenvironmental evidence exists in the Park for a wetter period with higher rainfall and perhaps warmer temperatures just before the appearance of the first farming people, suggesting that a drying trend at the end of this wetter interval may have contributed to the movement of farming communities into what had once been hunting-gathering territory. We suggest that the numerous sites of engraved rock art in Hwange National Park’s northern area represent one response of hunter-gatherers to the existence of the ethnically different farming groups, who may have been perceived as socially threatening to the foragers’ traditional way of life.

The last phases of prehistoric human presence in the National Park area began around the year A.D. 1800, when the ancestral Nambya people migrated into the region. The National Park possesses several important sites associated with the Nambya and their way of life during the “Zimbabwe” period of the later Iron Age, including Bumbusi and Mtoa ruins, neither of which has ever been surveyed, test-excavated, or mapped. These sites are currently endangered by elephants and buffalo which knock over the stone walls, by antbears burrowing under the walls and into midden deposits, and by uncontrolled surface-collecting by Park visitors and some employees. At least 10 other smaller stone-wall ruin sites also exist in the Park, primarily in the Sinamatella and Robins areas, and all of them need to be studied further before they are completely destroyed by natural processes such as animal trampling or tree-growth, or by people.

Perhaps one of the more interesting observations emerging from the first stage of this archaeological research is that during the 19th century a surprisingly large and extensive network of villages were occupied by Bantu farmers and cattle-herders in the land that would later become the National Park. We estimate that as many as 2,000 people lived in the future National Park between 1780 A.D. and 1870 A.D. These were Wange’s people. During this time, an estimated 1,000 tonnes of wood per year would have been cut for firewood, fencing, hut construction, and charcoal-making (for iron-manufacture). Hence, the flora and fauna of a large portion of the future National Park must have been dramatically shaped by human activities only a little more than one hundred years ago. As well, the bush-burning practices of hunter-gatherers also would have had a major impact on the area’s woodlands.

Evidence has been recovered from our tree-ring studies that the middle of the 19th century was wetter than the 20th century has been. Yet in spite of the higher levels of moisture one hundred years ago, our archival research in conjunction with the archaeological and paleoenvironmental studies indicates clearly that the Hwange region never supported more than about 6-8,000 elephants during the heyday of the 19th century ivory-hunting period. The well-known Victorian-era hunter EC. Selous shot elephants in the future Hwange National Park about 10 years after most of the Nambya farmers and cattle-keepers had abandoned the region in the face of Ndebele raids, and his descriptions of the landscape and natural history are enlightening about climatic changes over the past 100 years.

The National Park also possesses a fine record of the Colonial era in the region, when the Rhodesian government pegged land for European farmers and ranchers. If properly surveyed, test-excavated, and mapped, these farm sites can be rich sources of information about the early 20th century in the region before the land and its resources were afforded complete protection as a National Park.

1.3.3 Management Implications

First, and most importantly, it is to be emphasized and never overlooked that Hwange National Park is charged by law and by its own Mission Statement to protect and preserve the cultural resources located within it. To avoid damaging all historical, archaeological, and palaeo-ecological resources, the Department of National Parks should first produce an inventory of known or predicted historical, archaeological, and palaeo-ecological sites within the boundaries of Hwange National Park, and this inventory should be evaluated by trained archaeologists who may then determine how best to salvage information from threatened sites. The major proportion of the costs of producing such an inventory most likely would be borne by external researchers who are willing to undertake the task, if the Department of National Parks can agree to provide some assistance such as the waiving of Park entry fees, the waiving of fees currently demanded for the use of Research Scouts, and other such unnecessary and restrictive fees or related burdens that have recently been placed upon external researchers.

The salvaging of sites and information can be a simple procedure, if done professionally. Some sites are threatened by natural processes such as animal-trampling, which are relatively ungovernable. Yet nonetheless the effects of such natural processes can be objectively examined, and some means can be devised to either neutralize the processes or to mitigate their effects.

Other destructive processes affecting sites are caused by human actions, such as road-grading, gravel-quarrying, or outright looting or vandalism, the latter activity having already adversely affected Bumbusi and Mtoa ruins, among other sites in the Park. Before any more building construction or road-grading is done in the Park, professionally trained archaeologists must be allowed to survey and test-excavate every potential historical, archaeological, and palaeo-ecological site in the Park. Once again, we emphasize that external researchers should be encouraged to undertake this work, and should be positively supported through the waiving of fees and perhaps by the provision of free temporary housing to visiting archaeologists from the National Museums and Monuments.

A second set of implications for the Management Plan derives from our discoveries of cycles of climatic extremes in the Hwange district. We now have identified several major trends in climate over the past 110,000 years for Hwange National Park. A trend called "Punctuated aridity" characterizes the region, and has left its traces in the deepest Kalahari sands where large relict fields of longitudinal dunes can be found. Very arid periods lasting up to 5,000 years interrupted wetter periods in prehistory, and during these intervals the crests of Pleistocene dunes were dramatically re-activated by winds. The driest periods were 110-100,000 years ago, 50-40,000 years ago, and around 20,000 years ago. But there were also many other dry intervals of lesser duration, as well, when woodlands changed composition in response to changes in rainfall amounts and distribution. During the wetter periods, such as around 27-33,000 years ago, or before 2,000 years ago, miombo woodland elements such as *Brachystegia* spp. expanded their range by about 30-100 kilometers beyond their current limits. *Baikiaea* woodlands also expanded and contracted in response to rainfall changes. These observations indicate that the Hwange system is completely dynamic but it is also sensitive to an unknown degree to certain climatic changes. The sensitivity must be further studied, and the Department of National Parks should encourage external researchers to carry on tree-ring dating and dendroclimatological studies in and around the National Park. These studies will help reveal the age of the Park's teak woodlands and other vegetational communities, and will be critical in understanding the future shape of the Park's changing floristic component.

ATTACHMENT 1: Table listing archaeological sites, the periods when they were occupied by people (Hist = Historical [from 1870 to the present], Iron Age = 2,000 -100 years ago, Stone Age = 250,000 - 200 years ago), their locations, and suggested actions to be taken for each one.

TABLE: ARCHAEOLOGICAL SITES IN HWANGE NATIONAL PARK

Compiled by G. Haynes/J. Klimowicz

MAP	SITE NAME	UTM COORD	HIST	IRONAGE	STONE AGE	COMMENTS
1825D1	Pandamatenga	LK 592 514	Yes	No	Yes	not in Park
1825D2	Earlier Nantwich House	LK847 433	Yes	No	No	should be tested and mapped
1825D2	Big Tom's Pan	LK933 331	Yes	No	Yes	should be surveyed
1825D2	Mahohoma Area Village	LK838 348	Yes	Yes	Yes	should be surveyed, collected, mapped
1825D2	Robins Camp Deka River Slopes	LK925 411	No	Yes	Yes	should be surveyed
1825D2	Tsamtsa Pan	LK793 289	No	Yes	Yes	should be surveyed
1825D2	Tsamhole Pan	LK827 275	No	No	Yes	should be surveyed, tested, mapped
1825D2	Last Big Nantwich House	LK846 436	Yes	No	No	should be tested and mapped
1825D2	Old Deka Camp	LK737 364	Yes	No	Yes	should be tested, mapped
1825D2	Old Deka Camp	LK744 364	Yes	No	Yes	should be tested, mapped
1825D2	Giese's Deka Historic Huts/Dump	LK744 358	Yes	No	Yes	should be tested, mapped
1825D2	Historic Farm Cattle Area (?)	LK822 343	Yes	No	Yes	should be tested
1825D2	Historic Farm Kraal or House	LK827 348	Yes	No	Yes	should be tested
1825D2	Mahohoma Area Village	LK845 331	No	Yes	Yes	should be surveyed, tested, mapped
1825D2	Mahohoma Area Wall/Graves	LK846 335	No	Yes	Yes	should be mapped, tested
1825D2	Tsamtsa Vlei	LK794 285	No	No	Yes	should be surveyed
1825D4	Black Vlei Paved w/Chert Pebbles	LK880230	No	No	Yes	should be systematically surveyed
1825D4	Sibuyu Baobab	LK075 019	Yes	No	No	destroyed by elephants
1826A4	Kamandama Ruins	MK430611	No	Yes	No	not in Park: partly destroyed by road- grading
1826B3	Chirowamaga Ruins ("Shangano")	MK562 607	No	Yes	No	not in Park

MAP	SITE NAME	UTM COORD	HIST	IRONAGE	STONE AGE	COMMENTS
1826C1	Bumbusi Last Shelter(South side of road)	MK154 529	No	Yes	Yes	should be tested
1826C1	Crocodile Pools	LK987 413	No	No	Yes	should be surveyed
1826C1	Walling Near Chingahobe Dam	MK079415	No	Yes	No	should be tested, mapped
1826C1	Spoor	MK142 533	No	No	Yes	should be tested, recorded
1826C1	Ruins (Khami Type)	LK993 396	No	Yes	Yes	should be tested, mapped
1826C1	Bumbusi Ridge Rockshelter w/Engravings	MK155 529	No	No	Yes	should be tested, recorded
1826C1	IA Site Near ESA Lookout Site	LK996 279	No	Yes	Yes	should be tested, mapped
1826C1	ESA Lookout Site	LK989 285	No	Yes	Yes	should be surveyed
1826C1	East Side of ESA Lookout Site	LK994 278	No	No	Yes	should be surveyed
1826C1	Deteema River Scatters	MK092 334	No	Yes	Yes	should be surveyed
1826C1	Deteema Ruins	MK097 354	No	Yes	No	should be tested, mapped
1826C1	Bumbusi Cave	MK141 525	No	Yes	Yes	should be re-tested
1826C1	Recent Village Near Dolio Springs	MK034 357	Yes	No	No	should be tested, mapped
1826C1	Dolio Springs -'Near Recent Village	MK028 356	No	No	Yes	should be surveyed
1826C1	Deka River & Deteema Mouth	MK065 499	No	No	Yes	should be surveyed
1826C1	Tshowe Ruins or Wall	LK96 46	No	Yes	No	(not yet located on ground)
1826C1	Road Near River & Farm	MK 1252	No	No	Yes	should be mapped
1826C1	Bumbusi Ruins, Main Site	MK 142 533	No	Yes	No	Should be tested, mapped, stabi lized
1826C1	Dolilo Marsh	MK 038 379	Yes	No	Yes	should be tested.
1826C1	Bumbusi-Spoor & Pots	MK 15 53	No	Yes	Yes	should be tested, Recorded
1826C1	Bumbusi Farm	MK 121 524	Yes	No	Yes	should be tested , mapped

MAP	SITE NAME	UTM COORD	HIST	IRONAGE	STONE AGE	COMMENTS
1826C1	Deka & Big Tom's Junction	LK 982 411	No	No	Yes	should be surveyed
1826C1	Salt Pan	LK 978 338	No	No	Yes	should be surveyed
1826C1	Salt Pan Recent Village	LK 978 338	Yes	Yes	No	should be tested , mapped
1826C2	Salt Spring-Deteema Road	MK 212 415	No	No	Yes	should be surveyed
1826C2	Sinamatella Ranch Worker's Kraal	MK 290 455	Yes	No	No	should be tested , mapped
1826C2	Sinamatella Homestead	MK 278446	Yes	No	No	should be tested, mapped
1826C2	Smith's Mine Hills Dam/ Rock Tower	MK 253 508	Yes	No	No	should be tested , mapped
1826C2	Spear Points at Chompani Dam	MK 434 301	Yes	No	No	should be tested
1826C2	Mandavu Dam Terrace Ruin	MK 237 385	No	Yes	No	should be tested, mapped, stabilized
1826C3	Dandari Road, Carved Teak Tree	LK 999 223	Yes	No	No	should be recorded, stabilized
1826C3	Manzimbomvu Pan	MK 000 243	No	No	Yes	should be surveyed
1826C3	Dandari Pan	MK 000 165	No	No	Yes	should be surveyed
1826C4	Nehimba Village Site	MK 431 090	Yes	Yes	No	should be tested, mapped
1826C4	Nehimba	MK 399 102	No	No	Yes	should be intensively tested
1826C4	Pan South East of Nehimba /	MK 420 086	No	Yes	Yes	should be surveyed
1826C4	East Shumba Pan	MK 329 199	No	Yes	Yes	should be surveyed
1826C4	Village Site Enroute to Bumbumutsa	MK 214 178	Yes	Yes	No	should be tested, mapped
1826C4	Nehimba Termite Mound	MK 413 091	No	No	Yes	should be re-surveyed
1826C4	Big Shumba Pan	MK 273 167	No	Yes	Yes	should be intensively surveyed
1826D1	Grassy Pan Near Mtoa Pan	MK 675 326	No	Yes	Yes	should be intensively surveyed
1826D1	Mzizi West Kopje	MK 624 316	No	Yes	Yes	should be tested
1826D1	Iron Axe Site/Dead Baboon Site	MK 622 314	No	Yes	No	should be tested
1826D1	< Mtoa Pan	MK 665 335	No	Yes •	Yes	should be intensively surveyed

MAP	SITE NAME	UTM COORD	HIST	IRONAGE	STONE AGE	COMMENTS
1826D1	Sikumi Forest	MK 604 504	No	Yes	Yes	not in Park
1826D1	Mtoa Ruins	MK 666 361	No	Yes	Yes	should be tested, mapped, stabilized
1826D1	Baobab Holes	MK 667 351	No	Yes	Yes	should be mapped, tested
1826D1	Mambanje River	MK 778 454	Yes	Yes	Yes	should be intensively surveyed
1826D1	Rock Ring, Baobab Holes Area	MK 662 352	No	Yes	Yes	should be tested, mapped
1826D1	Mtoa Ruins to Inyantue Dam Road	MK 631 380	No	Yes	No	should be surveyed
1826D1	Mzizi Springs	MK 652 333	No	Yes	Yes	should be intensively surveyed, mapped
1826D1	Redeposited in Stream Channel	MK 07 03	No	No	Yes	(redeposited—upstream source)
1826D2	Main Camp Gate Area & Wind Pump	MK 946 296	Yes	No	Yes	should be tested mapped
1826D2	Sikumi forest	MK 961 504	No	No	Yes	not in Park
1826D2	Sidena Pan	MK 945 303	No	No	Yes	brickworks should be teste; survey nedeed
1826D2	Dete Police Road	MK 838 414	No	No	Yes	should be intensively tested, mappe
1826D2	Borrow Pit 1 km Inside Gate	MK 943 295	No	No	Yes	should be intensively surveyed
1826D2	Main Camp Gravel Pit	MK 951 294	No	No	Yes	should be surveyed, intensively tested
1826D2	Livingi Pan	MK 921 323	No	Yes	Yes	should be surveyed
1826D2	Balia Balia Pan	MK 916 295	No	Yes	Yes	should be surveyed; teak trees to be cored
1826D2	Granite Quarry	MK 801 438	Yes	Yes	Yes	should be surveyed
1826D2	Mtoa toockshelter	MK 661 362	No	Yes	Yes	should be tested
1826D2	Railway Line	MK 757 489	No	No	Yes	should be intensively surveyed
1826D2	Lion Spoor Site	MK 786 448	No	No	Yes	should be surveyed
1826D3	Bembesi Pan	MK 623 174	No	No	Yes	should be surveyed

MAP	SITE NAME	UTM COORD	HIST	IRONAGE	STONE AGE	COMMENTS
% 1826D3	White Hills Pan Area	MK 625 147	No	No	Yes	should be intensively surveyed, tested
1826D3	Giraffe Pan North East	MK 576 108	No	No	Yes	should be surveyed
1826D3	Shapi Gravel Pit	MK 575 150	No	No	Yes	should be tested
1826D3	Giraffe Pan	MK 568 107	No	Yes	Yes	very urgent testing, mapping needed
1826D3	Guvalala	MK 727 183	No	No	Yes	should be surveyed
1826D3	East Shapi Swamp	MK 576 142	No	No	Yes	should be intensively surveyed.
1826D4	Umkauzane	MK 988 076	No	Yes	No	should be surveyed
1826D4	Dopi Gravel Pit	MK 923 159	No	No	Yes	should be tested
1826B2	Shakwanki	MJ 194 845	No	Yes	No	should be intensively surveyed tested
1926A3	Lememba	MJ 181 665	No	No	Yes	should be intensively surveyed tested
1926A3	Tamafupa	MJ 048 629	No	No	Yes	should be surveyed
1926A3	Shabi Shabi	MJ 131 629	No	Yes	No	should be intensively tested
1926B2	MaSummamalissa Gravel Pit	MJ 984 905	No	No	Yes	should be surveyed , tested
1926B3	Bushman Pan	MJ 686 565	No	No	Yes	should be surveyed
1926B4	Setshetshe	MJ 993 706	No	Yes	Yes	should be surveyed
1926B4	Libuti	MJ 776 482	Yes	Yes	No	should be surveyed and tested
1926C1	Ngwahla (Ngasha)	MJ 130 388	Yes	No	No	may be very recent

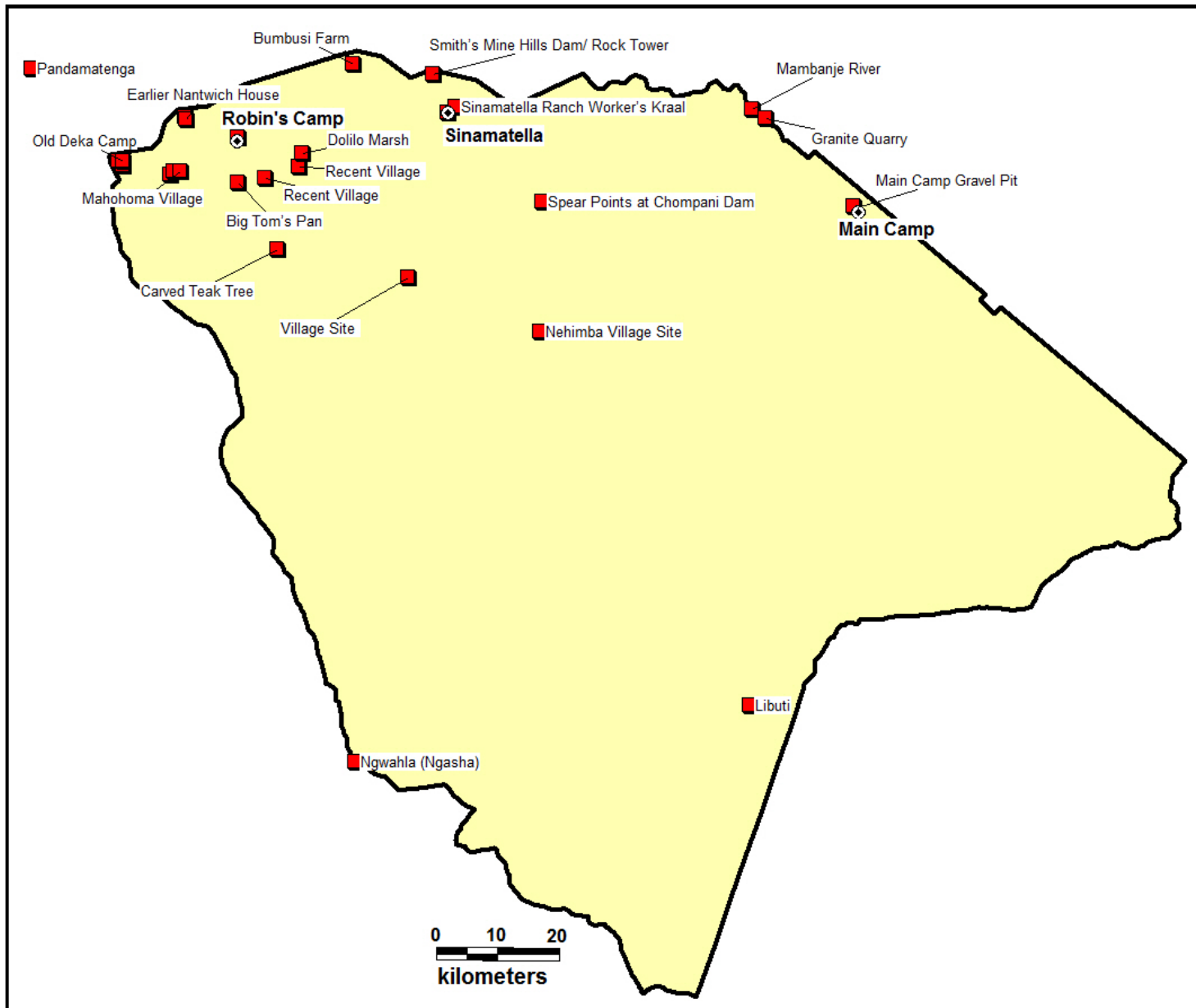


Figure: Historical Sites in Hwange National Park

Data was mapped from the Haynes and Kilomowicz Information – So only accurate to a six figure grid reference

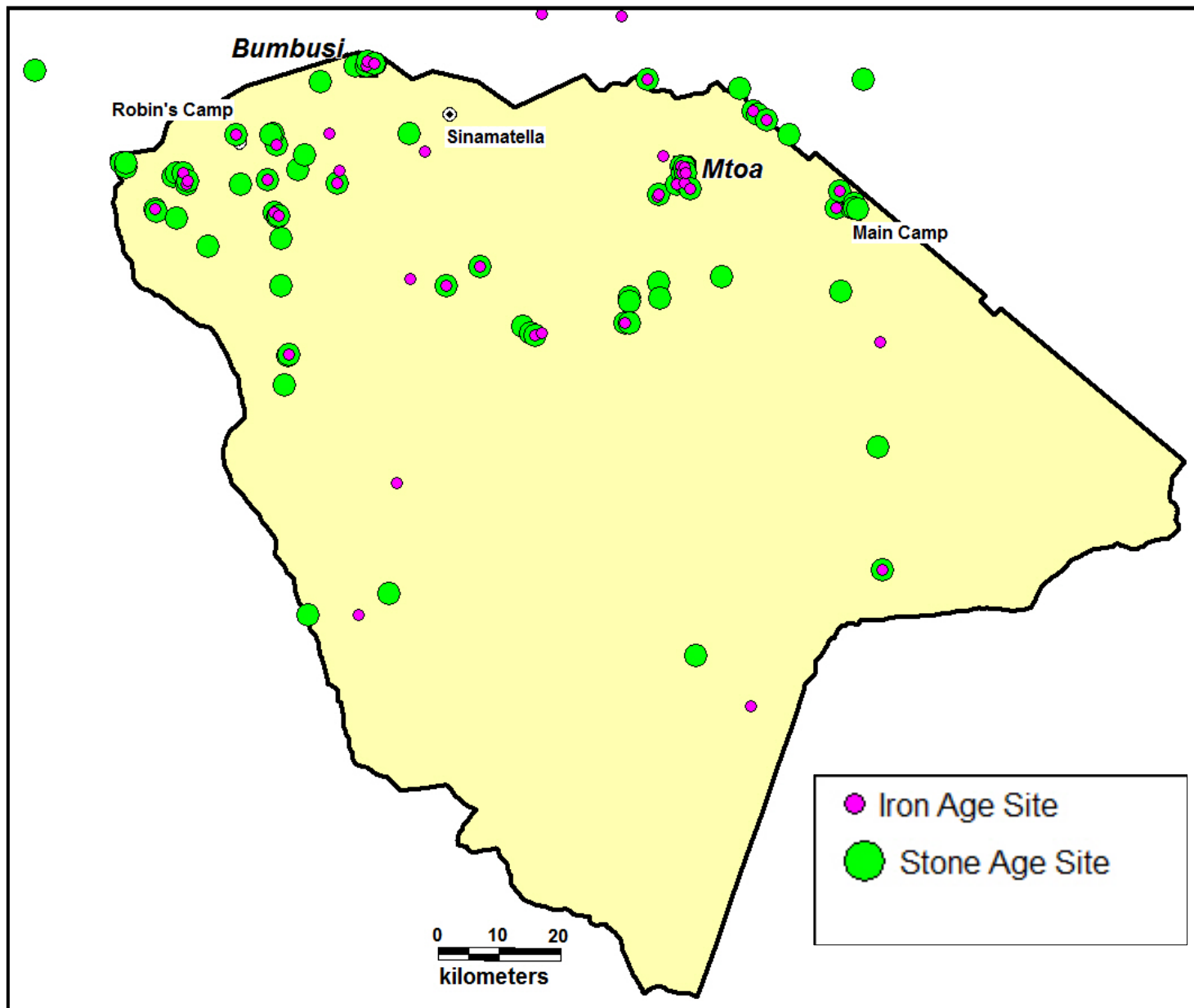


Figure: Historical Sites in Hwange National Park

Data was mapped from the Haynes and Kilomowicz Information – So only accurate to a six figure grid reference.

In addition some sites are both Stone Age and Iron Age.

ANNEX 3: VEGETATION SURVEY SUMMARY

1 NON-KALAHARI SAND VEGETATION TYPES

Group A - Woodland thicket types on Lower to Upper Karoo sediments

The three communities within this group are confined to small areas in the Sinamatella region, occurring on both sandstones and mudstones of the Karoo Series. They cover an area of 187.35 square kilometres.

Colophospermum mopane and *Diospyros quiloensis*, although rarely dominant, are most often represented in the group, *Canthium gfaucum*, *Combretum elaeagnoides*, *C. mossambicense*, *Markhamia zanzibarica* and *Acacia ataxacantha* are common.

Type 1 *Combretum - Boscia angustifolia* open scrub and thicket on Lower Karoo sandstone.

This scrub or thicket type occurs as small islands of vegetation. It can be seen on low, elongated dome-shaped, sandstone ridges on the eastern sides of the Masuma and Mandavu Dam. This type can be recognised as either open scrub or thicket (2 to 4 m tall) often dominated by *Combretum elaeagnoides*, *C. apicuiatum*, *C. ceiastroides* and *C. collinum* with scattered *Lonchocarpus eriocalyx*. Other common species include *Diospyros quiloensis*, *Colophospermum mopane*, *Canthium pseudorandii*, *Combretum collinum* and *Boscia angustifolia* var. *corymbosa*. Indicator species are *Canthium pseudorandii*, *Combretum collinum* and *Abrus schimperi*.

Type 2 *Colophospermum mopane - Acacia* woodland adjacent to riverine vegetation

This mopane woodland is found in the low lying Madumabisa mudstone areas adjacent to the riverine vegetation of watercourses such as the Lukozi River and its tributaries.

This type is less diverse than other types in this group, and commonly includes *Diospyros quiloensis*, *Dichrostachys cinerea*, *Combretum mossambicense*, *Terminalia prunioides*, *Erythroxylum zambesiicum*, *Acacia robusta* and *Acacia ataxacantha* in the well developed understorey. The indicator species *Acacia robusta* is generally associated with seasonally moist habitats in Hwange National Park.

Type 3 *Colophospermum mopane - Commiphora marlothii* mixed woodland on scree slopes.

This community or vegetation type is easily identified since it occurs only on steep scree slopes of escarpments of Karoo formations in the Sinamatella area. This species rich community (81 species) is a thicket or woodland thicket type, with no one species dominant. Almost always present are *Colophospermum mopane*, *Markhamia zanzibarica*, *Canthium glaucum*, *Combretum elaeagnoides*, *Grewia flavescens* var. *flavescens* and *Diospyros quiloensis*.

This type occurs on lithosols of the steep scree slopes of escarpments in the Sinamatella area. The species of woody plants found in this habitat are those which are thicket forming on rocky soils. The most common trees are usually found on rocky outcrops or in rocky areas, such as *Commiphora marlothii* and *Sterculia africana*.

Group B - Mixed bushland, thicket and woodland on Basement Complex formations.

This group of vegetation types is found in the Sinamatella and Robins sub-regions and in the north western area of the Main Camp sub-region, mainly on the Basement Complex.

The group is the most species rich in the Park (185 species). Most of the species present are generally found in rocky habitats or can be found in the middle to highveld where conditions are more moist. For example *Azelia quanzensis*, *Strychnos madagascariensis*, *Lannea discolor* and *Catunaregam spinosa* (*Xeromphis obovata*) are typically found in rocky areas, and *Diplorhynchus condylocarpon*, *Brachystegia boehmii*, *Euclea divinorum* and *Terminalia sericea* are frequently present in areas of higher rainfall.

Type 4 Castle kopje mixed woodland and thicket

This type is widespread in distribution in the Sinamatella area, occurring in the Mambanje area north west of Dete and on 2 km wide north-east, south-westerly oriented series of rocky kopjes. It is also found west of Sinamatella Camp on and around Bumboosie Hill on Basement Complex.

This is the most diverse of all the vegetation types in the Park (156 species). The community is generally mixed woodland and thicket with *Colophospermum mopane*, *Combretum apiculatum*, *Commiphora mossambicensis*, *Diospyros quiloensis*, *Erythroxylum zambesiaccum*, *Kirkia acuminata* being most commonly represented.

The indicator species of the type are *Bridelia mollis*, *Commiphora karibensis*, *Elephantorrhiza goetzei*, *Sterculia africana* and *Azelia quanzensis*. They are species typically found in rocky areas.

Type 5 *Colophospermum mopane* - *Julbernardia-Combretum* wooded bushland

In this mixed bushland to woodland, *Colophospermum mopane* and *Julbernardia globiflora* are commonly co-dominants with *Combretum zeyheri*, *C. apiculatum* and *Terminalia sericea*. *Diplorhynchus condylocarpon*, *Commiphora mossambicensis*, *Diospyros quiloensis*, *Carphalea pubescens*, *Erythroxylum zambesiaccum*, *Catunaregam spinosa*, *Pterocarpus rotundifolius* and *Grewia monticola* are found in the understory. There are numerous species occurring in this type which are found in miombo or *Brachystegia* woodland, for example, *Strychnos madagascariensis*, *Brachystegia boehmii*, *Lannea discolor* and *Pseudofachnostylis maprouneifolia*.

Type 6 *Combretum* - *Baphia* thicket

Combretum - *Baphia* thicket covers an extensive area (366.8 square kilometres) from Dete to Shumba, along the watershed, on the ecotone between the Kalahari sands and other geological types. The reddish sandy clay soils on which it occurs are Kalahari sands overlying Basement Complex or Basalt. The topography is usually flat to sloping.

In this diverse thicket to bushland type (130 species), the species most frequently occurring in samples include *Combretum apiculatum* (sometimes dominant) with *C. cefastroides*, *C. elaeagnoides*, *Colophospermum mopane*, *Erythroxylum zambesiaccum*, *Baikiaea plurijuga*, *Diospyros quiloensis*, *Pterocarpus rotundifolius*, *Grewia monticola* and *Commiphora mossambicensis*.

Group C - *Colophospermum mopane* woodland and thicket on Granitic Gneiss and Madumabisa Mudstones.

This mopane woodland group (types 7, 8 and 9) covers an extensive area in the Sinamatella region {692,3 square kilometres). In these woodlands dominated by *Colophospermum mopane*, species such as *Diospyros quiloensis* and *Erythroxylum zambesiacum* are almost always present. Although mopane woodland is often thought of as species poor, this is the third most diverse group with 156 woody species. Many of the thicket species are common, including *Combretum elaeagnoides*, *Markhamia zanzibarica*, *Carphalea pubescens*, *Cassia abbreviata*, *Cissus cornifolia*, *Acacia nigrescens*, *Commiphora mossambicensis*, *Combretum apiculatum*, *Dafbergia meianoxylon*, *Commiphora africana*, *C. pyracanthoides*, *Grewia monticola*, *Dichrostachys cinerea* and *Grewia flavescens* var. *flavescens*. The indicator species for the group is *Terminalia prunioides*.

Type 7 *Colophospermum mopane* - *Combretum* woodland on Basement Complex

This is the most extensive of the mopane woodland types covering 469 square kilometres. It can be found on the rocky ground of the Basement Complex from the northern boundary of the Park around Inyantue Siding stretching in a belt 1 km to 15 km wide, in a south west, north east orientation, to the edge of the Dandari Vlei.

It varies from woodland to bushland and thicket dominated by *C. mopane* with thicket species such as *Combretum apiculatum*, *C. elaeagnoides*, *Xeroderris stuhlmannii*, *Commiphora mollis*, *Terminalia randii*, *T. stuhlmannii*, *Diospyros quiloensis*, *Erythroxylum zambesiacum*, *Cissus cornifolia*, *Dichrostachys cinerea* and *Grewia monticola*

Type 8 *Colophospermum mopane* - *Terminalia prunioides* woodland on Madumabisa mudstones.

This type, found on Madumabisa mudstone on slightly raised ground, is found only in the Sinamatella sub-region on Karoo mudstones. *Colophospermum mopane* is always present as a tree and dominates this type forming a uniform woodland about 8 to 10 m tall. *Erythroxylum zambesiacum*, *Acacia nigrescens* and *Diospyros quiloensis* trees are scattered throughout this type. In the understorey *Combretum elaeagnoides*, *Terminalia prunioides*, *Erythroxylum zambesiacum*, *Commiphora pyracanthoides*, *Commiphora africana*, *Diospyros quiloensis*, *Grewia monticola* and *Vepris zambesiaca* are found.

Type 9 *Colophospermum mopane* - *combretum elaeagnoides* thicket on Basement Complex

This thicket is found from Deteema to Chingahobe, Dolilo and to below Bumboosie Hill. It covers a large area about 5 km on either side of the Inyantue River and north of Shumba Pans to the eastern edge of the Dandari Vlei. This is a *C. mopane* - *Diospyros quiloensis* - *Combretum elaeagnoides* thicket type with *Erythroxylum zambesiacum*, *Dichrostachys cinerea*, and *Carphalea pubescens*. *Diospyros quiloensis* trees and *Berchemia discolor* are the indicator species.

Other species include *Combretum mossambicense*, *Lonchocarpus capassa*, *Fiueggea virosa* and *Combretum imberbe* which are indicative of a sometimes riverine habitat. Thicket species such as *Xeroderris stuhlmannii*, *Canthium glaucum*, *Markhamia zanzibarica*, *Carphalea pubescens*, *Grewia flavescens* var. *flavescens*, *Combretum apiculatum* and *C. zeyheri* are commonly found in this community. The presence of species such as *Bauhinia petersiana*, *Combretum collinum*, *C. Zeyheri*, *Pseudolachnostylis maprouneifolia*, *Vitex paysonii* and *Baphia massaiensis* are indicative of the sandier soils of this type compared to the other mopane types of this group.

Group D - *Colophospermum mopane* - *Combretum imberbe* woodland to bushed grassland in SEASONALLY INUNDATED AREAS.

This group comprises two communities (types 10 and 11) which occur on alluvium and seasonally inundated soils in the Sinamatella, Robins and Dzivanini areas. In the Sinamatella area the first type in this group is found on the banks of the Lukozi River and Tshakabika Rivers and the second type in the Dzivanini area along the Gwabasabuya, Limpande and Dzivanini Rivers. In the Robins area the second type in this group is found on the upper reaches of the Little Toms, Big Toms, Salt Pans, Dolilo and Deteema Rivers, all along the Bumboosie River and surrounding Shumba Pans. *Lonchocarpus capassa*, *Combretum mossambicense* and *Combretum imberbe* (>3 m) are the indicator species for the group.

Type 10 Riverine vegetation with *Diospyros mespiliiformis* and *Combretum mossambicense*

This riverine vegetation is found mainly on the banks and terraces of the large rivers in the Sinamatella area on Karoo sediments and the granitic gneisses of the Basement Complex.

It is a diverse, tall woodland type (124 species) with a well developed understorey tending to thicket with species as *Diospyros quiloensis*, *Canthium glaucum* and *Stychnos potatorum*. *Combretum hereroense* is always present as a tree and *Combretum imberbe*, *Diospyros mespiliiformis*, *Lonchocarpus capassa*, *Acacia galpinii*, *Kigeia africana* and *Colophospermum mopane* are common constituents of the canopy. *Fiueggea virosa* (formerly *Securinea virosa*), *Combretum mossambicense* and *Dichrostachys cinerea* are common in the understorey. The indicator species are *Diospyros mespiliiformis*, *Combretum mossambicense*, *Fiueggea virosa* and *Diospyros quiloensis*.

Type 11 *Colophospermum mopane* - *Acacia* - *Combretum* grassland to woodland in seasonally inundated areas.

This community which varies from open bushed grassland to bushland, thicket and woodland, is usually dominated by *Colophospermum mopane* with scattered *Combretum imberbe*, *C. hereroense*, *Lonchocarpus capassa* and *Ziziphus mucronata*. Other common species include *Acacia nigrescens* and *Dichrostachys cinerea*.

According to Sweet (1971) some or ail of the soils of this type may be sodic. More sampling of the soils and species composition of this type is required. Boreholes yield salty water in the Dzivanini area.

Group E - *Colophospermum mopane* bushed grassland to woodland on the watershed, on Basalt and Karoo formations.

This group consists of a seasonally waterlogged type on deep soils derived from basalt (type 12), two types of shallow soils derived from basalt (typically in the Robins area, types 13 and 14) and two types on deep clay * one in the Sinamatella area (type 15) and the other (a seasonally waterlogged type) widespread in the Dzivanini area (type 16). It is the most geographically extensive group of the non-Kalahari sand types covering an area of 1,475.4 square kilometres. Only *Colophospermum mopane* is consistently present in almost all samples in this group.

Type 12 *Colophospermum mopane* - *Combretum hereroense* bushed grassland to bushland on the watershed.

Type 12 is widespread in distribution along the watershed, stretching from Dete to Shumba, Dandari Vlei and the Botswana border. It is the most extensive of the non- Kalahari sand vegetation types with an area of 592.4 square kilometres (4% of the Park). This community is associated with seasonally waterlogged soils derived from basalt and Kalahari sands where they meet.

In this mixed bushed grassland type *C. mopane* is almost always present but is not always dominant. Co-dominant species include *Combretum apiculatum*, *C. hereroense*, *C. imberbe*, *C. adenogonium*, *Terminalia sericea* and *Boiusanthus speciosus*. Other common species include *Pterocarpus*

rotundifolius, *Commiphora mossambicensis*, *Diplorhynchus condyocarpon*, *Daibergia melanoxylo*, *Euclea divinorum*, *Peltophorum africanum* and *Grewia monticola*.

Type 13 *Colophospermum mopane* - *Combretum* bushland on basalt.

This bushland and bushed grassland type is the typical *C. mopane* bushland of the Robins area and is found along the boundary with the Matetsi Safari Area, west of the Big Toms River and north of Tsamhole.

The species composition within type 13 varies with the topography; i.e. *Kirkia acuminata* is common in rocky areas, on hilltops; while *Diplorhynchus condyocarpon* may be found in more moist conditions; and *Combretum imberbet* *C. hereroense* and *Peltophorum africanum* are typical of seasonally waterlogged location.

The only low trees (about 3 to 4 m tall) usually found in this bushland are *C. mopane*, *Combretum apiculatum* and *C. hereroense*. The indicator species are *Diplorhynchus condyocarpon*, *Pterocarpus rotundifolius*, *Peltophorum africanum* and *Scferocarya birrea*.

Type 14 *Colophospermum mopane* bushland on basalt

This is the second type of bushland confined only to the basalt of the Robins area. It is found at or near (up to 8 km away from) the contact between basalt and the Basement Complex and Kalahari sand. The topography is undulating with low hills and many seasonal streams. Other than *Colophospermum mopane*, common species of this slightly more dense bushland type include *Combretum apiculatum*, *Commiphora pyracanthoides*, *Acacia nigrescens* and *Daibergia melanoxylo*.

Type 15 *Colophospermum mopane* - *Vepris zambesiaca* woodland on Madumabisa mudstones.

This mopane woodland type occurs predominantly on Madumabisa mudstones in the Sinamatella area. *Dichrostachys cinerea*, an indicator of disturbance, is always present in this type. The well developed understorey consists of *Diospyros quiloensis*, *Commiphora africana*, *C. pyracanthoides*, *Terminalia stuhlmannii*, *Daibergia melanoxylo* and *Grewia bicolor*.

Type 16 *Colophospermum mopane*-*Acacia* - *Grewia bicolor* stunted woodland in the Dzivanini area.

This type occurs extensively on deep basalt-derived clays in the Dzivanini area only. It covers an area of 371.5 square kilometres. The topography is flat to gently undulating.

There are only 26 species represented in the samples of this type, the least diverse in the Park. *C. mopane* is the dominant species, with the next most common species *Dichrostachys cinerea*. *Dalbergia melanoxylo*, *Acacia sieberiana*, *A. robusta*, *A. niootica*, *Acacia erubescens*, *Ximenia americana* and *Grewia monticoia* are also common. The indicator species is *Grewia* 6/co/or which is found as a low shrub with *Boscia matabelensis*.

The soils are mostly grey to black deep, self churning clays which crack when dry. In depressions in these areas, shallow lakes and marshes are formed, the extent of which depend upon the rainfall. In the dry season the areas can be seen as grasslands interspersed in the stunted mopane woodland. Periodic prolonged waterlogging, together with long dry periods from May to October, severely restrict the number of woody species which can survive on the Dzivanini mud flats. Only *Colophospermum mopane* was present in all samples, sometimes as scattered trees or as a stunted woodland.

2 KALAHARI SAND TYPES

There are 6 groups (F to K) described below. They cover three quarters of the Park from Main Camp to the Botswana border and south to the edge of the Dzivanini flats. *Baikiaea plurijuga* is the most common constituent of woodlands, and *Terminalia sericea* of bushlands. Indicator species of Kalahari sand types are *Baphia massaiensis*, *Acacia erioioba*, *Terminalia sericea*, *Ochna pulchra* and *Rhus tenuinervis*. *Acacia erioloba*, *A. fieckii*, *Rhus tenuinervis*, *Lonchocarpus nelsii* are found in every Kalahari sand vegetation type. Species which are only found in the Kalahari sand types are *Croton pseudopulchellus*, *Combretum psidioides* and *Guibourtia coleosperma*. The terrain of the Kalahari sands is characteristically flat.

Group F - *Combretum imberbe* bushed grassland on periodically waterlogged soils.

This group is widely distributed in the Kalahari sands and consists of types 17, 18 and 19. It extends over 1,302 square kilometres or 9% of the Park.

Type 17 *Colophospermum mopane* woodland - *Combretum* bushed grassland mosaic on ecotone Kalahari sands

This type is found in an extensive area just south of Shumba Pans, around Mopane Pan and in the Dzivanini area at the edge of the Kalahari sands and adjacent to the Gwabasabuya River and in patches along the Botswana border south of Korodziba Pan. It is a mosaic of *Colophospermum mopane* woodland or bushland interspersed with areas of *Combretum apiculatum*, *C. hereroense*, *C. collinum* and *Acacia nigrescens*.

Only *Colophospermum mopane* and *Acacia nigrescens* are commonly found as trees in representative samples. Common species are *Commiphora africana*, *Grewia flavescens* var. *flavescens*, *Terminalia sericea* and *Lonchocarpus nelsii*. The indicator species are *Acacia nigrescens* and *Lonchocarpus capassa*.

The surface soils are mostly sandy clays and the rest clays. They are derived from the underlying geology which is basalt, in the Dzivanini area and possibly in the Mopane Pan to Nehimba areas. There are several species which frequently occur in this type which are more typical of non-Kalahari sand vegetation types such as *Colophospermum mopane*, *Combretum apiculatum*, *Lonchocarpus capassa* and *Acacia nigrescens*.

Type 18 *Acacia* - *Boscia albitrunca* - *Colophospermum mopane* bushed grassland in interdune troughs

This type is widespread in the Triga Vlei area, Libuti, Josivanini, on the Jupanda, Manga, Kennedy and Linkwasha fossil vleis. It is associated with inter-dune troughs and fossil vlei line topography of the Kalahari sands. It is also found on the ecotone Kalahari sands in an area south of Libuti near Leasha. It is the most extensive type within this group covering an area of 781.8 square kilometres.

This type is dominated by grassland with scattered clumps of trees and bushes. The trees include species such as *Acacia erioioba*, *A. luederitzii*, *Combretum imberbe* and *Colophospermum mopane*, and the bush species are mainly *Combretum hereroense*, *C. apiculatum*, *Acacia erubescens*, *Grewia flavescens* var. *flavescens*, *Dichrostachys cinerea*, *Commiphora africana*, *Diospyros lycioides* and *Ziziphus mucronata*. *Boscia albitrunca* is a very noticeable evergreen constituent of this community with its striking gnarled, white trunk.

There are scattered seasonal pans all along the dune troughs, with clumps of *Ziziphus mucronata* and *Diospyros lycioides* often fringing the pan edge. There is also typically a large tree at the pan edge - a 15 to 20 m *Colophospermum mopane*, *Combretum imberbe* or *Acacia erioioba*. The indicator species are *Ziziphus mucronata* and *Boscia albitrunca*.

Type 19 *Combretum hereroense* - *Hyphaene* bushed grassland on calcrete.

Type 19 is found mainly in the east of the Park, in calcrete areas such as the ten mile drive, Ngweshla, Makwa, at the top of the Kennedy Vlei, Mbiza to Ngamo at the heads of fossil vlei lines and in the Josivanini and Shape areas. It is also found in inter-dune troughs of the northern dunes i.e. from Josivanini north and east to the Mbazu and Mandiseka area in the Park. Some of the larger areas of calcrete, such as Makololo and Ngamo, may have been playa lakes during the third pluvial of the Pleistocene era.

This type is the most diverse of the Kalahari sand types (107 species). The community is characteristically open bushed grassland dotted with *C. imberbetrees* and sometimes tall (25 metre) *Hyphaene* palms, and clumps of *C. hereroense*, *Diospyros hereroense* and *Dichrostachys cinerea* bushes. There is some concern over the regeneration of the *Hyphaene* palms since there are no palms of intermediate height or age (e.g. on the Mbiza or Makololo flats).

Common species include *Terminalia sericea* and *C. zeyheri*. The indicator species are *Burkea africana* and *Combretum imberbe*.

These calcrete areas are more extensive in area than the long, narrow dune troughs in which the *Acacia-Boscia albitrunca* - *Mopane* bushed grassland community is found. At the edges of the calcrete areas, with which this type is usually associated, the bushland becomes thicket and grades into type 30.

Combretum imberbe and *C. hereroense* are the most common species of tree, with *Terminalia sericea*, *Maytenus senegalensis* and *Peltophorum africanum* the most common of the tall shrubs. *Lonchocarpus capassa*, *Daibergia melanoxylon* and *Grewia monticola* are common in the low shrub stratum.

Group G - *Acacia-Baikiaea* bushland and woodland on Kalahari sands.

This group of bushland and woodland types (20, 21, 22 and 23) is widespread in distribution, occurring from the railway line in the east to the Botswana border. The area covered by the group is about 3,106.6 square kilometres or 21.8% of the Park. It is the most extensive group of vegetation types with 106 woody species.

Type 20 *Acacia-Mundulea sericea* bushland

Type 20 is found in the Triga Vlei, Wexcau area, Josivanini, Umkowazaan, Shape and Guvalala area and is associated with inter-dune troughs and eroded dune troughs especially in the Triga Vlei system. It covers an area of 967.2 square kilometres, nearly 7% of the Park.

This bushland is usually dominated by *Acacia* species such as *A. iuederitzii* and *A. ataxacantha*, and sometimes *A. erubescens*. *Colophospermum mopane*, *Lonchocarpus nelsii* and *Boscia albitrunca* may also be dominant or very common, although the latter species if not found in the northern Kalahari sand areas. In the tree canopy layer only three species are commonly represented in samples - *Acacia erioioba*, *Lonchocarpus nelsii* and *A. iuederitzii*. *Mundulea sericea* is almost always present as a tall shrub and *Dichrostachys cinerea*, *Terminalia sericea*, *Combretum coiinum*, *Grewia flavescens* var. *flavescens*, *Combretum hereroense* and *Ochna cinnabarina* are also very common shrubs.

Type 21 *Terminalia sericea* - *Lonchocarpus nelsii* bushland

Type 21 is found in the Guvalala, Nyamandhlovu, Sinanga and Umkowazaanto Libuti areas on flat terrain, in shallow fossil drainage lines and in or adjacent to dune troughs on sandy clay soils. This type has a variable physiognomy, from bushland to thicket and woodland but is most often bushland. *Lonchocarpus nelsii*, *Combretum collinum*, *Terminalia sericea* and *Acacia erioioba* trees are often present. In the tall shrub layer *Dichrostachys cinerea* and *Acacia ataxacantha* are the most frequently encountered species, with others such as *Acacia fleckii*, *Combretum collinum*, *Ochna*

pulchra, *Grewia flavescens* var. *flavescens* (which is always present) *Combretum zeyheri* and *Lonchocarpus nelsii*. The indicator species is *Ochna pulchra*.

This community occurs adjacent to type 23 *Baikiaea* woodland and type 26 *Burkea africana* bushland and woodland. It mainly occurs in an area which was logged from the 1920's until 1944 and has a high elephant density in the dry season. This vegetation may thus be a degraded form of *Baikiaea* woodland as Childes & Walker (1987) have suggested.

Type 22 *Colophospermum mopane* - *Combretum apicuiatum* bushland

This type occurs in the Manga Two area, Makona, Wexcau, Triga Vlei and Josivanini area in flat, depressed areas on sandy clay soils. It covers an area of only 28.3 square kilometres, the least extensive of the Kalahari sand types.

Colophospermum mopane trees are common although not usually dominant. Scattered *Combretum apicuiatum*, *Acacia fleckii*, *Boscia albitrunca*, *Terminalia sericea* and *Lonchocarpus nelsii* and *Combretum collinum* are common constituents. The presence of *Colophospermum mopane* and *Baikiaea plurijuga* together in the same community is unusual. They are usually representative of the shallow clay soils and deep sandy soils respectively.

The indicator species are *Colophospermum mopane* and *Dalbergia melanoxylon*. Other species which differentiate this type from the other types in group G include *Markhamia zanzibarica*, *Erythroxylum zambesiacum*, *Cissus cornifolia*, *Commiphora mossambicensis*, *AHophylus africanus*, *Combretum apicuiatum*, *Euclea divinorum*, *Peltophorum africanum*, *Dichapetalum rhodesicum* and *Pterocarpus angolensis*.

Type 23 *Baikiaea* - *Combretum* woodland thicket on fossil sand dune crests.

This woodland thicket type is found mainly on fossil sand dune ridges in the central and southern Kalahari sand areas of the Park and on the western edges of most fossil drainage lines in the eastern part of the Park. It occurs west and south of the Dopfi fossil drainage line as small patches of woodland surrounded by *Terminalia-Baikiaea* bushland (type 25). It covers an area of 1,329.1 square kilometres in over 600 patches of woodland thicket and is the most fragmented vegetation type.

This type is dominated by *Baikiaea plurijuga* which is present in the canopy layer in all samples of this type. Other trees include *Acacia erioioba*, *Lonchocarpus nelsii* and *Croton gratissimus* the latter two of which may be classified as tall shrubs (over 3 m tall). Common tall shrubs (1-3 m tall) include *Combretum celastroides* (can be over 3 m in height), *Dichrostachys cinerea*, *Ochna cinnabarina*, *Acacia ataxacantha*, *Grewia flavescens* var. *flavescens*, *Baphia massaiensis*, *Croton gratissimus* and *Acacia fleckii*. Of the low shrub (<1 m tall) species *Grewia aveliana* is the most commonly encountered, with *Rhus tenuinervis*, *Hippocratea indica* and *Croton pseudopulchellus*. The indicator species are *Baikiaea plurijuga*, *Combretum celastroides*, *Grewia aveliana*, *Croton gratissimus* and *C. pseudopulchellus*.

At the edge of this woodland, *Baikiaea* trees may be replaced by pure samples of *Acacia erioioba* trees.

Group H - Terminalia - Combretum bushland

This group of bushland types (24 and 25) occurs extensively in the Kalahari sand area covering an area of 2,830.7 square kilometres or about 20% of the Park. *Combretum* species (*C. collinum* and *C. zeyheri*) and *Terminalia sericea* dominate these types. Also common are *A. erioloba*, *Baphia massaiensis*, *Ochna pulchra*, *Combretum psidioides*, *Croton pseudopulchellus*, *Erythrophleum africanum* and *Burkea africana*.

Type 24 *Terminalia sericea* - *Acacia erioloba* bushland

This vegetation is found in or beside fossil drainage lines (especially the Dopivlei) and in the Triga Vlei where sands have been eroded. It thus has a relatively restricted distribution.

The main difference between this bushland and type 25 bushland is that *Baikiaea plurijuga* is completely absent from this type. *Terminalia sericea*, *Acacia erioloba* and *Burkea africana* are always present (usually as scattered trees), and in the tall shrub layer *Ochna pulchra* is always present with *Baphia massaiensis*, *Combretum psidioides* and *Ancylanthos bainesii* and *Acacia ataxacantha*.

Type 25 *Terminalia sericea* - *Baikiaea plurijuga* bushland

This *Terminalia sericea* bushland is the most widespread of all vegetation types covering an area of 2,572.4 square kilometres or 18% of the Park. Although *Baikiaea plurijuga* does not occur in every sample representing this type, species which are usually associated with *Baikiaea* do. Thus *Bauhinia petersiana*, *Combretum collinum*, *Baphia massaiensis* and *Croton pseudopulchellus* are almost always present in this type. The latter species is one which differentiates this type from the former *Terminalia* bushland type.

It is found west of Nyamandhlovu Pan and near Caterpillar, to the Botswana border and to the southern-most limit of the Kalahari sand. It occurs on deep redistributed Kalahari sand and on fossil dune crests adjacent to type 23 *Baikiaea plurijuga* - *Combretum celastroides* woodland. Species which occur with the dominant *Terminalia sericea* include *Baikiaea plurijuga*, *Combretum collinum*, *C. zeyheri*, *Ochna pulchra*, *Baphia massaiensis*, *Dichrostachys cinerea*, *Acacia ataxacantha*, *A. fleckii* and *Croton pseudopulchellus*. The indicator species are *Commiphora angolensis*, *Croton pseudopulchellus*, *Baikiaea plurijuga* and *Pterocarpus angolensis*.

Group I - *Baikiaea plurijuga* woodland and bushland on deep Kalahari sands.

Within this group are two typical *Baikiaea* woodland types and a bushed woodland type. Type 27 is widely distributed in the Main Camp to Mandiseka area in the east of the Park.

Types 26 and 28 are found in the eastern Kalahari and west of the extension of Manga fossil drainage line and between Dina pan, Tibukai and Cement on the Botswana border.

The indicator species for this group are *Vitex payos*, *Guibourtia coleosperma*, *Diplorhynchus condylocarpon* and *Pseudolachnostyhis maprouneifolia*.

Type 26 *Burkea africana* - *Pterocarpus angolensis* bushland and woodland.

This type is usually found in the eastern edges of fossil vlei lines, on redistributed Kalahari sands. It is often found adjacent to *Baikiaea* - *Guibourtia coleosperma* woodland, Type 27 and is also widely distributed west of the Manga Vlei line.

This bushland to woodland type is dominated by *Burkea africana*, *Terminalia sericea* and *Erythrophleum africanum*. Common shrubs include *Combretum zeyheri*, *C. psidioides*, *Baphia massaiensis*, *Combretum collinum* and *Ochna pulchra* and *Vitex payos*. *Diplorhynchus condylocarpon*, *Bauhinia petersiana*, *Strychnos spinosa* and *Guibourtia coleosperma* are common as low shrubs.

The indicator species is *Combretum collinum*, separating this type from type 27. Other differential species include *Acacia ataxacantha*, *Croton pseudopulchellus* and *Dichapetalum rhodesicum*. *Baikiaea plurijuga* is present in only two thirds of the samples of this type which is similar to type 25.

Type 27 *Baikiaea plurijuga* - *Guibourtia coleosperma* woodland

This vegetation type is found only in the eastern Kalahari sand areas, on deep redistributed sand and is often situation adjacent to type 30 and calcrete areas. It is more extensive than type 28 covering an area of 604 square kilometres. It is found around Main Camp and down to Ngamo in the east and as far as Manga Vlei in the west. It is not found west of the Manga Vlei extension in this Park. Since the rainfall is thought to be on average higher in the east of the Park than the west, one could hypothesize that this type is associated with more moist or mesic conditions.

This woodland is dominated by *Baikiaea plurijuga* and *Guibourtia coleosperma*. *Croton pseudopulchellus*, *Erythrophieum africanum* and *Pterocarpus angolensis* are important constituents. *Burkea africana* and *Terminalia sericea* are also often present as trees. *Ochna pulchra*, *Terminalia sericea*, *Combretum zeyheri* and *Pseudolachnostylis maprouneifolia* are common tall shrubs. In the low shrub stratum *Diplorhynchus condylocarpon*, *Strychnos spinosa*, *Vitex payos* and *Pterocarpus angolensis* are common.

The indicator species are *Baikiaea plurijuga*, *Guibourtia coleosperma* (1-3 m) and *Pseudolachnostylis maprouneifolia*. Other species which differentiate this type from type 29 are *Dichrostachys cinerea* and *Acacia erioioba*.

Type 28 *Baikiaea plurijuga* - *Croton gratissimus* woodland

This type is very similar to type 27 and is found near Dete, on White Hills and in the west of the Kalahari sand area near Shakwanki and north east of Xibi Amabandi. It is found on deep redistributed Kalahari sand, and is characteristically found on the catenal position between type 27 and ecotone *Baikiaea plurijuga* woodland to bushland.

Indicator species are *Croton gratissimus* (1-3 m) and *Vangueria infausta*. Other species which differentiate this type from types 26 and 27 are *Grewia monticola*, *Rhus tenuinervis* and *Grewia avellana*.

In this woodland type *Baikiaea plurijuga* is almost always present as a tree, with *Guibourtia coleosperma* and *Croton gratissimus*. In the tall shrub layer *Croton pseudopulchellus*, *C. gratissimus*, *Baphia massaiensis*, *Combretum zeyheri*, *C. collinum*, *C. psidioides*, *Ochna pulchra*, *Terminalia sericea* and *Vangueria infausta* are common. In the low shrub layer *Dichapetalum rhodesicum*, *Dichrostachys cinerea*, *Grewia aveliana*, *Bauhinia petersiana* and *Burkea africana* are common.

Group J - Ecotone *Baikiaea plurijuga* woodland and thicket on red Kalahari sands.

Type 29 Ecotone *Baikiaea plurijuga* - *Commiphora mossambicensis* woodland and thicket

Ecotone *Baikiaea plurijuga* - *Commiphora mossambicensis* woodland thicket is found in the northern reaches of the Kalahari sand - the most extensive tracts of this type being in the Robins sub-region. It covers an area of 855.4 square kilometres within the Park. It is a well developed *Baikiaea* woodland type, in terms of canopy cover and its diverse and dense understorey.

This teak woodland being on the ecotone, has the greatest species diversity of the teak woodland types, with 99 species. In the canopy, which is dominated by *Baikiaea plurijuga*, there is also *Erythrophleum africanum*, *Combretum apiculatum*, *Terminalia sericea*, *Erythroxylum zambesiacum* and *Burkea africana*. In the tall shrub layer *Ochna pulchra*, *Baphia massaiensis*, *Combretum collinum*, *Bauhinia petersiana* and *Terminalia sericea* are common. *Catunaregam spinosa* (formerly *Xeromphis obovata*), *Diplorhynchus condylocarpon*, *Grewia monticola* and *Dichapetalum rhodesicum* are common in as low shrubs.

Group K - *Burkea africana* bushland surrounding calcrete areas.

Type 30 *Burkea africana* - *Terminalia brachystemma* bushland

This Kalahari sand group is restricted in distribution to the east of the Park, from Main Camp to Ngamo, adjacent to or surrounding calcrete areas, along the top of the eastern watershed area. The vegetation is bushland, thicket or woodland dominated by *Burkea africana* and *T. sericea* with *Erythrophleum africanum*, *Combretum imberbe* and *Combretum hereroense*. It is the presence of the latter *Combretum* species, which are tolerant of waterlogged conditions, and which separate this type from type 26 *Burkea* bushland and woodland. The latter type is also found adjacent to calcrete areas. Scattered *Guibourtia coleosperma* and *Combretum imberbe* trees may be found in this type. Other common constituents include *Ochna pulchra*, *Combretum psidioides*, *Annona stenophylla*, *Diplorhynchus condyocarpon*, *Strychnos spinosa* and *Swartzia madagascariensis*. Type 30 is differentiated from Type 29 by the obvious absence of *Baikiaea plurijuga* and the presence of *Terminalia brachystemma*, *Annona stenophylla* and *Combretum imberbe*.

Hyphaene petersiana is a notable species in this type but its distribution is patchy (it is not a consistent component of the samples representing this type. Other unusual species to be found here, but rarely so, are *Parinari curatifolia* (found nowhere else in the Park) and *Kigelia africana* (usually only found in riverine fringe in Hwange).

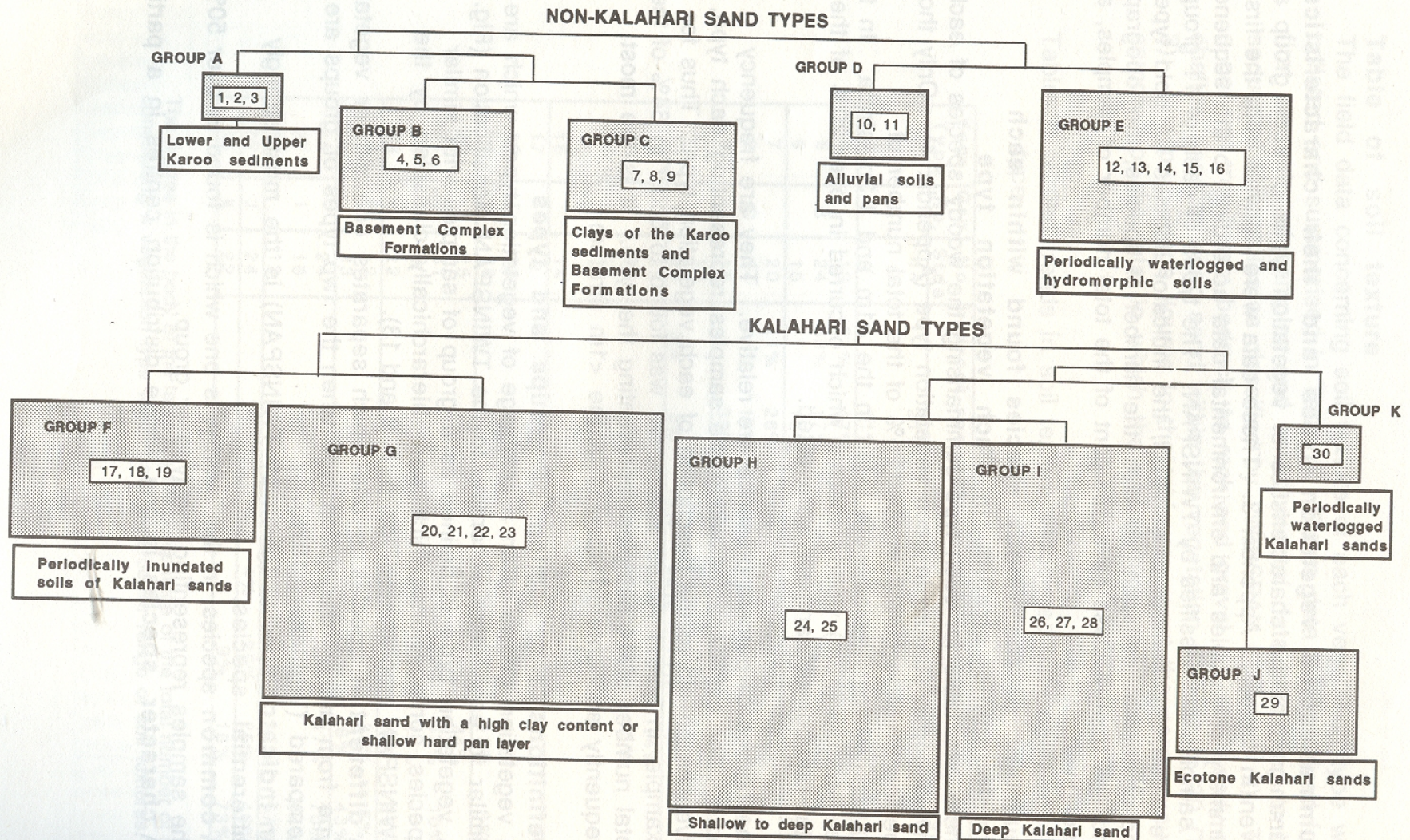


Fig. 4. Vegetation groups and types and their associated geology, according to the TWINSpan classification.
 Note that the areas of the boxes around the type numbers are representative of the areas covered by each vegetation group.

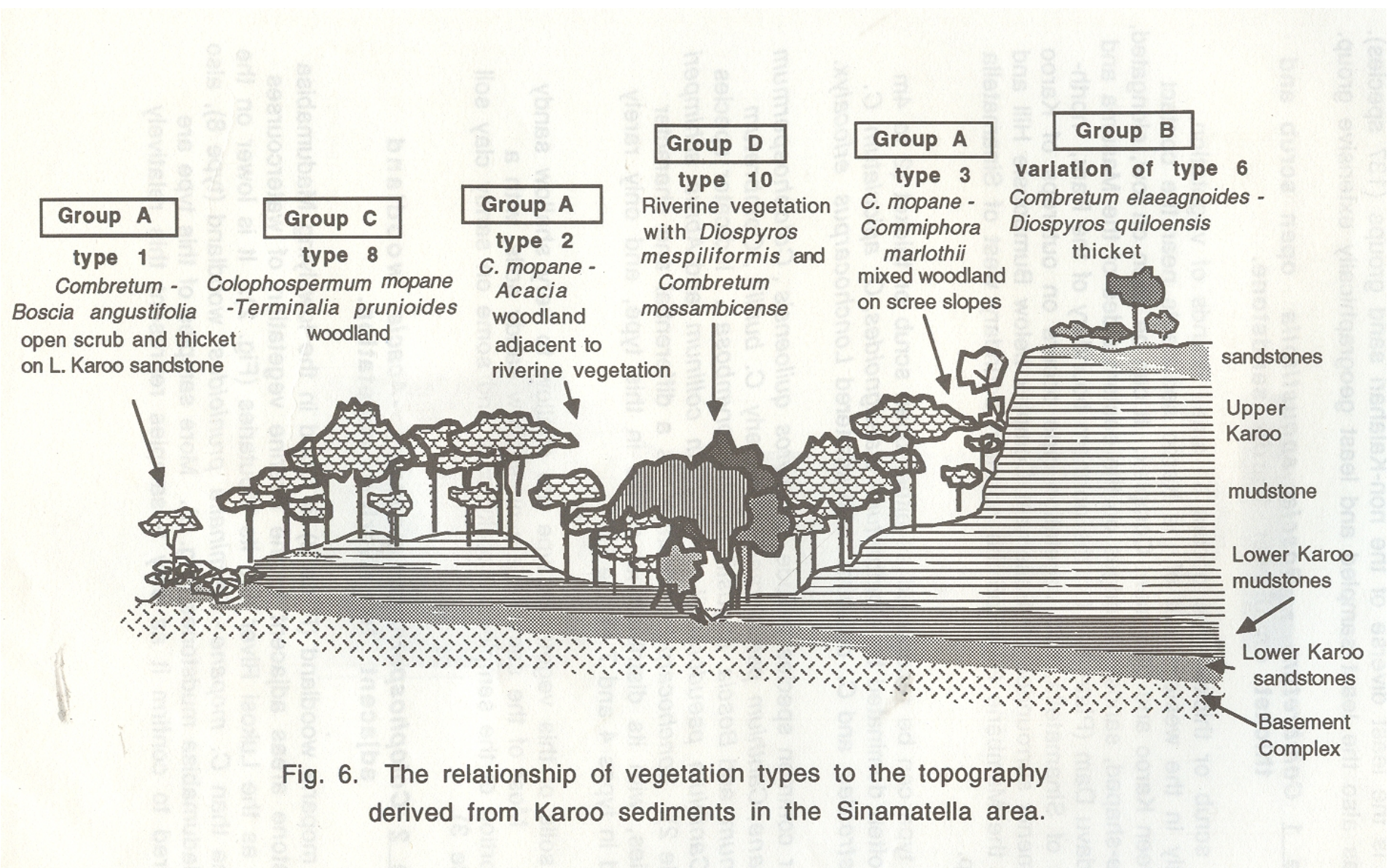


Fig. 6. The relationship of vegetation types to the topography derived from Karoo sediments in the Sinamatella area.

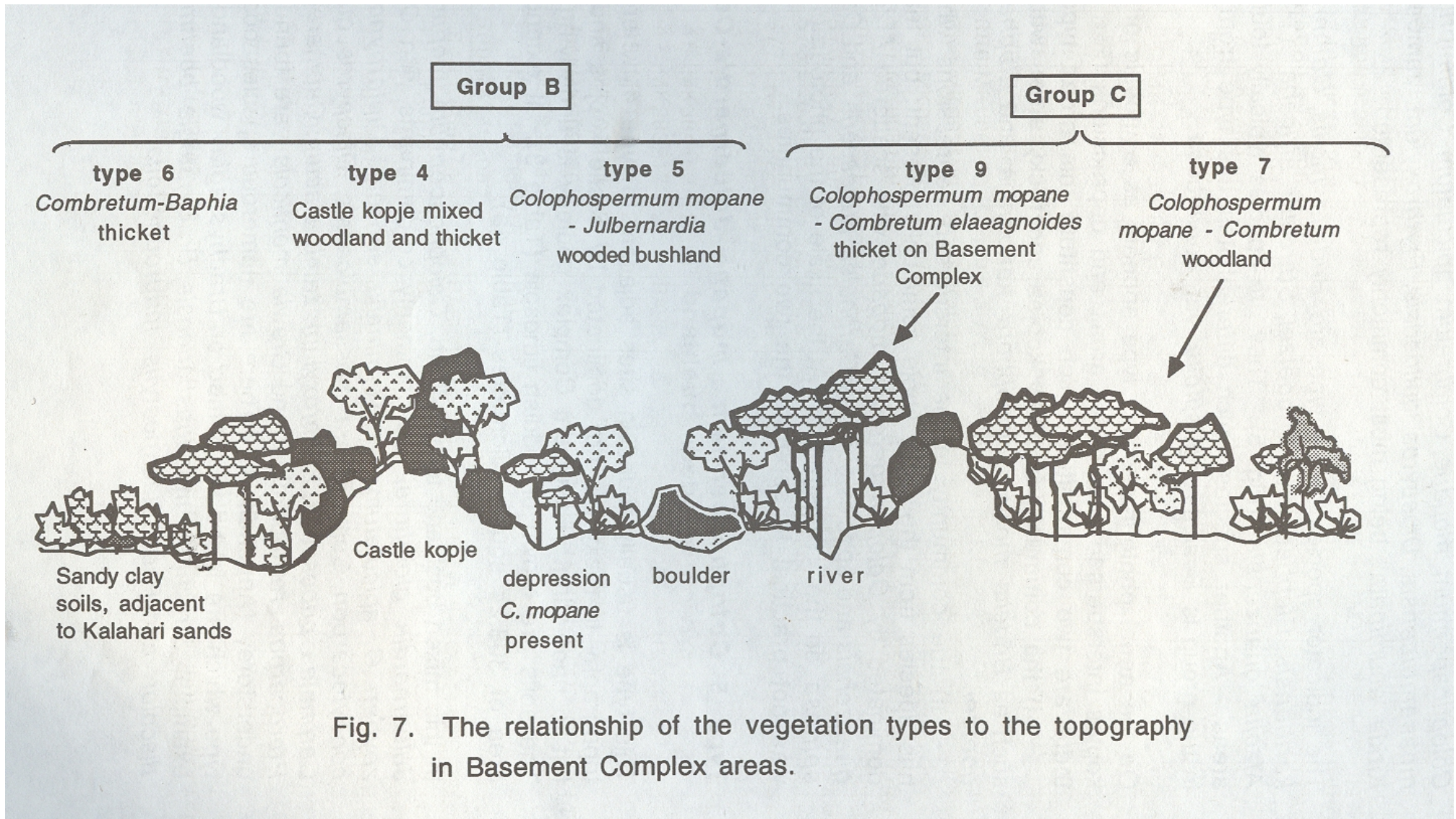


Fig. 7. The relationship of the vegetation types to the topography in Basement Complex areas.

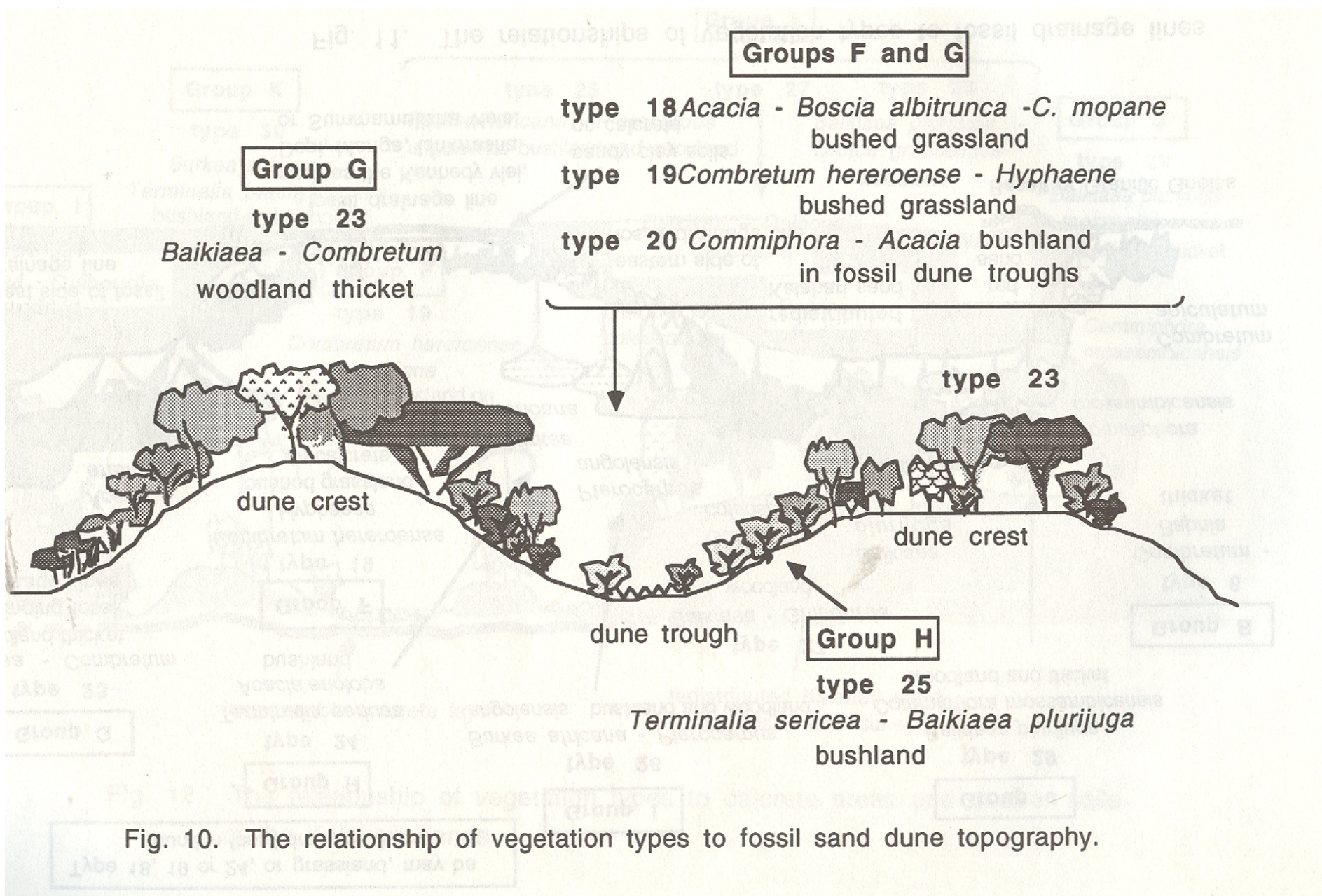


Fig. 10. The relationship of vegetation types to fossil sand dune topography.

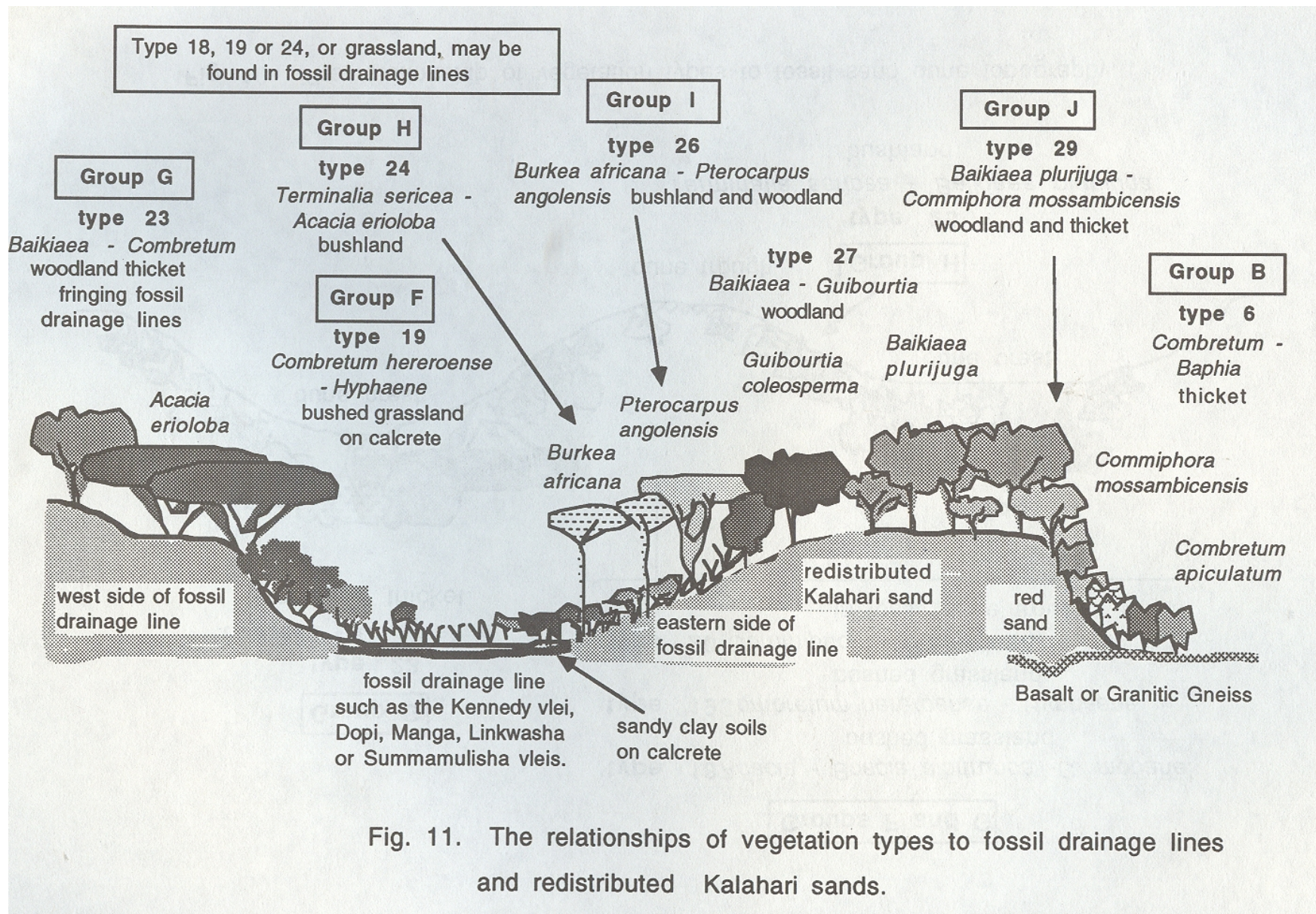


Fig. 11. The relationships of vegetation types to fossil drainage lines and redistributed Kalahari sands.

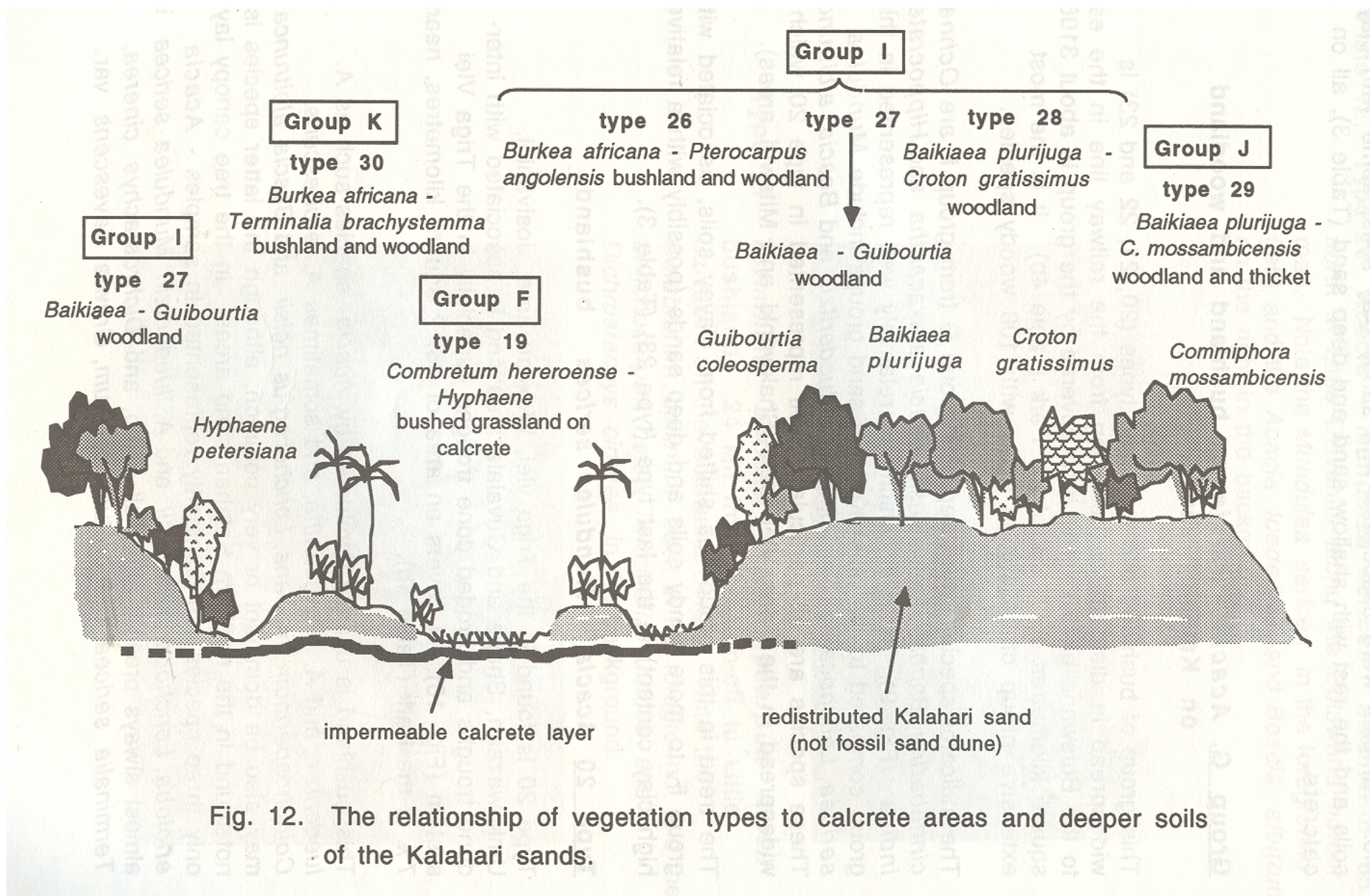


Fig. 12. The relationship of vegetation types to calcrete areas and deeper soils of the Kalahari sands.

ANNEX 4: PRELIMINARY ARTHROPOD LISTING

Lists from Ecologist, Main Camp

1: Bushed Grassland

Arachnids

Order	Family	Genus	Species
.....	Scolopendromorpha	Scolopendra	morsins
Araneomorpha	Amonoxenidae	Ammoxenus	daelidus
Araneomorpha	Amonoxenidae	Dasylabris	stimubtrix
Araneomorpha	Amonoxenidae	Ammoxenus	daelidus

Insects

Insects – Bushed Grassland			
Order	Family	Genus	Species
.....	.....	Paltothyreus	sp
.....	.....	Pogonobasis	verruciosa
Coleoptera	.....	Adesmia	sp
	Bulprestidae	Phaenoderus	magnicollis
	Carabidae	Boeomimetes	ephippium
	Carabidae	Boeomimetes	ephippium
	cucculionidae	Paltothyreus	tarsatus
	cucculionidae	Euronycha	byrrhinus
	Elateritidae	Cardiotarsus	capensis
	Melolonthinae	Euronycha	byrrhinus
	Melolonthinae	Zophosis	rikatlae
	Scarabidae	Copris	bornemisszai
	Scarabidae	Pachylomerns	femorallis
	Scarabidae	Copris	bornemisszai
	Scarabidae	Pachylomerns	femorallis
	Tenebrionidae	Zophosis	rikatlae
	Tenebrionidae	Adesmia	sp
	Tenebrionidae	Phanerotoma	scrobicolle
	Tenebrionidae	Tarsocnodes	molossa
	Tenebrionidae	Pachylomerns	femorallis
	Tenebrionidae	Hoplocorypha	sp
	Tenebrionidae		
	Tenebrionidae		
	Tenebrionidae	Zophosis	rikatlae
	Tenebrionidae	Adesmia	sp
	Tenebrionidae	Phanerotoma	scrobicolle
	Tenebrionidae	Stips	gebieni
	Tenebrionidae	Tarsocnodes	molossa
Diptera	Calliphoridae	Hemipyrellia	sp
	Calliphoridae	Tarsocnodes	molossa
	Calliphoridae	Hemipyrellia	sp
Hemiptera	.....	Latimbus	sp
	Coridae	Agonoscemis	puberula
	Pentatomidae	Agonoscemis	puberula

Insects – Bushed Grassland			
Order	Family	Genus	Species
	Pentatomidae	Agonoscemis	puberula
	Reduviidae	....(juvenile)....	.....
Hymenoptera	Formicidae	Paltothyreus	tarsatus
	Formicidae	Amnoxenus	daelidus
	Formicidae	Hemipyrellia	sp
	Formicidae	Paltothyreus	tarsatus
	Multilidae	Dasylabris	stimubtrix
	Multilidae	Sphingonotas	tricinctus
	Multilidae	Dasylabris	stimubtrix
Isoptera	Macrotemit	Macrotemes	michaeseni
	Macrotemit	Macrotemes	michaeseni
Mantodea	Mantididae		
Orthoptera	Acrididae	Trilophidia	sp
	Acrididae	Trilophidia	sp
	Acridinae	Sphingonotas	tricinctus
	Acridinae	Himatismus	epitragoides
	Acridinae	Sphingonotas	tricinctus
ref 65	.....	Hildebrandti	sp
.....	Eggs	.....	.....
.....	Eggs	Phanerotoma	scrobicolle
.....	Eggs	.....	.....

2: Grassland Mosaic

Arachnids

Order	Family	Genus	Species
Araneomorpha	Amonoxenidae	Ammoxenus	daelidus
	Scolopendromorpha	Scolopendra	morsins

Insects

Order	Family	Genus	Species
Coleoptera	Bulprestidae	Hildebrandti	sp
Coleoptera	Carabidae	Boeomimetes	ephippium
Coleoptera	cucculionidae		
Coleoptera	Elateritidae	Cardiotarsus	capensis
Coleoptera	Scarabidae	Copris	bornemisszai
Coleoptera	Scarabidae	Pachylomerns	femorallis
Coleoptera	Tenebrionidae	Zophosis	rikatlae
Coleoptera	Tenebrionidae	Adesmia	sp
Coleoptera	Tenebrionidae	Phanerotoma	scrobicolle
Coleoptera	Tenebrionidae	Stips	gebieni
Coleoptera	Tenebrionidae	Tarsocnodes	molossa
Diptera	Calliphoridae	Hemipyrellia	sp
Hemiptera	Pentatomidae	Agonoscemis	puberula
Hymenoptera	Formicidae	Paltothyreus	tarsatus
Hymenoptera	Multilidae	Dasylabris	stimubtrix
Isoptera	Macrotemit	Macrotemes	michaeseni
Orthoptera	Acrididae	Trilophidia	sp
Orthoptera	Acridnae	Sphingonotas	tricinctus

3: Thickets

Arachnids

Order	Family	Genus	Species
Araneomorpha	Amonoxenidae	Ammoxenus	daelidus

Insects

Order	Family	Genus	Species
Coleoptera	cucculionidae	Phaenoderus	magnicollis
Coleoptera	Melolonthinae	Euronycha	byrrhinus
Coleoptera	Scarabidae	Pachylomerns	femorallis
Coleoptera	Tenebrionidae	Zophosis	rikatlae
Coleoptera	Tenebrionidae	Adesmia	sp
Coleoptera	Tenebrionidae	Phanerotoma	scrobicolle
Coleoptera	Tenebrionidae	Tarsocnodes	molossa
Coleoptera	Tenebrionidae	Pogonobasis	verruciosa
Coleoptera	Tenebrionidae	Himatismus	epitragoides
Diptera	Calliphoridae	Hemipyrellia	sp
Hemiptera	Coridae	Latimbus	sp
Hemiptera	Pentatomidae	Agonoscemis	puberula
Hymenoptera	Formicidae	Paltothyreus	tarsatus
Hymenoptera	Formicidae	Paltothyreus	sp
Hymenoptera	Mutillidae	Dasylabris	stimubtrix
Mantodea	Mantididae	Hoplocorypha	sp
Orthoptera	Acridinae	Sphingonotas	tricinctus

ANNEX 5: REPTILES

List from Ecologist, Main Camp

Common Name	Scientific Name
Puff Adder	<i>Bitis arietans</i>
Gaboon Viper Adder	<i>Bitis gabonica</i>
Berg Adder	<i>Bitis atropos</i>
Horned Adder	<i>Bitis caudalis</i>
Common Nite Adder	<i>Causus rhombeatus</i>
Black Mamba	<i>Dendroaspis polylepis</i>
Green Mamba	<i>Dendroaspis angusticeps</i>
Egyptian Cobra	<i>Naja haje</i>
Forest Cobra	<i>Naja melanoleuca</i>
Mozambican Spitting Cobra	<i>Naja mozambica</i>
Rinkaals	<i>Heamachatus heamachatus</i>
Boomslang	<i>Dispholidus typus</i>
Southern Twigsnake/Southern Vinesnake	<i>Thelotornis capensis</i>
Olive Grass Snake	<i>Psammophis sibilans</i>
Western Yellow Billed Sand Snake	<i>Psammophis subtaeniatus</i>
Tiger Snake	<i>Telescopus semiannulatus</i>
Black Headed Centipede Eater	<i>Amblyodipsas ventrimaculatus</i>
Southern African Python	<i>Python sebae</i>
Mole Snake	<i>Pseudaspis cana</i>
Greensnake	<i>Philothamnus hoplogaster</i>
Bush Snake	<i>Philathamnus semivuriogatus</i>
Common Egg Eater	<i>Dasypeltis scabra</i>
Common Slug Eater	<i>Duberria lutix</i>
Schlegels Blind Snake	<i>Typhlops schlegelii</i>
Bibrons Blind Snake	<i>Typhlops bibronii</i>
Thread /Wormsnake Peters Black Worm Snake	<i>Leptotyphlops scutifrons</i>
Black Thread Snake	<i>Leptotyphlops conjuncta</i>
Long Tailed Thread Snake	<i>Leptotyphlops longicauda</i>
Amphisbaenians/Worm Lizards	
Van Dams Dwarf Worm Lizard	
Kalahari Dwarf Worm Lizard	
Blunt Headed Worm Lizard	
Agamas	
Southern Tree Agama	

Common Name	Scientific Name
Chameleons	
Common Flap Neck Chameleon	
Lizards	
Ornate Sandveld Lizard	
Ornate Rough Scaled Lizard	
Jones Girdled Lizard	
Zimbabwe Flat Lizard	
Giant Plated Lizard	
Rough Scaled Plated Lizard	
Speckled Rock Skink	
Rainbow Skink	
Crocodiles	
Nile Crocodile	<i>Crocodylus niloticus</i>
Tortoises	
Spekes Hinged Tortoise	
Geckos	
Cape Gecko	
Van Sons Gecko	
Zimbabwe Flat Ghecko	
Common Tropical House Gecko	
Flat Headed Tropical House	
Wahlbergs Velvet Gecko	
Common Dwarf Gecko	
Bradfields Dwarf Gecko	
Giant Ground Gecko	
Kalahari Ground Geckos	
Turners Gecko	
Common Barking Gecko	

ANNEX 6: BIRDS

This list is from the Ecologist, Main Camp

Status_key	Habitat_key	Habitat_key	Habitat_key
b=breeder	A=aquatic	E=ephemeral pans	KSW=kalahari sand woodland
m=migrant	BV=basaltic vleis	GH=granite hills	R=rivers
r=resident	C=camps only	KSG=kalahari sand grassland	S=shallow soils on basalt
v=vagrant	D=dams	KSP=kalahari sand pans	SB=Southern basalt only
			T=throughout the park

zim.no	species	status	Habitat
1	Ostrich	br	ksw/b
3	Black-necked Grebe	v	d
4	Dabchick	bm	e
5	white Pelican	m	d
6	Pink-backed Pelican	m	d
8	Reed cormorant	bm	e
9	African Darter	br	d
10	Grey heron	r	d
11	Black-headed heron	v	-
12	Goliath heron	br	d
13	Purple heron	v	-
14	Great white heron	r	d
15	Little egret	r	d
16	Yellow-billed egret	bm	e
17	black egret	v	e
19	cattle egret	r	ksp
20	Common squacco heron	v	e
22	Rufous-bellied heron	v	d
23	Green-backed heron	r	d/r
24	Black-crowned night heron	br	d/r/e
25	white-backed night heron	r	r/d
26	Little bittern	bm	e
27	Rail heron	bm	e
28	Hammerkop	br	a
29	White stork	m	t
30	Black stork	m	t
31	Abdmin`s stork	m	t
32	Woolly-necked stork	m	e
33	African openbill	bm	e
34	Saddlebill	br	t
35	African marabou	bm/r	t
36	Yellow-billed stork	m	d

zim.no	species	status	Habitat
37	Sacred ibis	m	ksp
38	Glossy ibis	m	e
40	African spoonbill	r	d
41	Greater flamingo	m	d
42	Lesser flamingo	m	d
43	White-faced tree duck	bm	d/e
44	Fulvous tree duck	m	e
45	Egyptian goose	br	t
48	African black duck	br	r/d
49	Cape teal	m	ksp
50	hottentot teal	m	e
51	Red-billed teal	bm	t
55	Cape shoveller	v	-
56	Sourthen pochard	m	e
57	African pygmy goose	bm	e
58	Knob-billed duck	bm	ksp
59	Spurwinged goose	bm	ksp
60	Maccoa duck	bm	e
61	White-backed duck	bm	e
62	Secretary bird	br	t
63	Egyptian vulture	v	-
64	Hooded vulture	br	t
65	cape vulture	m	ksw
66	white-backed vulture	br	t
67	lappet-faced vulture	br	t
68	white-headed vulture	br	t
69	black kite	m	t
69	yellow-billed kite	bm	t
70	black-shouldered kite	br/m	t
71	african cuckoo hawk	br	ksw
72	bat hawk	r	t
73	honey buzzard	m	t
74	black eagle	br	gh
75	steppe eagle	m	t
76	tawny eagle	br	t
77	lesser-spotted eagle	m	t
78	walberg`s eagle	bm	t
80	african hawk eagle	br	t
81	ayres`s hawk eagle	r/m	t
83	martial eagle	br	t
85	lizard buzzard	br	t
86	brown snake eagle	br	t
87	black-breasted snake eagle	br/m	t
90	bateleur eagle	br	t

zim.no	species	status	Habitat
91	african fish eagle eagle	br/m	d//r/ksp
92	palmnut vulture	v	-
94	steppe buzzard	m	t
95	Augur buzzard	r	gh
97	ovambo sparrowhawk	br	t
98	little sparrowhawk	br	t
99	black sparrowhawk	r	t
100	little banded goshawk	br	t
101	african goshawk	r	r
102	gabar goshawk	br	t
103	pale chanting goshawk	r	ksw
104	Dark chanting goshawk	br	t
105	european marsh harrier	v	bv/ksg
107	montagu`s harrier	v	bv/ksg
108	Pallid harrier	v	bv/ksg
109	Gymnogene	br	t
110	Osprey	m	d/r
111	Peregrine	m	t
112	Lanner falcon	br/m	t
113	European hobby	m	ksw
114	African hobby	br/m	ksw
116	Red-necked falcon	r/m	ksp
117	western red footed falcon	m	t
118	eastern red footed falcon	m	t
119	rock kestrel	v	-
120	greater kestrel	v	-
121	lesser kestrel	m	t
122	Dickinson`s grey kestrel	br	t
123	coqui francolin	br	t
124	crested francolin	br	t
125	shelly`s francolin	r	s
126	red-billed francolin	br	ksw
127	natal francolin	br	s
129	swainson`s francolin	br	t
131	harlequin quail	bm	e
133	helmeted guinea fowl	br	t
134	crested guinea fowl	br	r
135	Kurrichane buttonquail	bm	e
136	Black-rumped buttonquail	m	e
137	wattled crane	v	-
138	southern crowned crane	br/m	b/ksw
140	corncrake	m	e
141	African crake	m	e
142	black crake	br	ksp

zim.no	species	status	Habitat
143	spotted crane	m	ksp
144	baillon`s crane	m	e
145	stripped crane	m	e
152	purple gallinule	m	e
153	lesser gallinule	bm	e
154	common moorhen	bm	e
155	lesser moorhen	bm	e
156	red-knobed coot	bm	e
157	african finfoot	r	e
158	kori bustard	br	ksg/bv
159	denham`s bustard	m	ksw
160	red-crested korhaan	br	t
161	black-bellied korhaan	br	bv
162	african jacana	bm	e
163	lesser jacana	bm	e
164	painted snipe	bm	e
165	ringed plover	m	d
166	white-fronted sandplover	m	ksp
168	Kittlitz`s sandplover	r/m	t
169	three-banded sandplover	br/m	t
170	caspian plover	v	-
172	crowed plover	br/m	t
173	lesser black-winged plover	v	-
174	blacksmith plover	br	t
176	african wattled plover	r	s
178	ruddy turnstone	m	d
180	common sandpiper	m	t
182	wood sandpiper	m	t
186	marsh sandpiper	m	t
187	greenshank	m	t
188	Curlew sandpiper	m	t
189	little stint	m	t
193	Ruff	m	t
194	Great snipe	m	e
195	Ethiopian snipe	m	e
200	Black-crowned avocet	v	d
201	black-winged stilt	m	e
203	spotted dikkop	br	t
204	water dikkop	br	d/r
205	Temminck`s courser	bm	t
206	three-banded courser	br	ksw
207	Bronze-winged courser	br	t
208	Common prantincole	v	d
209	black-winged prantincole	v	d

zim.no	species	status	Habitat
210	roack prantincore	v	d
212	Grey headed gull	m	d
214	caspian tern	v	d
216	Wiskered tern	bm	e
217	White-winged black tern	m	d/e
218	african skimmer	v	d
220	spotted sandgrouse	br	ksw
221	yellow-throated sandgrouse	m	t
222	double-banded sandgrouse	br	t
226	red-eyed dove	br	t
228	cape turtle dove	br	t
229	laughing dove	br	t
230	namaqua dove	bm	t
232	Emerald spotted wood dove	br	t
235	African green pigeon	m	r
236	Brown-necked parrot	m	r
238	Meyer`s parrot	br	t
242	Grey lourie	br	t
243	European cuckoo	m	t
244	african cuckoo	bm	t
246	red-crested cuckoo	m	t
247	black cuckoo	bm	t
249	great spotted cuckoo	bm	t
250	stripped crested cuckoo	bm	t
251	jacobin cuckoo	bm	t
253	emerald cuckoo	m	s
254	klaas`s cuckoo	bm	t
255	didric cuckoo	bm	t
257	black coucal	br	bv
259	senegal coucal	br	t
260	white-browed coucal	v	-
261	barn owl	br	t
263	wood owl	v	-
264	marsh owl	r	bv
265	scops	r	s
266	white-faced owl	br	t
267	pearl-spotted owlet	br	t
268	barred owlet	br	r
270	spooted eagle owl	br	s
271	giant eagle owl	br	t
272	pel`s fishing owl	v	d
273	europaean nightjar	m	t
274	rofous-cheeked nighjar	r/m	t
275	fiery-necked nightjar	r/m	ksw

zim.no	species	status	Habitat
276	freckled rock nightjar	br/m	gh
278	goboon nightjar	r/m	t
279	pennant-winged nightjar	bm	ksw
280	european swift	m	t
281	african black swift	m	t
282	white-rumped swift	bm	d
283	horus swift	v	r
284	little swift	br	t
288	palm swift	r/m	t
292	red-faced mousebird	r	r
293	narina trogon	m	r
294	pied kingfisher	br	d
295	giant kingfisher	bv	r/d
296	half-collared kingfisher	v	r
297	malachite kingfisher	r	d/r
298	pygmy kingfisher	m	t
299	senegal kingfisher	m	s
300	brown headed kingfisher	bm	t
301	chestnut-bellied kingfisher	bm	s
302	stripped kingfisher	bm	t
303	european bee-ater	m	t
304	olive bee-eater	m	s
305	southern carmine bee-eater	m	t
306	white fronted bee-eater	v	r
307	little bee-eater	m	t
308	swallow-tailed bee-eater	bm	t
309	european roller	m	t
310	lilac-breasted roller	br	t
311	racket-tailed roller	v	ksw/bw
312	purple roller	bm	t
313	Cinnamon roller	bm	t
314	Hoopoe	br	t
315	Red-billed wood hoopoe	br	t
316	African scimitarbill	br	t
317	Trumpet hornbill	m	r
319	african grey hornbill	br	t
320	red-billed hornbill	br	s
321	yellow-billed hornbill	br	ksw
322	crowned hornbill	r/m	s/ksw
323	bradfield's hornbill	br/m	ksw
324	southern ground hornbill	br	t
325	black-collared barbet	r	s
326	african pied barbet	r	ksw
329	yellow-fronted tinker barbet	r	ksw

zim.no	species	status	Habitat
331	crested barbet	r	t
332	greater honeyguide	br	t
334	lesser honeyguide	r	t
336	brown-backed honeyguide	r	ksw
338	bennett`s woodpecker	r	t
339	golden-tailed woodpecker	r	t
341	cardinal woodpecker	r	t
342	bearded woodpecker	r	t
347	white-tailed bush lark	m	ksw
348	rufous-naped lark	br	t
349	flappet lark	br	t
350	fawn-coloured lark	br	ksw
351	sabota lark	r	t
352	dusky lark	m	t
353	red-capped lark	m	ksp
354	chestnut-backed finch lark	m	t
355	grey-backed finch lark	m	ksp
356	european swallow	m	t
359	wire-tailed swallow	v	r/d
361	red-breasted swallow	bm	t
362	mosque swallow	r	s
364	lesser stripped swallow	br	t
367	grey-rumped swallow	bm	ksp
369	eropen house martin	m	t
370	european sand martin	m	t
371	brown sand martin	m	t
372	banded sand martin	m	t
375	eastern black cuckoo-shrike	br	s
376	white-brested cuckoo-shrike	r	ksw
378	fork tailed drongo	br	t
380	european golden oriole	m	t
381	african golden oriole	r/m	t
382	eastern black-headed oriole	rb	t
383	black crow	v	ksp
384	pied crow	br	c
386	acacia grey tit	r	ksw
388	sourthern black tit	br	t
390	cape penduline tit	v	sb
391	grey penduline tit	br	ksw
393	arrow-marked babbler	br	t
395	pied babbler	br	ksw
396	red-eyed bulbul	v	ksw
397	black-eyed bulbul	br	t
400	yellow-bellied bulbul	r	s

zim.no	species	status	Habitat
401	terrestrial bulbul	r	r
405	kurrichane thrush	br	ksw
408	groundscraper thrush	br	t
409	miombo rock thrush	v	ksw/bw
411	capped wheatear	bm	ksw
412	familiar chat	r	s
414	white-headed black chat	br	s
415	southern ant-eating chat	v	ksw
416	common stone chat	v	bv
427	white-browed scrub-robin	br	t
431	greater whitethroat	m	t
432	chestnut-vented warbler	r	ksw
434	icterine warbler	m	t
437	greater reed warbler	m	r/ksp
440	sedge warbler	m	r/ksp
441	lesser swamp warbler	v	ksp
446	willow warbler	m	t
453	long-billed crombec	br	t
454	red-faced crombec	br	ksw
456	yellow-bellied eremomela	br	ksw
457	green-capped eremomela	br	ksw
458	burnt-necked eremomela	br	t
459	bleating bush warbler	br	t
461	eastern barred bush warbler	br	ksw
464	fan-tailed cisticola	br	t
465	desert cisticola	br	ksw
469	tinkling cisticola	r	ksw
470	rattling cisticola	br	t
475	croaking cisticola	br	e
478	short-tailed cisticola	br	t
480	tawny-flanked prinia	br	t
481	black-chested prinia	r	ksw
483	spotted flycatcher	m	t
487	lead-coloured flycatcher	br	s
488	black flycatcher	br	t
489	marico flycatcher	r	kss
490	mouse-coloured flycatcher	br	ksw
493	white-flanked batis	br	t
500	african paradise flycatcher	bm	t
501	african pied wagtail	r	r
504	yellow wagtail	m	d
505	Richard's pipit	br	t
508	Buffy plain-backed pipit	r	s
510	Tree pipit	m	t

zim.no	species	status	Habitat
512	Golden pipit	v	-
516	Lesser grey shrike	m	t
517	red-backed shrike	m	t
519	magpie shrike	br	ksw
521	tropicau boubou	br	s
522	Crimson-breasted shrike	br	ksw
523	Southern puffback	br	t
524	Brubru	br	t
525	Brown-headed tchagra	br	t
526	Black-crowned tchagra	br	t
530	Gey-headed bush shrike	br	t
531	Orange-breasted bush shrike	br	t
534	White helmet shrike	br	t
535	Red-billed helmet shrike	br	t
537	White-crowned shrike	br	ksw
538	wattled starling	bm	ksw
539	Plum-coloured starling	bm	t
540	long-tailed glossy starling	br	s
541	Red-shouldered glossy starling	br	ksw
542	Blue eared glossy starling	r	s
545	African red-winged starling	br	ksp/d
546	yellow-billed oxpecker	br	t
547	Red-billed oxpecker	br	t
551	Coppery sunbird	v	-
552	Marico sunbird	bm	ksw
553	Little purple-banded sunbird	bm	ksw
555	Miombo double-collared sunbird	v	ksw
557	Southern white-bellied sunbird	bm	t
559	Scarlet-chested sunbird	bm	t
560	Black sunbird	bm	t
564	Yellow white eye	br	ksw
565	Black buffalo weaver	br	ksw
566	White-browed buffalow weaver	br	t
567	House sparrow	br	c
570	Grey-headed sparrow	br	t
571	yellow-throated sparrow	br	t
572	Scarly-feathered finch	br	ksw
576	Spotted-backed weaver	br	t
577	African masked weaver	br	t
578	Cabanis`s masked weaver	br	r
579	Large golden weaver	br	r/d
581	Red-headed weaver	br	t
582	Red-billed quelea	br/m	t
583	Rednbishop	br	e

zim.no	species	status	Habitat
585	Golden bishop	br	e
586	Yellow-rumped whydar	v	-
588	White-winged whydah	br	e/ksp
592	Shaft-tailed widow	r	ksw
593	Long tailed paradise widow	r	t
594	Broad-tailed paradise widow	r	t
596	Pink-backed firefinch indigobird	r	t
597	Red-billed firefinch indigobird	r	s
598	cuckoo weaver	r	ksp
599	orange-winged pytilia	r	ksw
600	Green-winged pytilia	r	t
606	Pink-backed firefinch	br	t
607	Red-billed firefinch	r	s
609	southern blue waxbill	br	t
610	Violet-eared waxbill	br	ksw
612	Black-cheeked waxbill	br	ksw
615	African quailfinch	br	t
618	Cut-throat finch	br	s
623	Yellow-eyed canary	m	ksw
624	Black-throated canary	m	ksw
630	Black-eared seedeater	m	ksw
632	Golden-breasted bunting	bm	ksw
634	Cinamon-breasted rock bunting	m	s
635	larklike bunting	m	ksw
637	Grey wagtail	v	-
638	White-headed Roughwing	v	-
639	Indian Myna	Invasive	KSW

ANNEX 7: MAMMALS

Mammal List from Ecologist, Hwange NP.

Common Name	Scientific name
Aardvark	<i>Orycteropus cafer</i>
Aardwolf	<i>Proteles cristata</i>
Ant bear	<i>Orycteropus cafer</i>
Baboon	<i>Papio ursinus</i>
Bat-eared fox	<i>Otocyon megalotis</i>
Black rhino	<i>Diceros birconis</i>
Buffalo	<i>Cinereus caffer</i>
Bushbaby, Lesser	<i>galago</i>
Bushbuck	<i>Tragelaphus scriptus</i>
Caracal	<i>Felis caracal</i>
Chacma baboon	<i>Papio ursinus</i>
Cheetah	<i>Acinonyx jubatus</i>
Civet cat	<i>Civettictis civetta</i>
Duiker, Common	<i>Sylvicapra grimmia</i>
Eland	<i>Taurotragus oryx</i>
Elephant	<i>Loxodonto africana</i>
Gemsbok	<i>Oryx gazella</i>
Giraffe	<i>Giraffa camelopardalis</i>
Hippo	<i>Hippopotamus amphibius</i>
Honey badger	<i>Mellivora capensis</i>
Hyaena, Brown	<i>Hyena brunnea</i>
Hyaena, Spotted	<i>Crocutta crocutta</i>
Impala	<i>Epycerros melampus</i>
Jackal, Black-Backed	<i>Canis mesomelas</i>
Jackal, Side-Striped	<i>Canis adustus</i>
Kudu	<i>Tragelaphus strepsiceros</i>
Leopard	<i>Panthera pardus</i>
Lion	<i>Panthera leo</i>
Mongoose, Banded	<i>Munngos mungo</i>

Common Name	Scientific name
Mongoose, Dwarf	<i>Helogale parvula</i>
Mongoose, Selous	<i>Paracynictis selousi</i>
Mongoose, Slender	<i>Herpestes sanguineus</i>
Pangolin	<i>Manis temmincki</i>
Porcupine	<i>Hystrix africaeustralis</i>
Roan antelope	<i>Hippotragus equinus</i>
Sable	<i>Hippotragus nigger</i>
Scrub hare	<i>Lepus saxatilis</i>
Springhare	<i>Pedetes capensis</i>
Steenbok	<i>Raphicerus campestris</i>
Vervet monkey	<i>Cercopithecus pygerythrus</i>
Warthog	<i>Phacochoerus aethiopicus</i>
Waterbuck	<i>Kobus ellipsiprymus</i>
White rhino	<i>Ceratotherium simum</i>
Wild dog	<i>Lycaon pictus</i>
Wildcat	<i>Felis libyca</i>
Wildebeest, Blue	<i>Connochaetes taurinus</i>
Wildpig	<i>Potamochoerus porcus</i>
Zebra	<i>Equas burchell</i>

Specially protected species of mammals, reptiles and birds in Zimbabwe

Mammals	Mammalia	Present in HNP
Aardwolf	<i>Proteles cristatus</i>	Yes
African wild dog	<i>Lycaon pictus</i>	Yes
Bat-eared fox	<i>Otocyon megalotis</i> Wankie district	Yes
Cheetah	<i>Acinonyx jubatus</i>	Yes
Gemsbok	<i>Oryx gazella</i>	Yes
Pangolin	<i>Manis temmincki</i>	Yes
Rhinoceros - Black	<i>Diceros bicornis</i>	Yes
Rhinoceros - Square-lipped	<i>Ceratotherium simum</i>	Yes
Roan antelope	<i>Hippotragus equines</i>	Yes
Reptiles	Reptilia	Present in HNP
Python	<i>Python sebae</i>	Yes
Birds	Aves	Present in HNP
African Hawk Eagle	<i>Hieraaetus spilogaster</i>	Yes
All the Bustards and Korhaans	Family <i>Otididae</i>	Yes
All the Cranes	Family <i>Gruidae</i>	Yes
All the Flamingoes	Family <i>Phoenicopteridae</i>	Yes
All the Pelicans	Family <i>Pelecanidae</i>	Yes
All the Storks	Family <i>Ciconiidae</i>	Yes
All the Vultures	Family <i>Aegypiidae</i>	Yes
Ayres' Hawk Eagle	<i>Hieraaetus dubius</i>	Yes
Bataleur	<i>Terathopius ecaudatus</i>	Yes
Black Eagle	<i>Aquila verreauxi</i>	Yes
Black-breasted Snake-Eagle	<i>Circaetus pectoralis</i>	Yes
Black Sparrowhawk	<i>Accipiter melanoleucus</i>	Yes
Brown Snake-Eagle	<i>Circaetus cinereus</i>	Yes
Fish Eagle	<i>Haliaeetus vocifer</i>	Yes
Hamerkop	<i>Scopus umbretter</i>	Yes
Lanner Falcon	<i>Falco biarmicus</i>	Yes
Martial Eagle	<i>Polemaetus bellicosus</i>	Yes
Osprey	<i>Pandion haliaetus</i>	Yes
Peregrine	<i>Falco peregrinus</i>	Yes
Secretary Bird	<i>Sagittarius serpentarius</i>	Yes
Tawny Eagle	<i>Aquila rapax.</i>	Yes

ANNEX 8: FIRE MANAGEMENT PLAN



HWANGE-MAIN CAMP 2014 FIRE MANAGEMENT PLAN



PREPARED BY: M. NYONI _____

DATE _____ (Acting Wildlife Officer-Park Management)

APPROVED BY: T JURA _____

DATE _____ (Area Manager-Hwange-Main Camp)

GOAL

- ❖ To prevent and ensure maximum protection of biodiversity ,infrastructure and human life from uncontrolled fires

OBJECTIVE

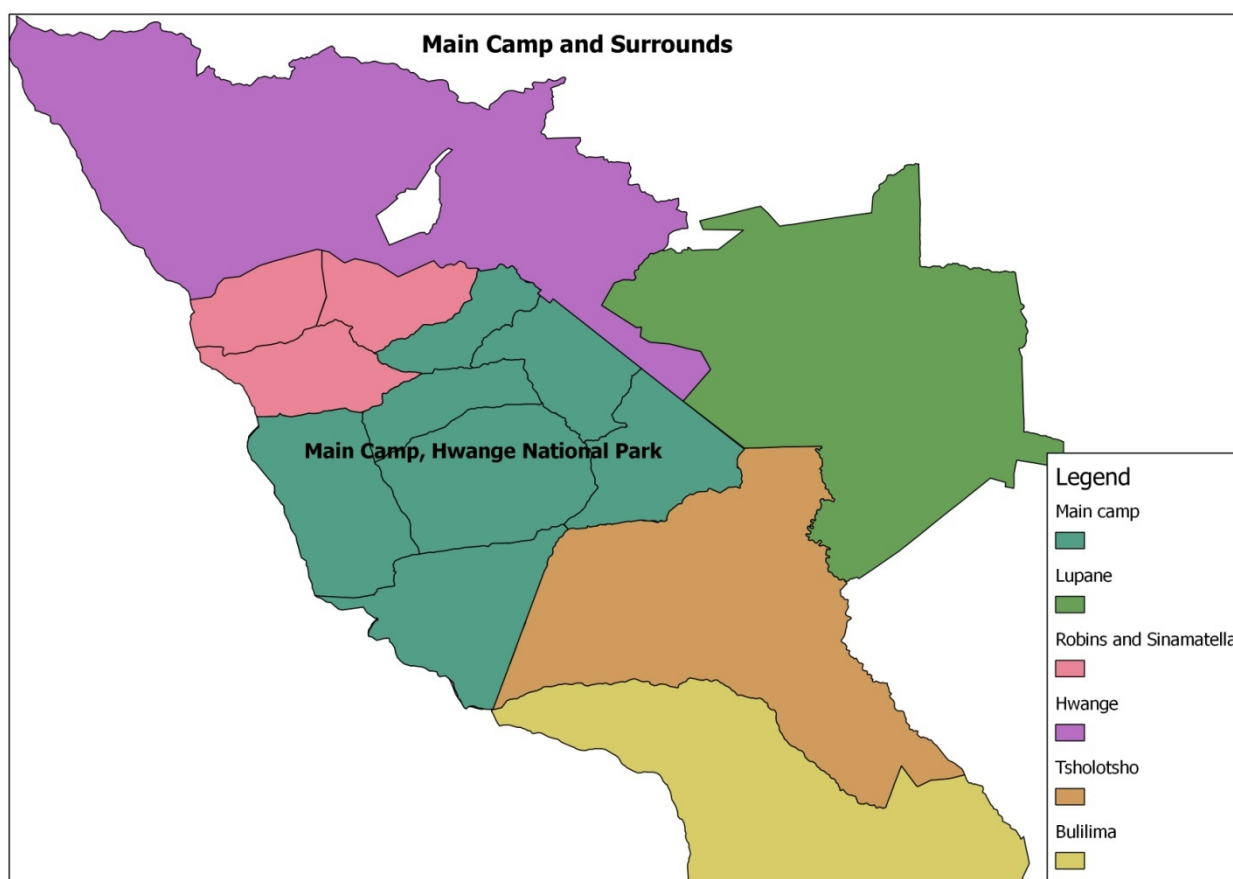
- ❖ Protect all fauna and flora within the park estate from uncontrolled fires
- ❖ Protect all the parks infrastructure from unwanted fires
- ❖ To increase fire awareness and preparedness within and outside the station
- ❖ To ensure timely co-ordination of manpower and firefighting equipment for putting out fires

INTRODUCTION

Hwange-Main Camp is one of the three management blocks of the 14 651km² of Hwange National Park and is 10 650km in extent. The park is bounded by Hwange, Lupane and Tsholotsho communal areas, Ngamo/Sikumi forestry areas the Gwayi ICA, Sinamtella and Robins camps and finally Botswana to the west. All these areas have different land use practices ranging from conservation, subsistence farming, consumptive and non-consumptive tourism. It is against these diverse land use practices that the protected area has to start its fire management action plan through awareness meetings aimed at concertizing these stakeholders on the adverse effects of destruction to infrastructure, loss of biodiversity and human life that unmanned fires can have. Most of the fires year in and out emanate from the periphery of the park where it shares boundaries with the aforementioned areas. Because of this trend the park thrives to be at a high state of preparedness for management of fire outbreaks.

Fire is an important process within many terrestrial biomes. The park uses fire as a management tool so as to achieve different management objectives such as reduction of moribund grass, parasite management, bush encroachment control and manipulation of wildlife movements so as to give over utilized areas time to recover. To this effect different fire regimes are used that is cool and hot fires. The park uses Cool fires just after the rain season for moribund reduction and parasite management and though seldom used are also hot fires which are used at the peak of the dry season for bush encroachment control.

The map below illustrates the position of Main Camp and its surrounding areas



FIRE WORK PLAN

The table below shows the station's work plan for the year.

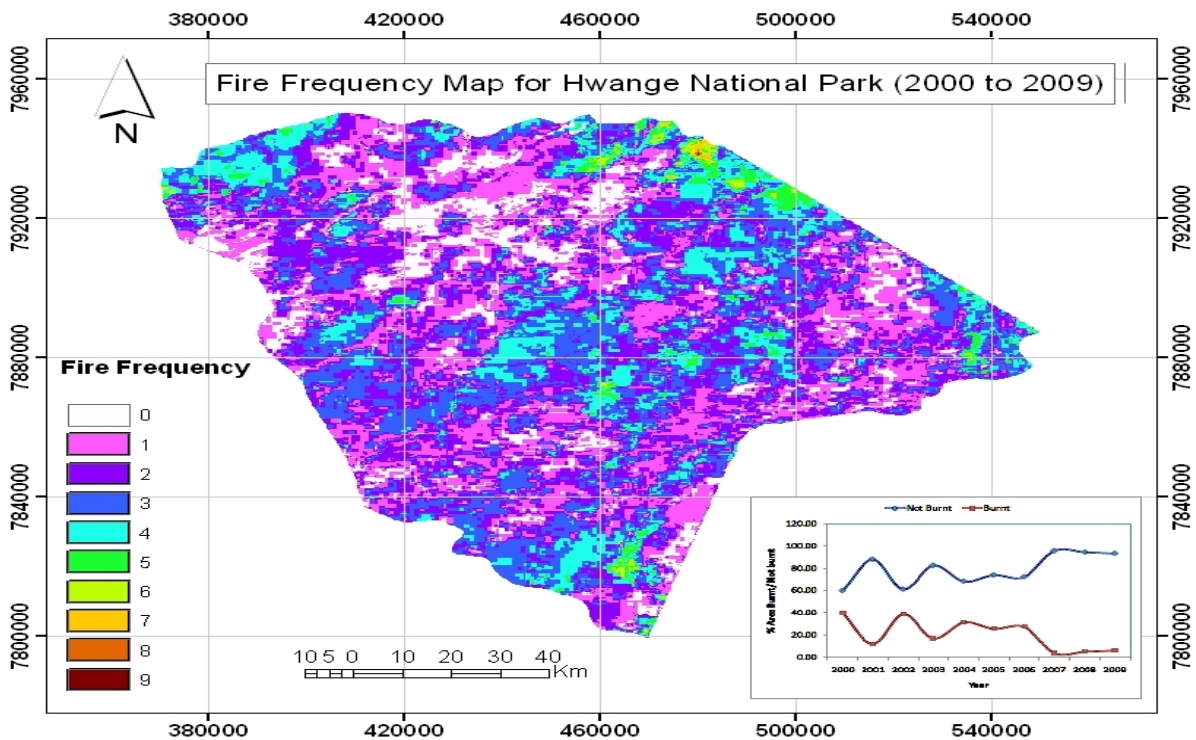
ACTIVITY	TARGET	TIME FRAME
Grading of road networks and Fire guards	Grade road network covering 518km Grade 620 km of fire guard network	Apr-August
Clearing of roads and fire guards	Cover distance of 300km clearing both roads & fireguards	May-October
Reseal pot holes on the tarred park road	Reseal 50km of tarred road	July – Aug
Mow grass along tourist routes	Mow 70km of road network	Mar- May
Early burning along major fire guards	Burn 370km of the fireguards	May-June
Block burning	Burn area covering x 500km ²	May –July
React to veld fires in the park	3 x outbreaks per year x 60 people x 3 days Aug-Oct	July - Oct

The intensity of fire is influenced by five major components which are; fuel size, continuity, compaction, moisture and fuel load as interpreted below;

- **Fuel size**-The amount and type of fuel influences the way and speed of combustion. Fine fuels like leaves and grass burn and spread more easily than heavy fuels like logs, stumps and large trees which burn slowly though with great intensity.

- **Continuity** - The amount of fuel available between fuels on the ground and in trees and the distance between these fuels can influence the rate at which fire spreads. Horizontal and vertical continuity is much faster where fuel sources are close together than when far apart and where a barrier is encountered like for example a road or firebreak.
- **Compaction**- When individual fuel pieces are loosely attached to each other and in adequate quantities they burn more easily because of sufficient oxygen. This results in a faster rate of spread of fire than when fuel is distantly spaced and in heavy fuels.
- **Moisture** - The quantity of moisture in fuel determines the intensity and ease of ignition. Where an area has more moisture in green vegetation, the more heat is required to burn it hence the spread of fire in such a situation will be less and easy to control.
- **Fuel Load**- The amount of fuel available in area influences the behavior and intensity of the fire. More fuel either fine or heavy and without any moisture will result in fast ignition and a fast rate of spread

It is of paramount importance that the aforementioned components are taken note of and subsequent corrective measures are implemented in order to prevent fires or otherwise to successfully put out the fire in the event of an outbreak. **Below is a fire frequency map of fires that the park has experienced in the past**



AVAILABLE RESOURCES FOR FIRE MANAGEMENT

The station has the following limited equipment and resources available for fire management and an ideal quantity of equipment has been included as well. In addition to the available resources different stakeholders to the park are always willing to assist with their resources for fire management such manpower, vehicles, mowers, tractors and tow graders

RESOURCE	AVAILABLE	IDEAL
Road & Fire Management Equipment;		
1. Motorized grader	0	1
2. Tractor	1(Requires new tyres front and rear)	2
3. Tipper truck	1-Non-runner	1
4. Land Rover	5	5
5. Tow grader	1(Requires new set of blades &tyres)	2 2
6. Disc harrow	0	60
7. Tractor drawn mower	1	20
8. Shovels	10	20
9. Racks	5	20
10. knapsacks	0	10
11. Pick axes	0	30
12. Wheelbarrows	0	
13. Fire beaters	30	

The station employees thirty contract works for fire management duties and all members of staff are on call at any time should the need arise to put out unwanted fires. Different stakeholders also bring in their manpower when requested to beef up the available manpower.

WATER POINTS

Water is a very important component for fire suppression however the park has no natural water points during the dry season when we experience wild fires. All the big dams in the southern part of the park no longer hold water that lasts for the whole duration of the dry season as a result of siltation and dam wall busts. To this effect the only available water sources are artificial game water supply boreholes which can be used for human use and fire fighting. High fire frequency areas along the park's railway boundary from mamabnje to Ngamo gate can access water from Dete police, livingi, makwa, Kennedy 1 and Ngamo. Fires along the Tsholotsho game fence boundary can access water from wexau ,mfokazana, madiseka, sicheche and mpisi boreholes. Water requirements for interior fires can be accessed from boreholes along management routes as well as from safari operators with concessions within the park at wilderness, Somalisa, The Hide and Nehimba safari camps.

STAKEHOLDER PARTICIPATION

The park does not live in isolation as such maintains a very good working relationship with its stakeholders who are always forthcoming with assistance for firefighting. Concession lease holders in the park have the mandate to grade and maintain roads and fireguards in their concessions. Constant routine checks must however be conducted to see if these operators are complying with fire management requirements. Researchers are also very helpful to the station for monitoring and generation of vegetation and fire maps whose input is incorporated in adaptive management.

CO-ORDINATION

The park management officer at the station is responsible for coordination and resource mobilization for fire management. Communication is thus very important and key to the successful management of all unwanted fires. It is mandatory for all stakeholders and the park itself in compliance with forestry and EMA acts to inform all interested and affected parties of any intention to conduct controlled burns.

The following park officers can be contacted for reporting any fire outbreaks in the park;

Name of Officer & Designation	Contact Details
Mr. T Jura-Area Manager	0774 011 397
Mr. P Sibanda-Senior Wildlife Officer	0774 473 526
Mr.E Makuwe-Ecologist	0774 135 874
Mr. Nyoni-Acting Park Management Officer	0772B 465 492
Mr.J Dube-Wildlife Officer	0773 829 149
Mr.P Mugwidi-Tourism Services Officer	0772 572 038
Mr.S Mudimba-Senior Ranger Scientific Services	0772 465 725
Mr.M Mawoneke-Senior Ranger Operations	0773 140 830

Stakeholder Contacts

Contact Person / Organisation	Contact Details
Mr. Gomwe-Area Manager-Sinamatella	0712 640 086/ Radio Call Sign 70
OIC-Dete ZRP	018-351
NRZ-Dete	018-392,379
Garry-Friends of Hwange	0772 363 338
Arnold Tshipa-Wilderness Safaris	0779 281 042
Nick-Somalisa	0772 126 986
Martin Pieters-Nehimba	078121842
Ian Godfrey-The Hide Safaris	0774 374 973
Zondo-Imvelo Safaris/Matupula Hunters	0772 330 598
Paradzai GumboLodzi Hunters	0775 582 026
Foggie Wilson-PDC	0772 465 555/018-710
Ivory Lodge	0774 665 458
Hwange Safari Lodge	018-750/333
Zakhele Mpala-CNRS	0772 465 534
Brent-Lion Reserach	0774 160 369
Paul -DART	0774 749 773
Masunda-Gwayi ICA	0774 400 972

FIRE TOWERS

The park does not have any fire towers as such fire reporting is everyone's responsibility, available means of reporting are; radios which are used by deployed patrolling rangers & safari operators, mobile phones, telephones and the internet is also used for reporting purposes by the different stakeholders. In addition to all the available means of reporting most stakeholders are subscribers to FIRMS an internet program that uses satellites to detect and give reports on any fire occurrences. Some concessionaires (Wilderness & Somalisa) have airstrips at their camps as such when a fire is seen while flying into or out of the camp reports are made to the station.

FIRE ALARM

The station has a manual bell that is used as a fire alarm The senior ranger is responsible for ringing the bell to which all persons in the camp have to respond to by meeting at the rendezvous point for further instructions. The bell is only used for fire emergencies to ensure that people respond quickly to the call.

SUPPRESSION ACTIVITIES

The ultimate goal of this plan is to prevent and ensure maximum protection of biodiversity, infrastructure and prevention of loss of human life from uncontrolled fires. This will be achieved by having sound knowledge of fire behavior and employing fire suppression measures that are safe and effective. Three major aspects will be considered when fighting all wild fires. These are reconnaissance of the fire before and on arrival at the scene and the actual attack of the fire.

Reconnaissance of the fire before arrival at the scene- The firefighting team leader has to have the following information before leaving the station;

- ✓ Location of the fire
- ✓ Reported extent of the fire
- ✓ Rate of spread
- ✓ Access routes
- ✓ Cause of the fire
- ✓ Possible threats, habitat, life and infrastructure
- ✓ Getting an updated weather update.

This information is important for logistical planning, resource and equipment mobilization for fire fighting.

Arrival on the scene- Ascertain the following;

- ✓ Role call of manpower to be deployed
- ✓ Size of the fire
- ✓ Location of the head fire, its direction and what is on its path
- ✓ Point of origin and cause
- ✓ Time of day
- ✓ Threats
- ✓ Weather at the fire i.e wind speed and direction
- ✓ Fire behavior i.e height of flames ,rate of spread and intensity
- ✓ Fuel type and arrangement

Planning the attack- The following considerations need to be made;

- ✓ Safety of manpower and general public e.g visitors to the park
- ✓ Decide on where to make the initial attack
- ✓ Choose method of attack, either direct or indirect
- ✓ Know the location of control lines like existing firebreaks
- ✓ Estimate probable spread and behavior
- ✓ Determine possible danger spots
- ✓ Brief and keep personnel together
- ✓ Focus on task at hand

Post suppression strategy

After the fire has been put out, the team leader has to;

- ✓ Make a roll call of deployed manpower
- ✓ Carry out a mop-up operation and surveillance to ensure that the fire is completely extinguished
- ✓ Carry out an audit and document the extent of the damage
- ✓ Map out the area
- ✓ Report compilation and submission to the Park's Area Manger

ANNEX 9: PLACE NAME MEANINGS IN HWANGE

From Gary Haynes – The Forest with a Desert Heart (Unpublished). His sources include : *Lore and Legend of Southern Rhodesia Place Names* (1960); Child and Reese (1977); 1917 letters from Native Commissioner H. Posselt (NAZ A 3 27/4/16); Goldsmith and Carter (1981).

Additional material from an internal report by Bruce Austin (Provincial Warden in 1975)

This is a compendium of only some names of pans, features, and rail sidings along the Park's eastern fringe. Quite a few of these have changed spelling more than once in the last 100 years, and the translations have been contested by native speakers of various languages. Alternative spellings provided here are not necessarily exhaustive. The language of attributed origin is indicated in parentheses.(Haynes)

- Balla Balla, Mbalabala (pan) – “kudu” (Ndebele)
- Bulungeti – Corrupted from Hulungeti (*Combretum imberbe*)
- Bumbumutsa – Bumblebee’s waterhole (Sarwa Bumbum [bumblebee] and Tsa [waterhole])
- Chivisa, Chebisa, Chembizi (pan) – “zebra call,” “zebra place” (Nambya; also Ndebele, “place of horse/zebra”))
- Cibilamabandi – Cibi = pan; LaMabandi was nickname of an early ranger (Jordaan) who always wore a particular type of broad belt.
- Cidumci – “scatter” Sarwa. Probably refers to bushmen being apprehended by scouts?
- Chingahobe – Receiving with gratitude (with both hands) (Kalanga)
- Dandari (pan) – “fallen log” (Danda=log); however, danda may mean “bow” (Tyua)
- Danga (pan) – “kraal” (Kalanga/Shona) (umDanga = enclosed yard or market)
- Dete (formerly Dett) (town) – “marsh, bog” (probably from ndetima, or itete, Ndebele), referring to the formerly wet vlei, now much drier after years of burning and overgrazing by livestock
- Deteema (pan, dam, ruins)–possibly from dedema, “shiver” (Nambya, Karanga)
- Dotama – Liquid which drips (Sarwa) or “move about” (Shona)
- Entubu (rail siding) – once called Nekatombi after a Nambya chief, then changed to Inyankulu, which was confused with Inyantue (river and rail siding), before settling on entubu, “gateway” (Nambya)
- Garakamwe – Stay once (Shona)
- Guvalala (pan) – “sleep there” in Fanagalo (a creole language of oversimplified Bantu words used by Europeans to communicate with servants); however, other roots are possible, such as ukubulala (“to kill”, Ndebele), or gu bulala (“place of killing,” Ndebele). Austin includes “squatting down rapidly” by a hunter (Kalanga root). Or to “shed off the dust” perhaps by washing, or to slough off the skin like a snake (Nhanzwa)
- Gugugu – Refers to a fallen hollow baobab in which hyenas breed. The young hyenas run around inside the hollow log making a sound like gugugu.

- Gwayi, Gwaai, iGwayi (river east of Hwange) – “tobacco” (Ndebele); also attributed as ukayi? (meaning “where” in Sotho language), asked by Basutu hunters looking for water in the Kalahari sands
- Gomo – Komo – striped like a leopard tortoise
- Hwa Hwa Du – Named by Austin after camping here and hearing an ant bear moving around and then stopping repeatedly. The name is an onomatopoeic word with Hwa Hwa for the rustling and Du for the silence.
- Hwecau – The place of the white buffalo
- Ingwe (rail siding) – “leopard” (Ndebele)
- Intundhla, Ntundhla (rail siding) – “giraffe” (Ndebele)
- Inyangadezendhlovu – Horns or tusks (Shona) and elephant (Ndebele)
- Jupanda – Named by a park warden (Dave Rushworth) and was a combination of the names of his wife and two daughters (Julianne, Patrisha and Linda)
- Kennedy (vlei, pans, rail siding) – named after a farmer who lived nearby; adopted as the rail siding name in 1917 instead of an African name
- Kokori (rail siding) – located on Kennedy’s farm; the original suggestion was “Teak,” changed to Dingane after a local chief, then Kokori after a name of a vlei; adopted for the siding name in 1914
- Korodziba – Hollow tree that holds water (Sarwa)
- Leasha – Something which has been thrown away
- Libuti – “gathering place” (Karanga)
- Limemba – A permanent water point. Derived from rich person in Ndebele? Refers to the wealth of the water
- Limpande – The place of the rain tree (*Lochocarpus capassa*) (Kalanga)
- Linkwasha (vlei, pan) – “son-in-law’s property” (Kalanga)
- Longone’s Pan – Named after an extremely tall water engineer
- Magesanyati – Shallow muddy pan – the place where the buffalo wash
- Makololo (pan, vlei) – “rain tree” (Tyua); also a tribal name (*Lochocarpus capassa*)
- Makona (pan) – “corners”
- Makukumalo – Named after the first assistant to Ted Davison (Jim Hill). Describes his way of walking “like an angry dog with back arched and hackles up or a porcupine raising its quills
- Malindi (rail siding) – “holes,” referring to springhare burrows in the loose Kalahari sands (Ndebele); also a chief’s name (Karanga/Shona)
- Mambanje (river, rail siding) – a river’s name, suggested as a siding name by Posselt 18 Feb. 1916

- Mandavu (dam) – “long beard” (Shona, Nambya)
- Manga (pan, vlei) – an East African word for “maize”; or perhaps “liar” (Ndebele)Manzibomvu – “red water” (Ndebele). Austin records Mhanga – the cracks of a heel referring to when the pan dies out and the mud cracks
- Mangisihole – Englishman’s Pan (Mangisi = Englishman and Hole)
- Manzimbomvu – Red or discoloured water (Ndebele)
- Matijole – an old man’s name who once lived here (Tonga)
- Mbejane (pan) – “rhinoceros” (?) (Ndebele)
- Mitswiri, Mtswiri (pan) – the leadwood tree, *Combretum imberbe*
- Msetje - “sandy” (Ndebele); or “sand” (Shona)
- Mtoa, Mutowa (pan, ruins) – the rubber tree, *Diplorhynchus condylocarpon* (Nambya)
- Muvalasangwana – “gardenia tree” (Ndebele) *Gardenia spatulifolia*
- Nemptunga – Teach someone how to whistle (Sarwa)
- Nantwich (camp) – farm named for a town in England
- Ngamo – A place that gleams and glitters (Nhanzwa)
- Nyamandhlovu (pan) – “elephant meat” (Ndebele)
- Nyorka (Nyoka, iNyoka) (pan) – “snake” (Ndebele)
- Robins (camp) –named for Herbert George Robins, who bequeathed his land to the government upon his death in 1939
- Secheche – Place of the polecat (Sarwa)
- Shabi Shabi (seepage) – little red mushrooms/fungus growing around teak trees in the Kalahari Sand (Tyua)
- Shakwanki, Tsokwanga, Chekwanki (seepage) – “cold ear/cracked from cold and dry” (chekwa = “ear”; Tyua)
- Shapi (pan) – “whose milk” (Tyua – pi = “milk” and sha = “female”); however, disputed by some as a misspelling of Tshabe = “run away” (Karanga)
- Shumba (pan) – “lion” (Karanga, Nambya)
- Sinamatella (camp) – “sticker bush” or tree (namatila, namathela = “be sticky”, Nambya, Ndebele)
- Summamalissa, Masummamalissa, Summamalisha (pans, vlei) - referring to the masuma tree (*Diospyros*, Zambezi ebony)
- Tamafupa, Tshamafupa (seepage) – “place of bones” (Tyua)
- Tamasanka (pan, seepage) – “tall reed” (Tyua)

- Tamboyentundhla, Mathamboentundhla (pan) – “giraffe bones” (Ndebele)
- Tsamhole (pan) – “waterhole belonging to two people”; disputed by some: tsa = “waterhole” and mhole = “breast” (Tyua)
- Tsamtsa – (Tswametsa) Tswam = elephant and tsa = pan. Elephant Pan (Sarwa)
- Tshemasi – Named by an early game scout. Masi is stingless mopani bee. Means the place where bees are numerous.
- Tshomopane – Pan surrounded by mopane
- Tsanga – “reed” (Kalanga/Shona)
- Tshabema – “Is it yours?” Question asked by cattle owners who have been raided (SiKaukau dialect)
- Tshakabika (warm springs, pan) – “cook in liquid” (Kalanga or Nambya)
- Tshebe Tshebe (pan) – “sandy,” loose sand (Ndebele)
- Tshekwanga – Probably derived from tsokwanga (water which bubbles out of the ground) (Kalanga)
- Tshontande (river, rail siding) – a river’s name, suggested as a siding name by Posselt 18 Feb. 1916
- Tswantsa – “elephant’s water hole” (Tyua: tsa = “waterhole”)
- Tuntshegumbo – From a story about hunters camped here, one with an injured leg. During the night one of the men kicked the injured man who remarked “you have kicked me, Tshegumbo” (Tshegumbo being the name of the kicker)
- WeXau, Hwecau (pan) – “place of white buffalo” (Tyua, but disputed by some)
- Zibanini, Zivanini, Sibanini (river, pans) – “maiden’s pool” (Karanga), or Dze-banani – “children’s pool” (Tswana)

ANNEX 10: PAN INVENTORY

HWANGE NATIONAL PARK



PAN INVENTORY

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1 INTRODUCTION

This is a preliminary analysis of the important pans in Hwange. It is hoped that it will be of use for the implementation of the new General Management Plan. It is expected that it will be continuously updated. Where possible the picture includes a ground-level photograph and a Google image. In all Google images north is at the top. The dates on the images can vary and so may not reflect the situation in 2014 (e.g. Chris's Pan was still to be established when the Google image was taken).

In addition, most of these photographs were taken after an exceptional rainy season over most of Hwange. The levels may not be representative of the levels seen in other years at the same dates. All Google images of pans have north at the top of the page.

1.1 PUMPED PANS

This section is an inventory of the pans that were being pumped during 2014.

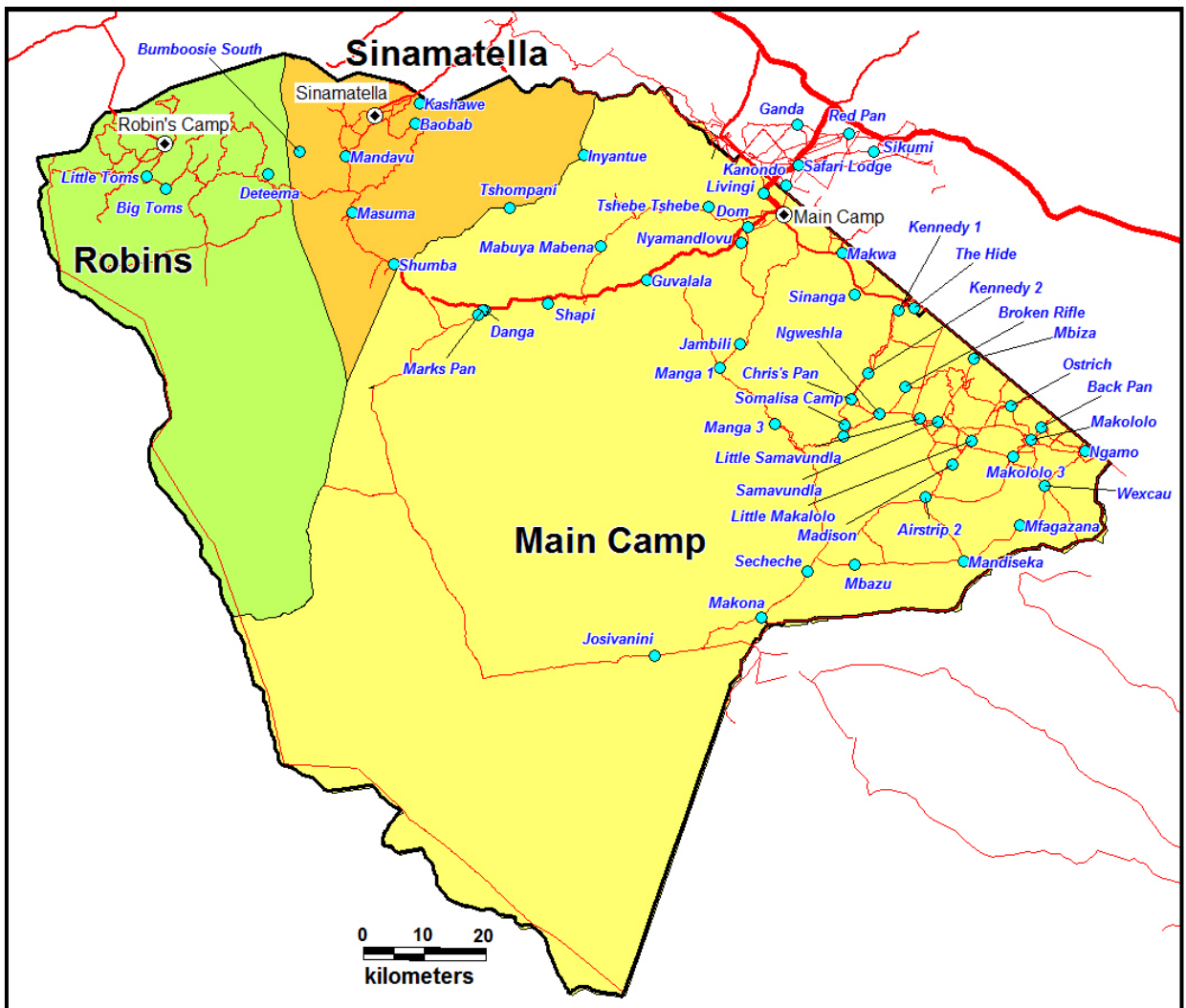


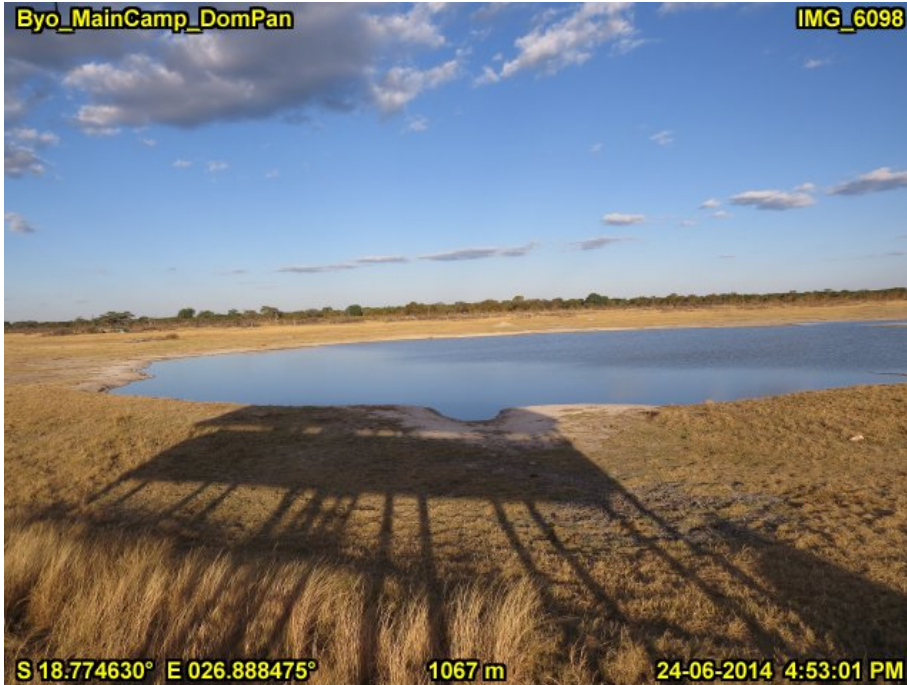
Table : Pumped Pans - 2015		
Pan	Responsibility	Comments
Baobab	Bhejane	Solar
Bumbumutsa	Bhejane	diesel
Bumbusi South	Bhejane	Solar
Inyantue vlei	Bhejane	solar
Mbala gate	Bhejane	solar
Mashambo	Bhejane	ZESA
Inyantue dam	Bhejane	solar
Masuma	Bhejane	Diesel (Assistance from Makomo)
Tshompani pan	Bhejane	solar
Shumba	Bhejane / FOH	Bhejane Trust solar + Friends of Hwange Windmill
Camp Hwange	Camp Hwange	
Big Shumba	Camp Hwange	
Guvalala	WEZ / Friends of H	Solar + diesel
Kennedy 1	Friends of Hwange	Solar
Kennedy 2	Friends of Hwange	Solar + diesel
Makwa	Friends of Hwange	Solar
Sinanga	Friends of Hwange	Solar
Shapi	Friends of Hwange	Windmill
Ngweshla	Friends of Hwange	Solar x 2 Previously pumped by Wilderness
Mbiza	Friends of Hwange	solar
Jambili	Friends of Hwange	diesel
Livingi	Friends of Hwange	diesel
Manga 1	Friends of Hwange	diesel
Nyamandlovu	Friends of Hwange	diesel
Tshebe Tshebe	Friends of Hwange	diesel
Mabuya Mabena	Friends of Hwange	Solar
Dopi	Friends of Hwange	diesel
Caterpillar	Friends of Hwange	diesel
Tshompani dam	Friends of Hwange	Windmill
Josivanini	Imvelo Safaris	
Madiseka	Imvelo Safaris	
Makona	Imvelo Safaris	
Mbazu	Imvelo Safaris	
Mfagazana	Imvelo Safaris	
Secheche	Imvelo Safaris	
Stoffies	Imvelo Safaris	
Major	Imvelo Safaris	
Danga	Nehimba	
Nehimba	Nehimba	

Table : Pumped Pans - 2015		
Pan	Responsibility	Comments
Chris's Pan	Somalisa	
Manga 3	Somalisa	
Somalisa	Somalisa	
Somalisa Camp	Somalisa	
Umkazaan	Somalisa	Solar. Saline
The Hide	The Hide	
Airstrip 2	Wilderness	
Back Pan	Wilderness	
Broken Rifle	Wilderness	
Kashawe	Wilderness	
Little Makololo	Wilderness	
Little Samavundla	Wilderness	
Madison	Wilderness	
Makololo 3	Wilderness	
Ngamo 1	Wilderness	
Ostrich	Wilderness	
Samavundla	Wilderness	
Wecau	Wilderness	
Big Toms	ZPWMA	
Borehole 5	ZPWMA	ZESA
Deteema	ZPWMA	
Dom	ZPWMA	solar
Little Toms	ZPWMA	
Mandavu	ZPWMA	
Manzimbomvu	ZPWMA	

Table : Pan pumping systems	
Type	Pan
Windmill	Shapi, Mbiza, Shumba, Kennedy 1
Solar	Boabab, Bumbusi South, Tshompani
ZESA	Davisons, Borehole 5, Kashawe, The Hide
Diesel	All others

PUMPED PANS

NYAMANDLOVU



Drilled: 1936 (50m)

Responsibility:
ZPWMA

Comments: The flagship pan for the park with easy access from Main Camp (important to exit the gate before closing time). Very popular viewing platform

FoH has drilled a new borehole and will be installing a solar pump.



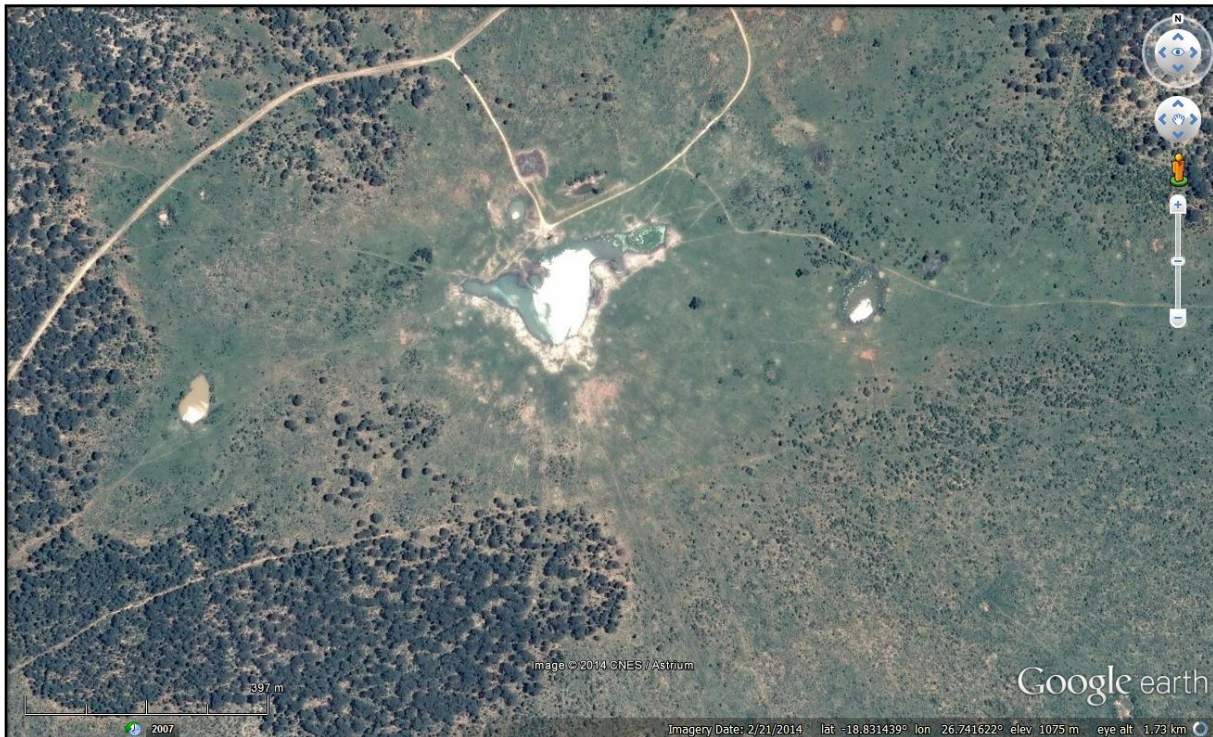
GUVALALA



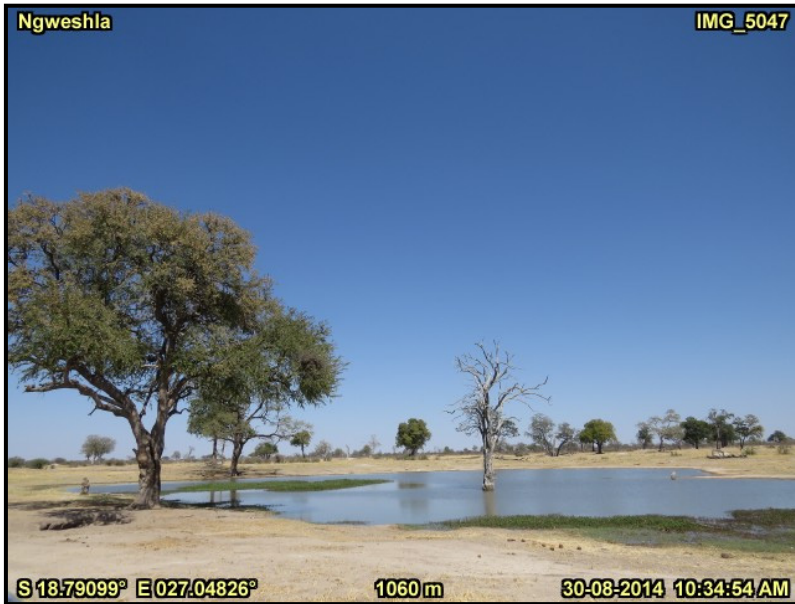
Drilled: 1952, 1965
(100m)

Responsibility: WEZ,
Friends of Hwange

Comments: Also with
viewing platform
where clients can
sleep. Water is saline?



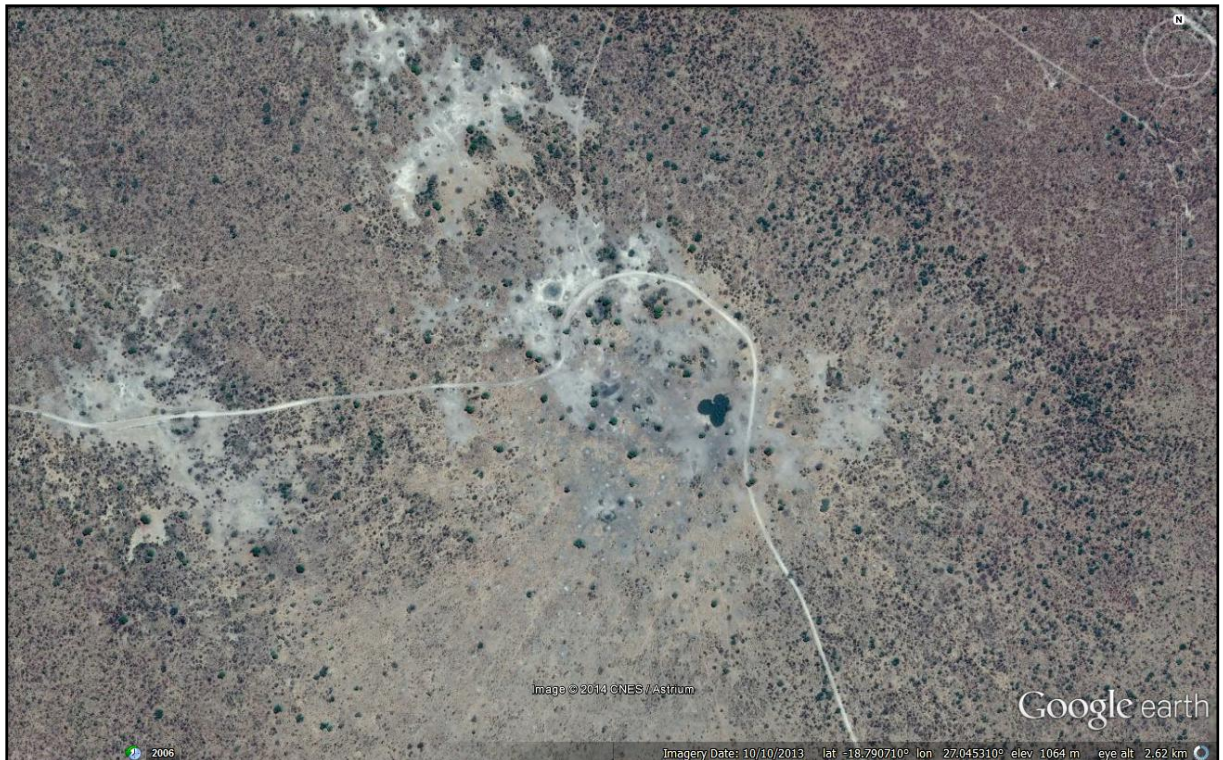
MAKWA



Drilled: 1950 (56m)

Responsibility:
Friends of Hwange

Comments:



KENNEDY 1



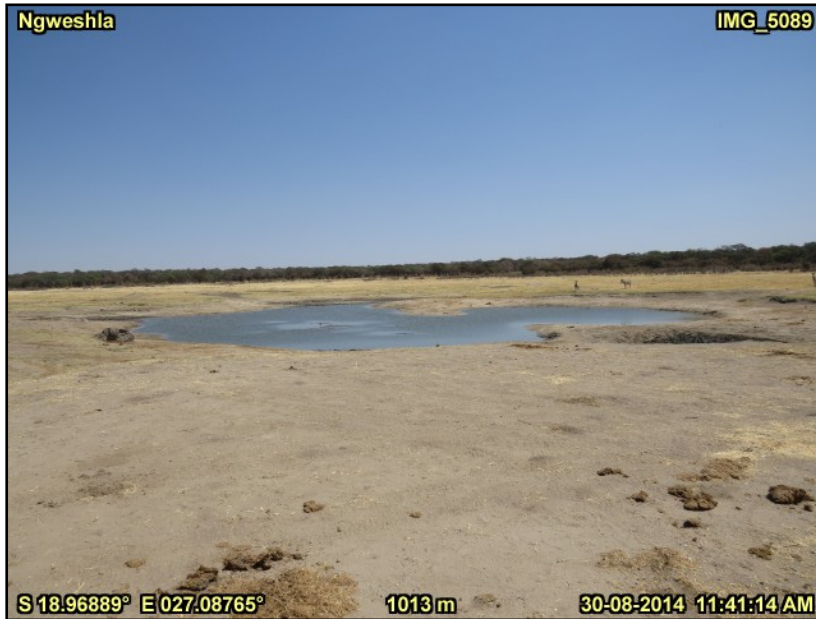
Drilled: 1944 (45m)

Responsibility:
Friends of Hwange

Comments: Is this being pumped in 2014 (or is the water going into another pan)



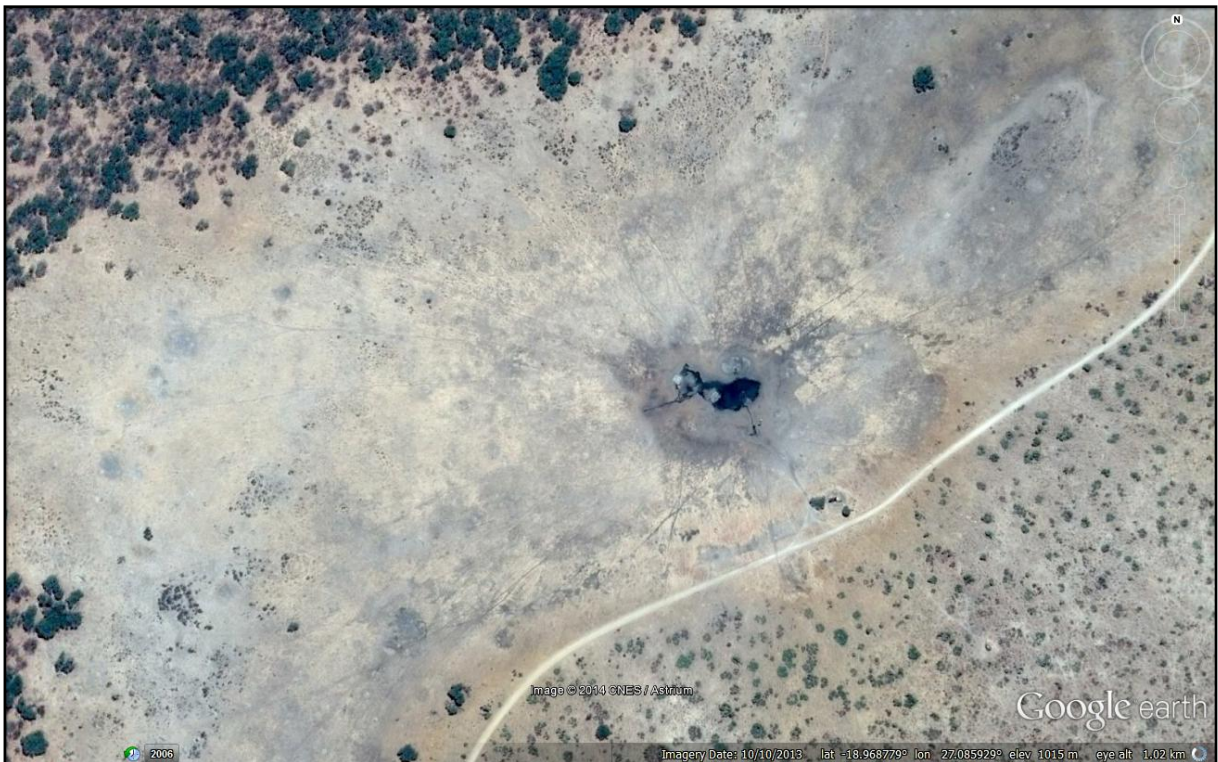
KENNEDY 2



Drilled: 1957 (65m)

Responsibility:
Friends of Hwange

Comments: Currently
pumped by solar,
donated by FoW?



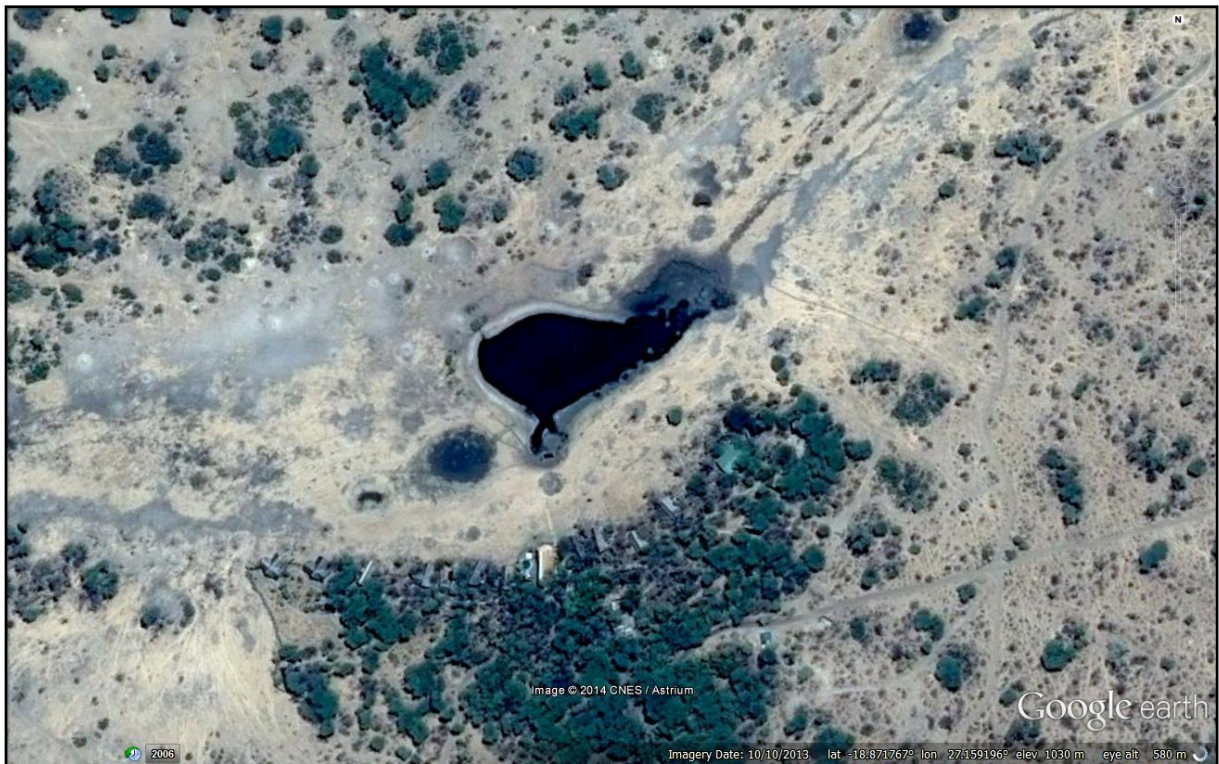
THE HIDE



Drilled:

Responsibility: The Hide

Comments:



INYANTUE

Drilled: 1970

Responsibility:
ZPWMA

Comments:

TSHOMPANI

Drilled: 1968 (39m)

Responsibility:
ZPWMA

Comments:
Windmill from FoH.
Solar installation
underway via
Bhejane Trust



NGWESHLA



Drilled: 1935 (41m),
1950 (78m)

Responsibility:
Previously Wilderness
but now taken over by
FoH

Comments: An
important waterhole on
the tourist circuit. Two
new solar units will be
installed



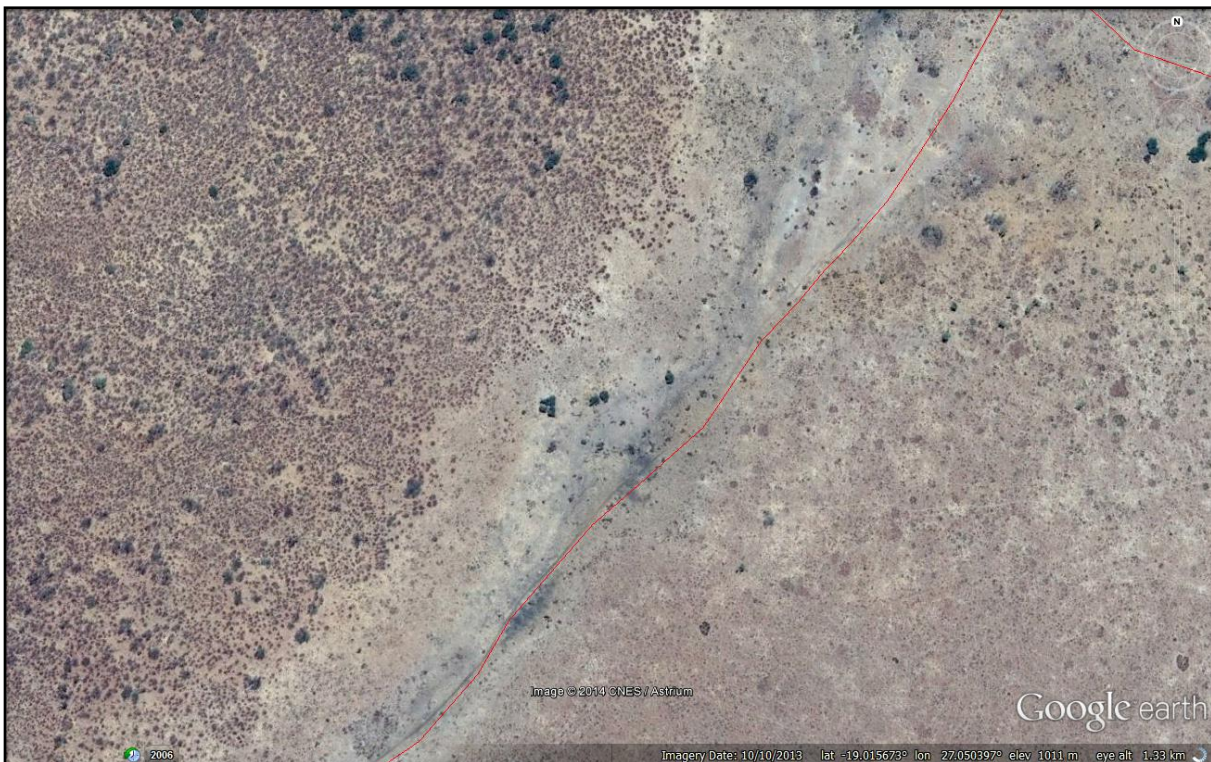
CHRIS'S PAN



Drilled: 2012?

Responsibility:
Somalisa Camp

Comments: Newly established hole to improve tourism



SOMALISA



Drilled: 1967 (68m)

Responsibility:
Somalisa Camp

Comments: Was
closed in the 1970s



SOMALISA CAMP



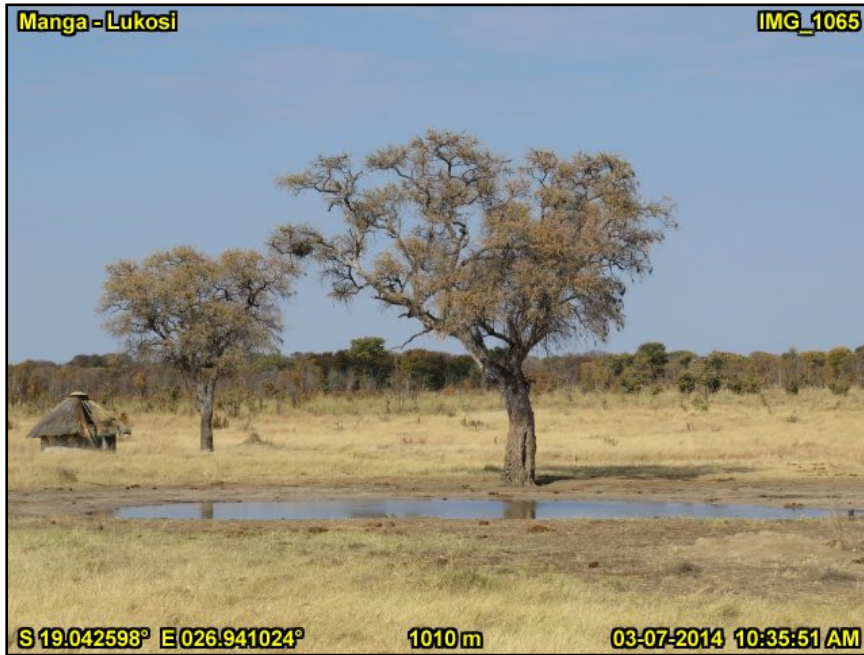
Drilled: 2012?

Responsibility:
Somalisa Camp

Comments: Two waterholes to provide game viewing experience at the camps (Somalisa and Somalisa Acacia)



MANGA 3



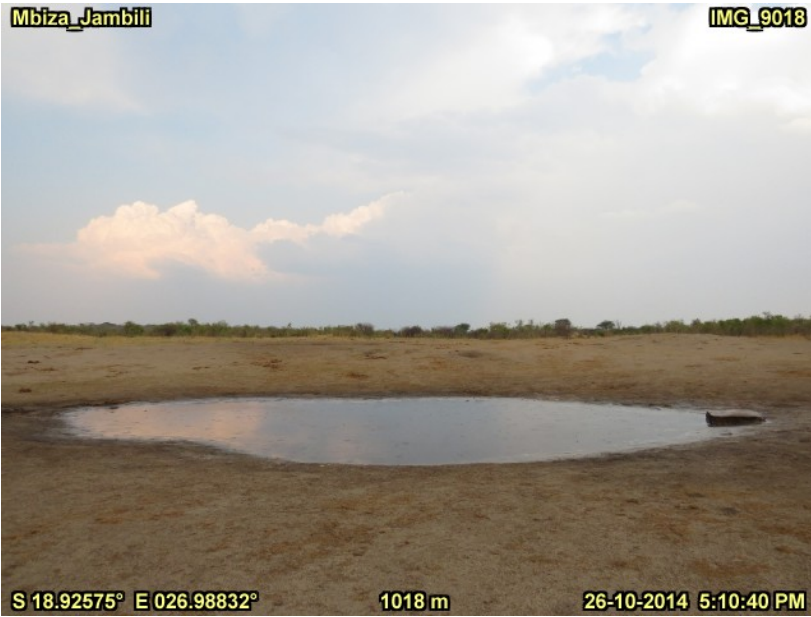
Drilled: 1984 (100m)

Responsibility:
Somalisa

Comments:



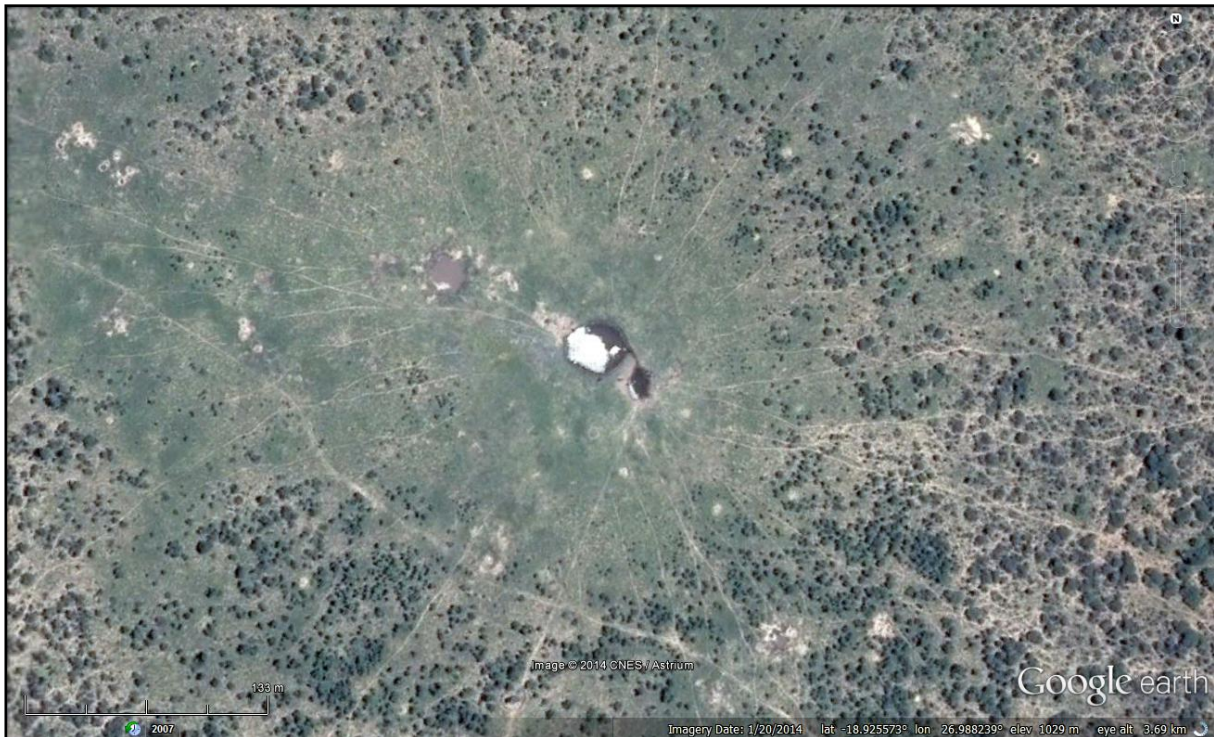
UMKWAWUZAAN



Drilled: 1973 (70m)

Responsibility:
Somalisa

Comments: Saline?
Pumped by solar.
Recent operation
started in 2014



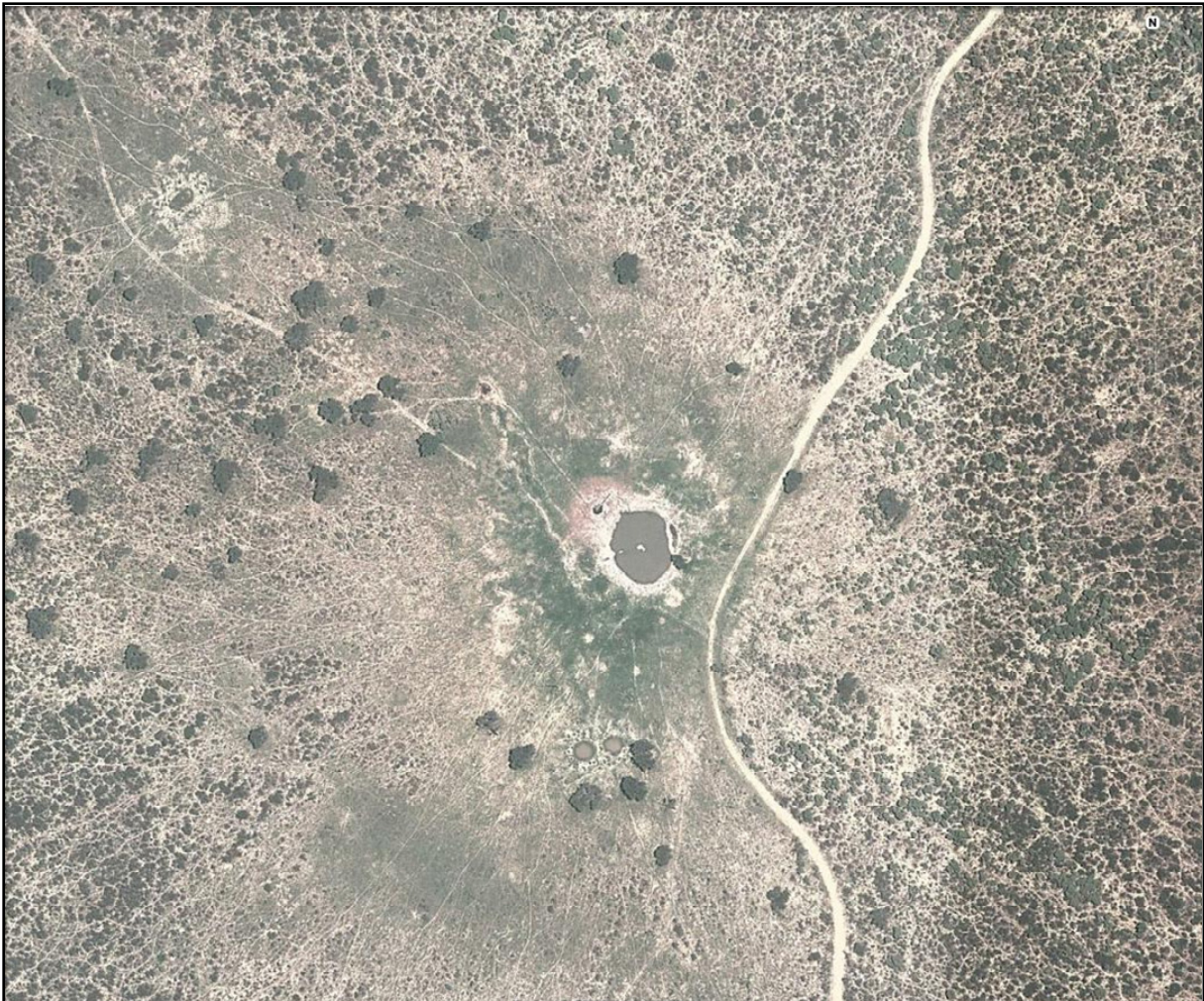
MANGA 1



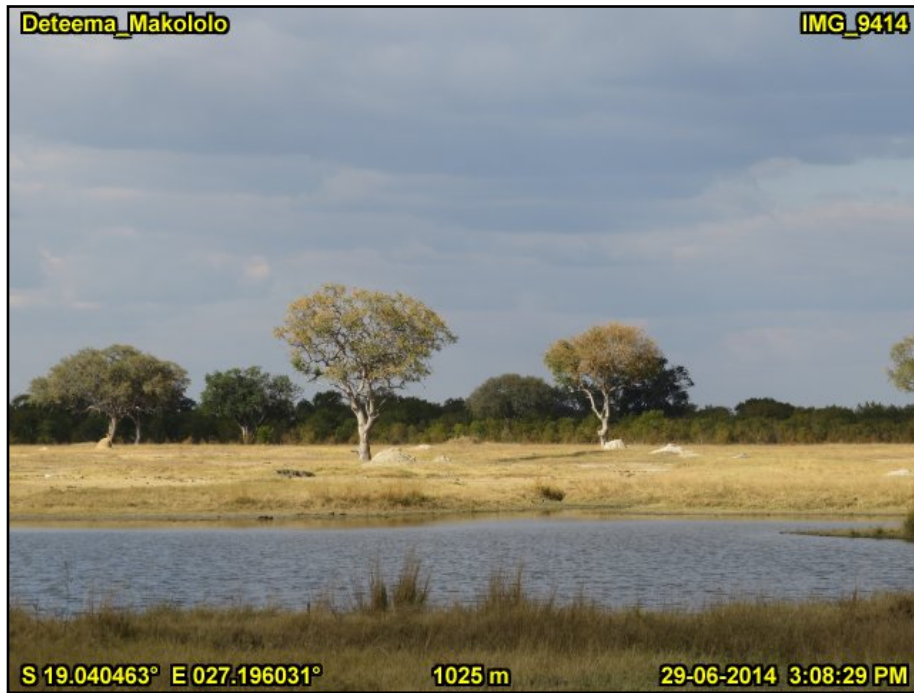
Drilled: 1984 (81m)

Responsibility:

Comments:



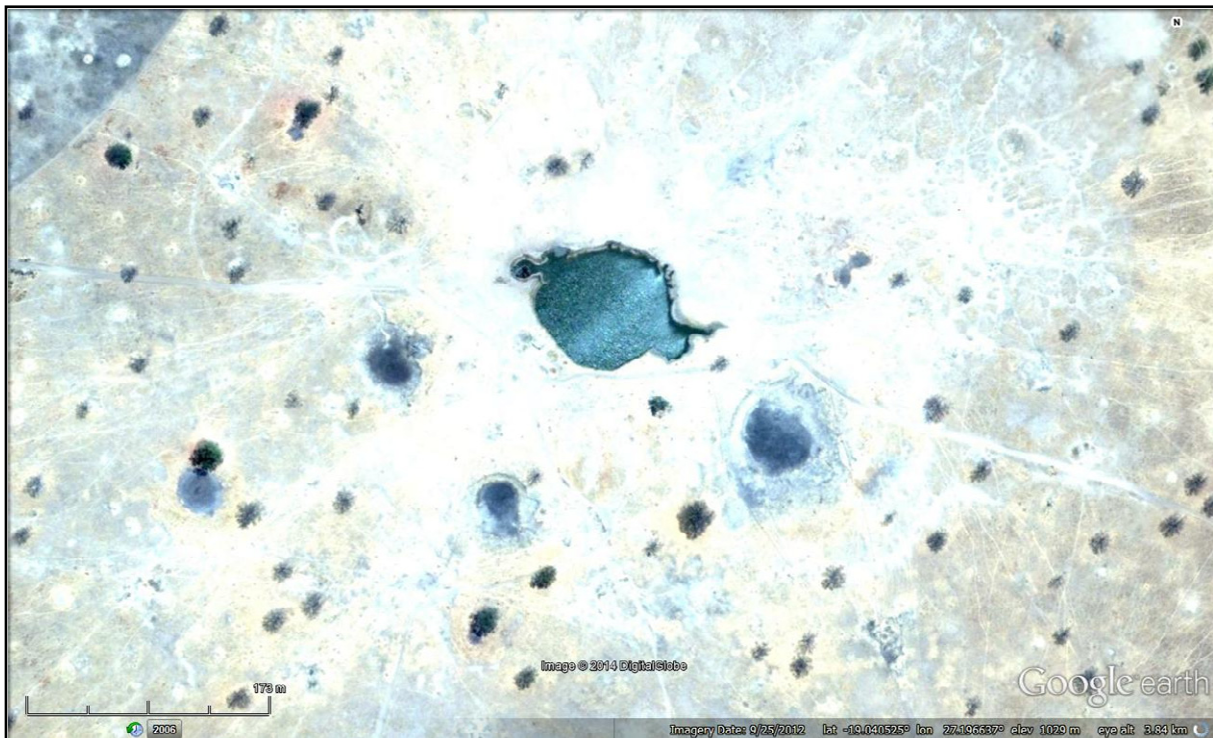
SAMAVUNDLA



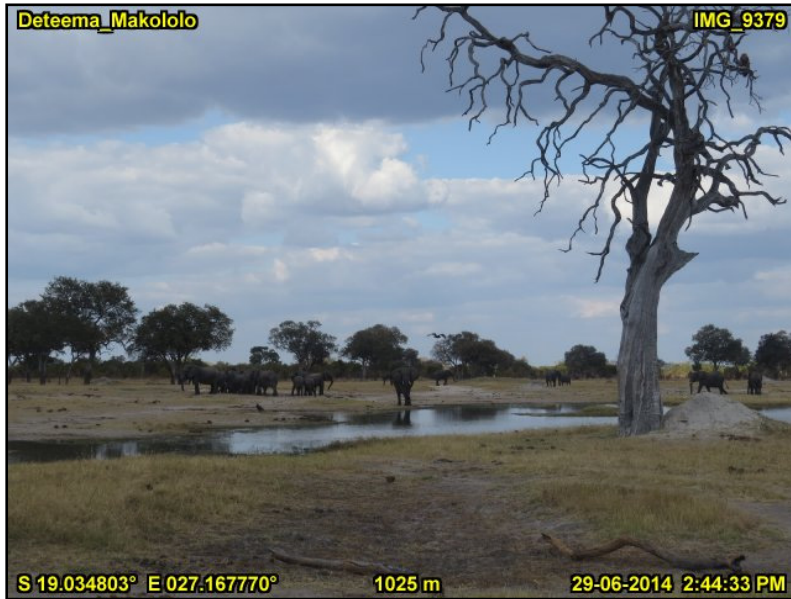
Drilled: 1963 (24m),
1969 (50m)

Responsibility:
Wilderness

Comments:



LITTLE SAMAVUNDLA



Drilled:

Responsibility:
Wilderness

Comments:

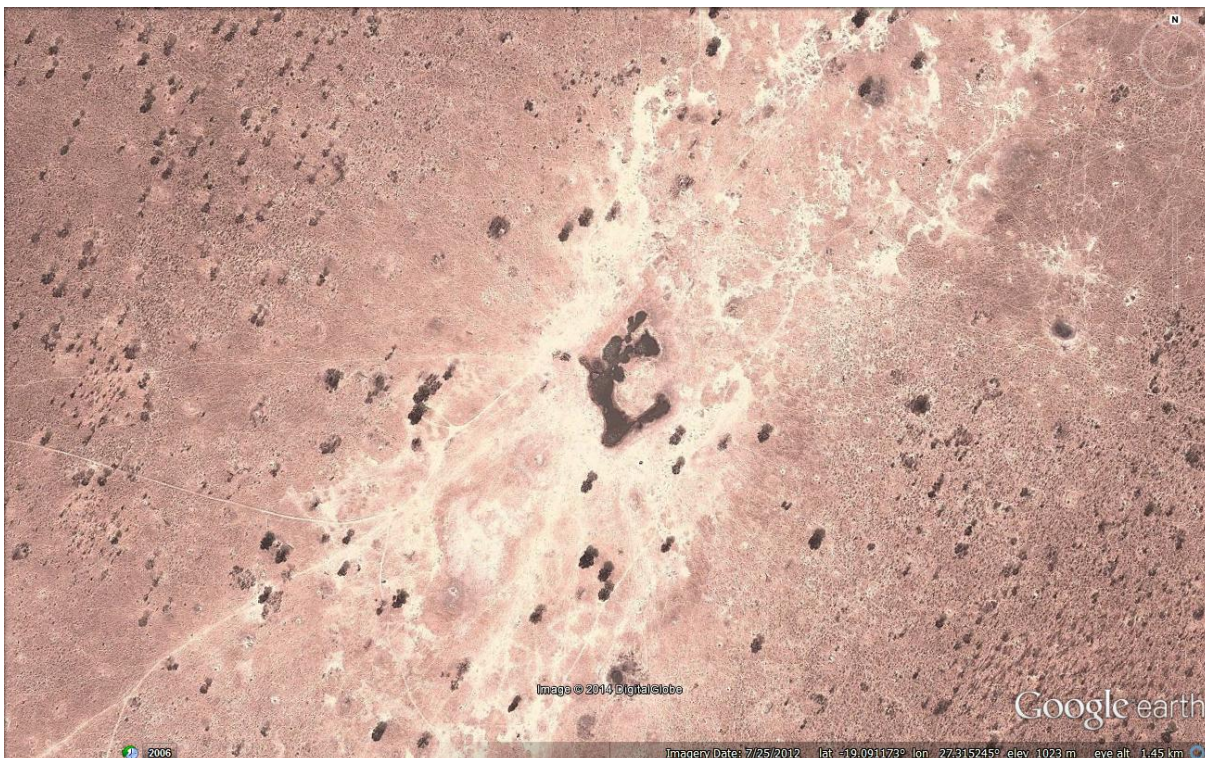


SCOTTS PAN

Drilled:

Responsibility:
Wilderness

Comments:



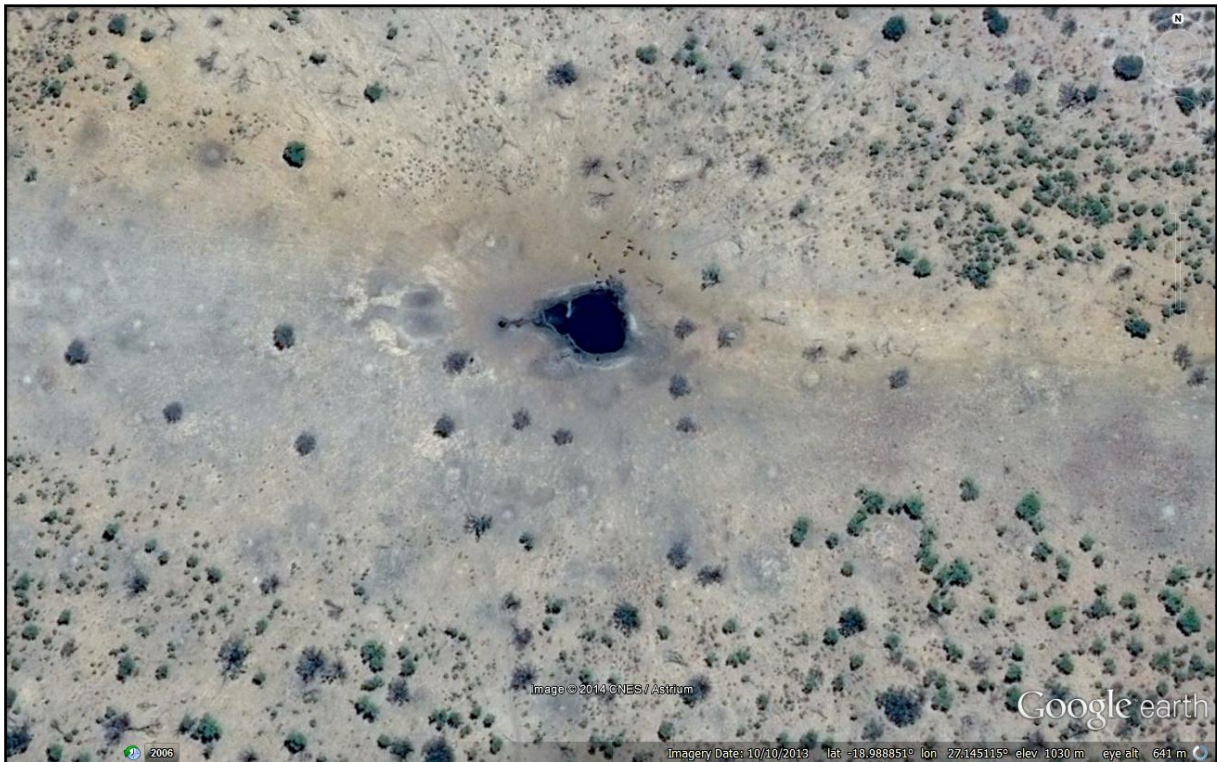
BROKEN RIFLE



Drilled:

Responsibility:
Wilderness

Comments:

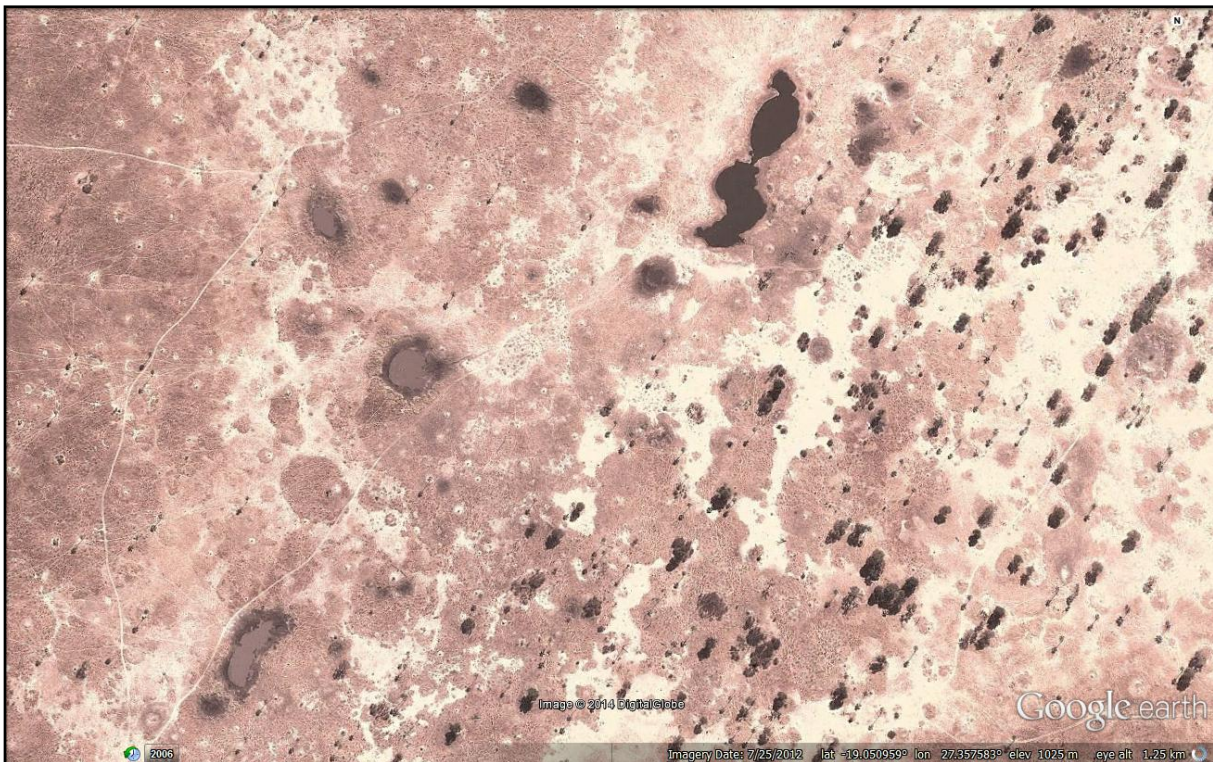


BACK PANS

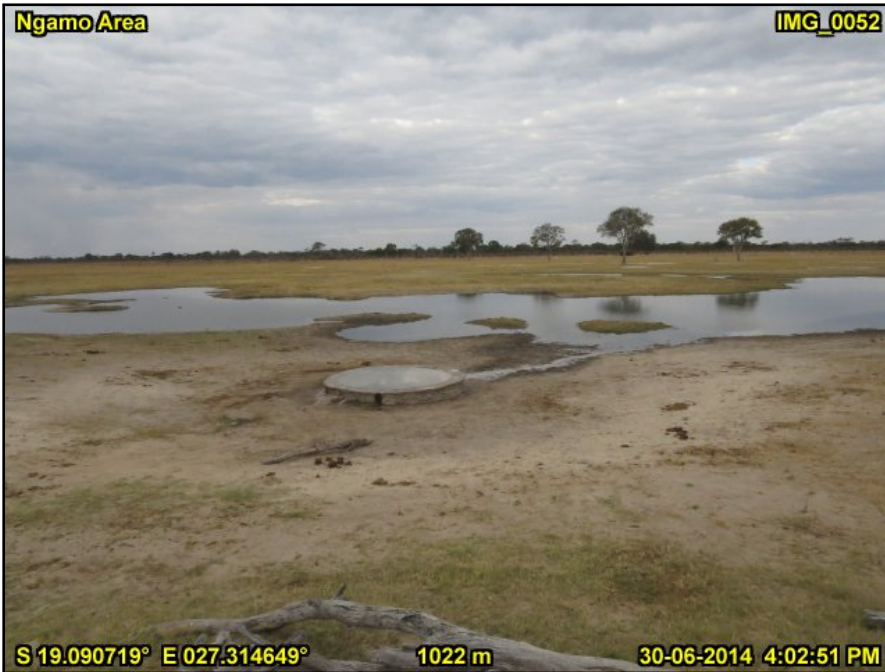
Drilled:

Responsibility:
Wilderness

Comments:



MAKOLOLO 3



Drilled:

Responsibility:
Wilderness

Comments:



LITTLE MAKOLOLO



Drilled:

Responsibility:
Wilderness

Comments: In front of
Little Makololo Camp



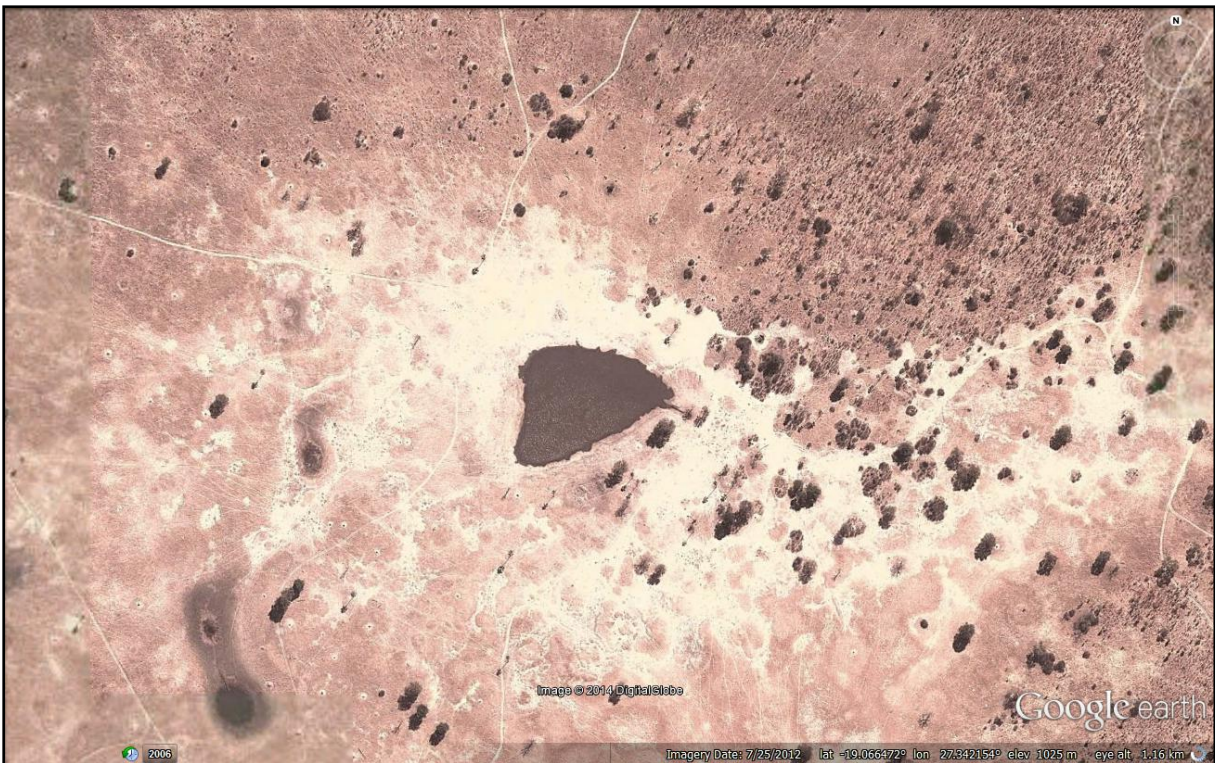
MAKALOLO 1



Drilled:

Responsibility:
Wilderness

Comments:

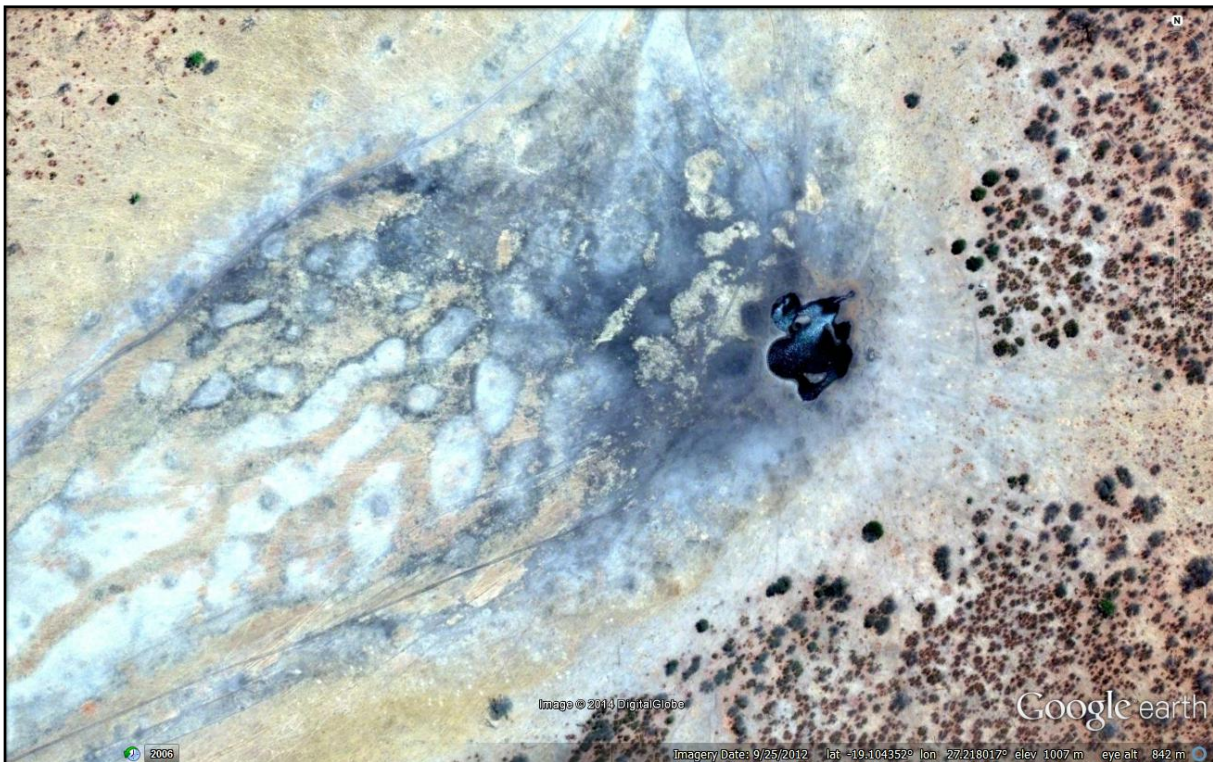


MADISON

Drilled:

Responsibility:
Wilderness

Comments:

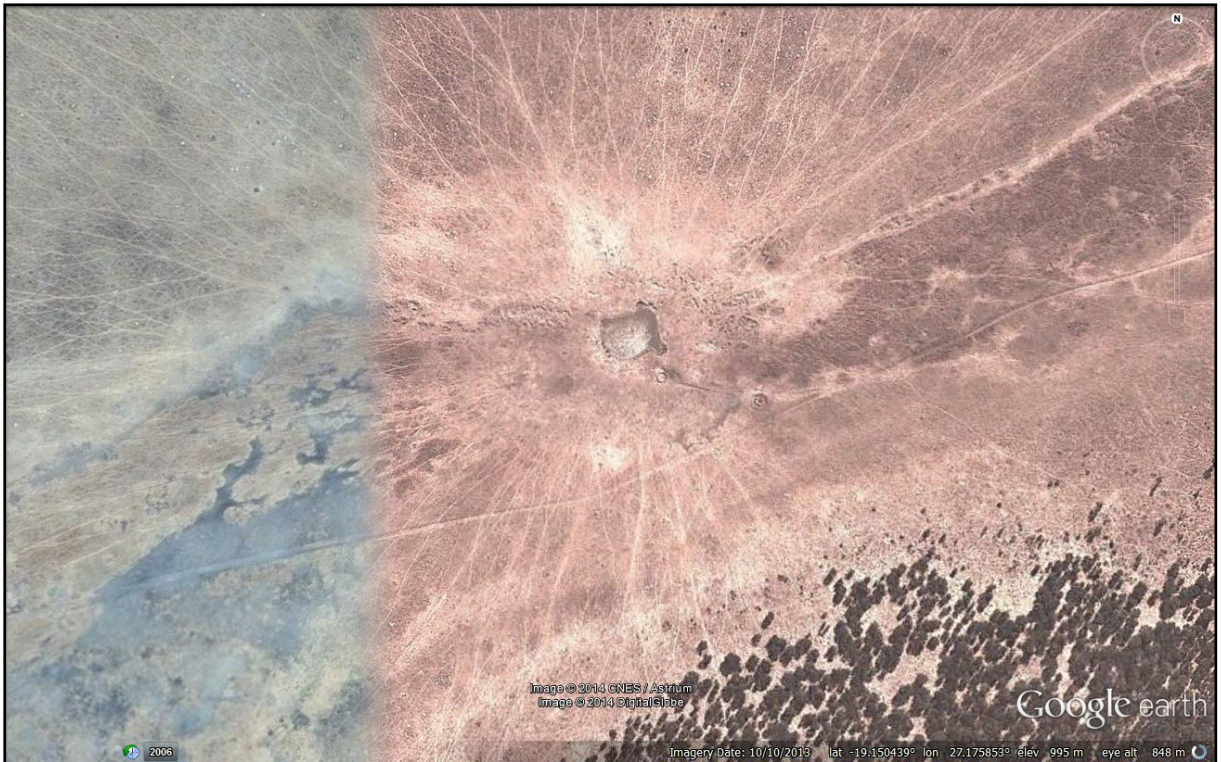


AIRSTRIP 2

Drilled:

Responsibility:
Wilderness

Comments:



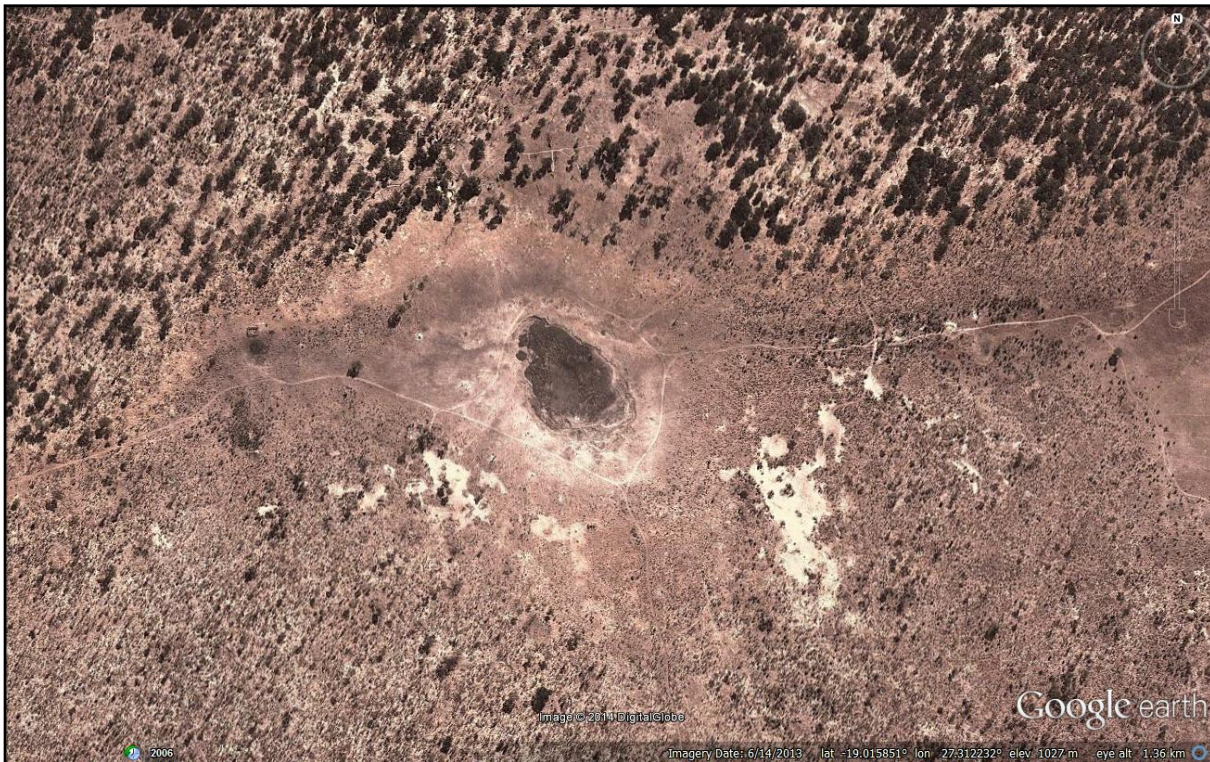
OSTRICH



Drilled:

Responsibility:
Wilderness

Comments: Is in front of Davison's Camp.
Pumped by ZESA



MBIZA



Drilled: 1957

Responsibility:
Recently relinquished
by Wilderness

Comments: Windmill
Pump



STOFFIES



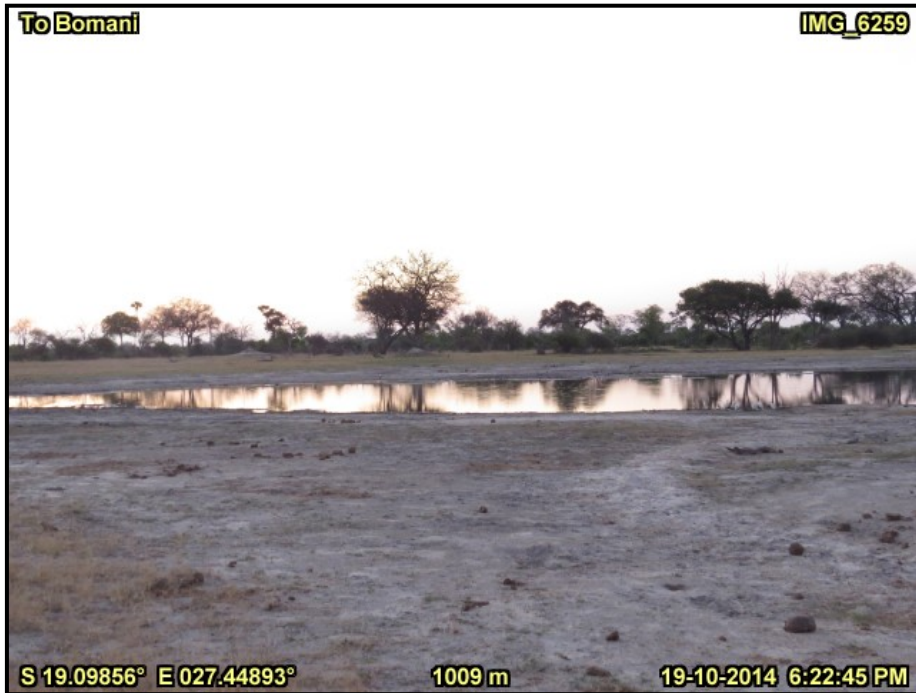
Drilled:

Responsibility:
Imvelo

Comments: Fed by pipeline from outside park. Google imagery prior to pan establishment



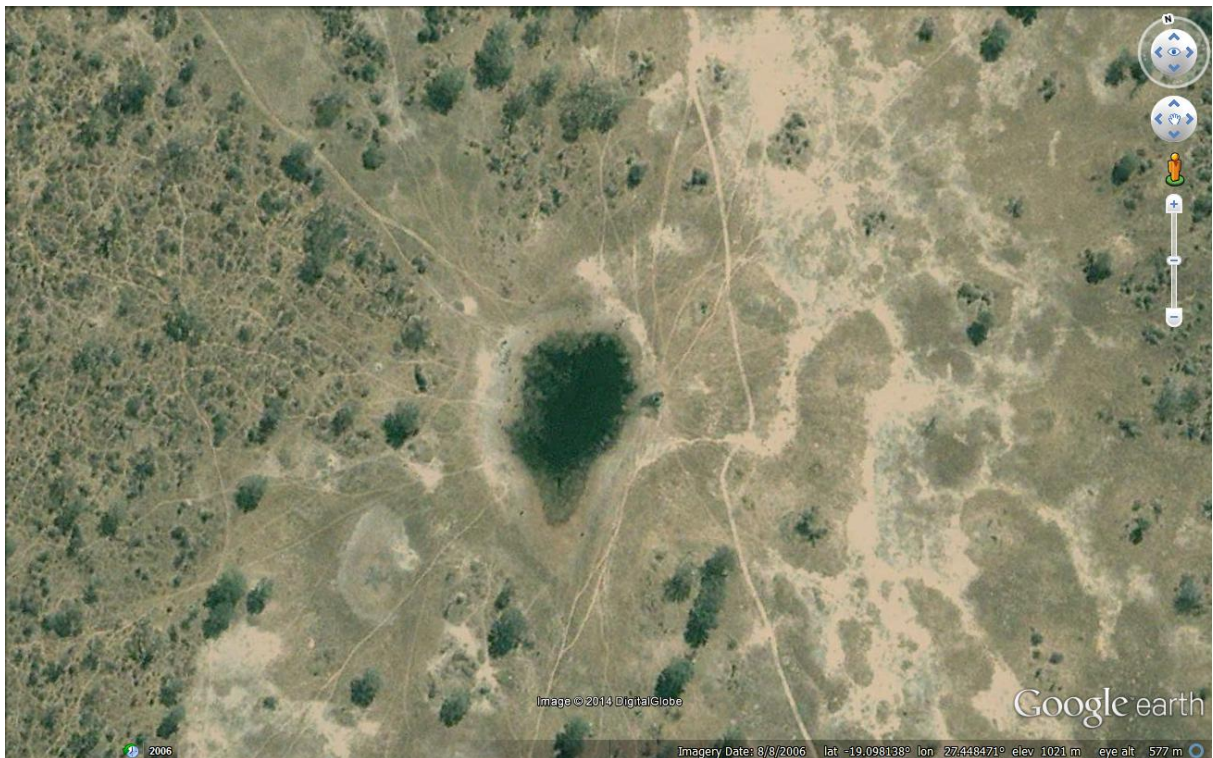
MAJOR



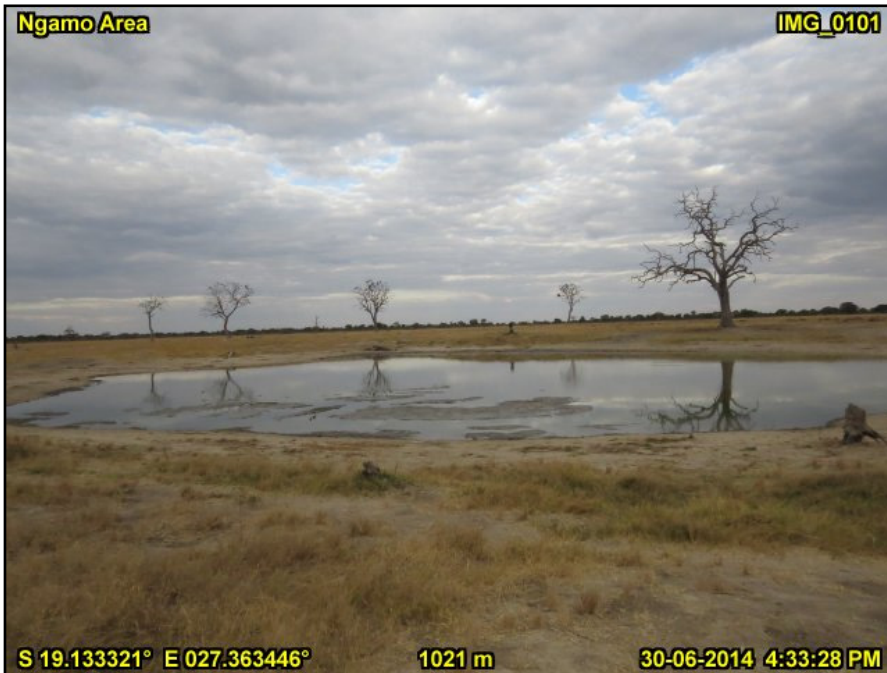
Drilled:

Responsibility:
Imvelo

Comments: Fed by
pipeline from outside
park



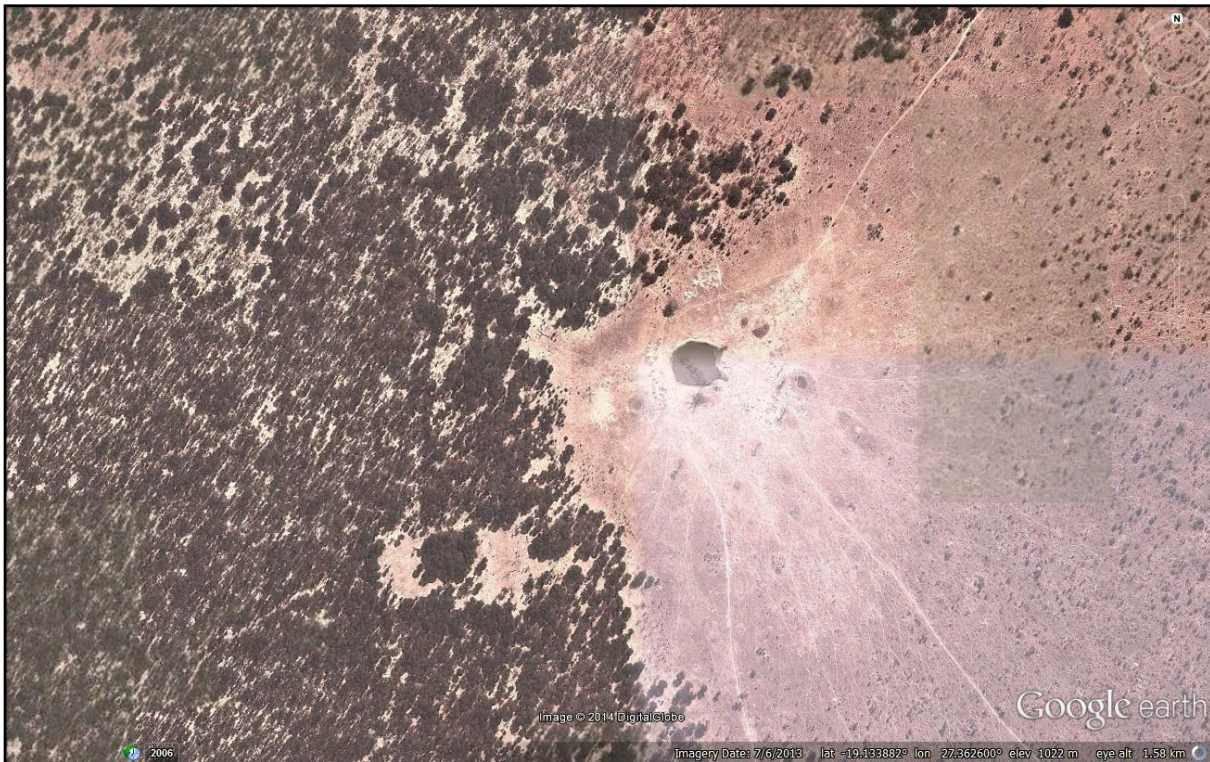
WECAU



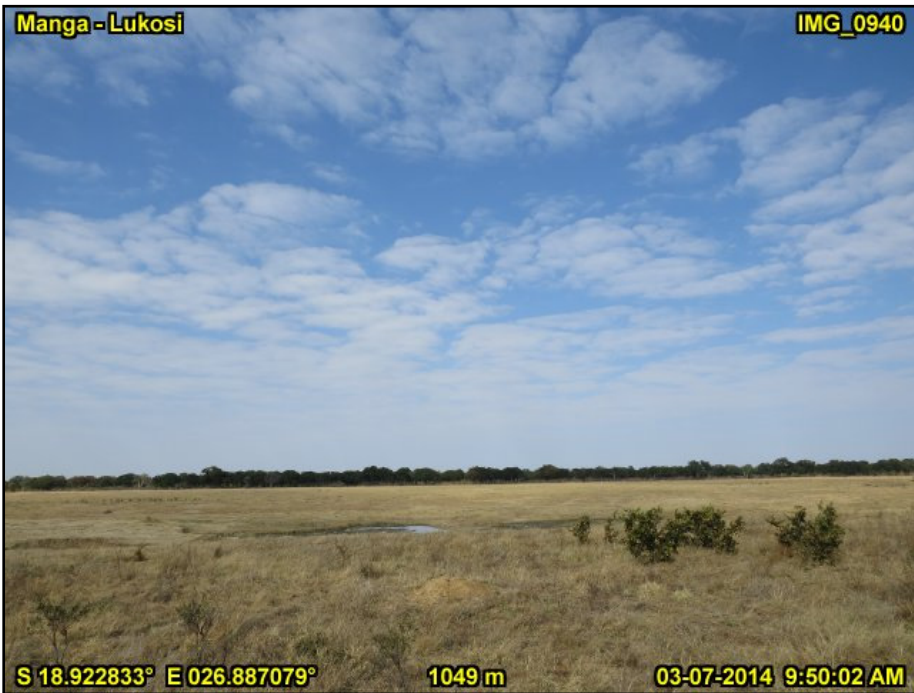
Drilled: 1963 (47m)

Responsibility:
Wilderness

Comments: Is in front
of Wecau anti-
poaching camp



JAMBILI



Drilled: 1956 (60m)

Responsibility:
Friends of Hwange

Comments: In front of
Jambili Picnic Site



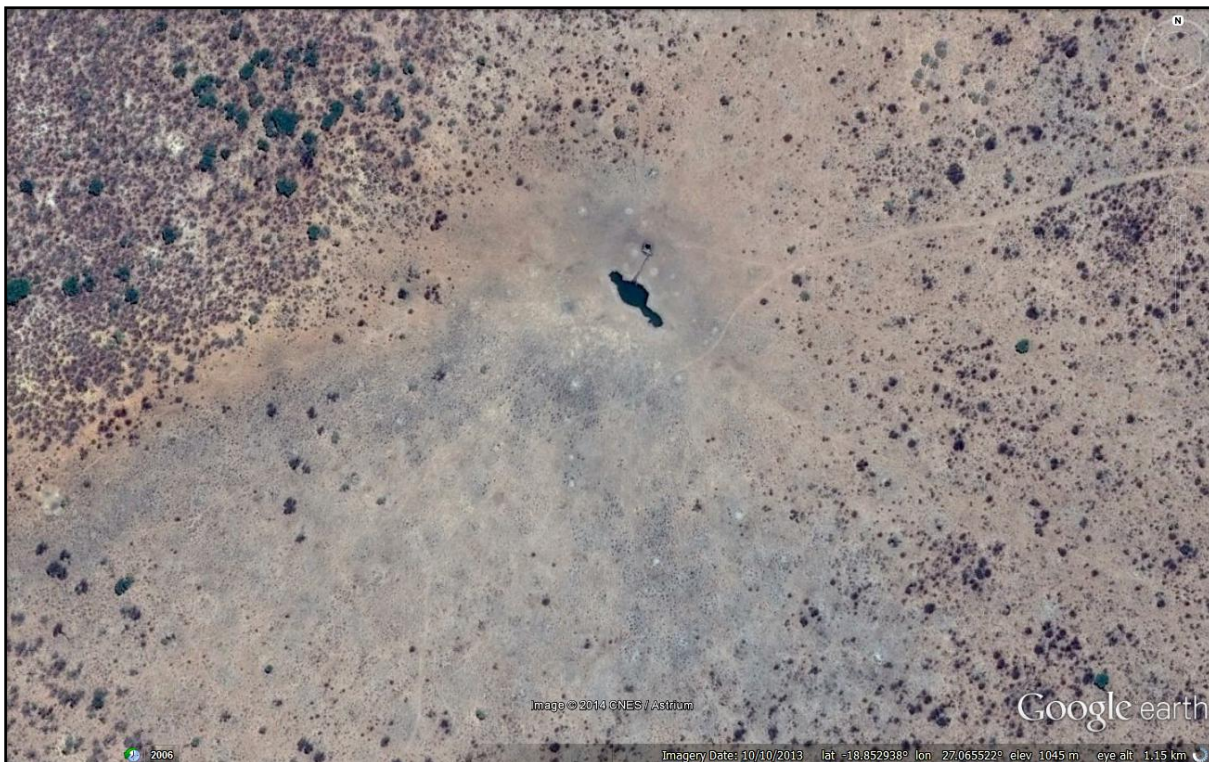
SINANGA



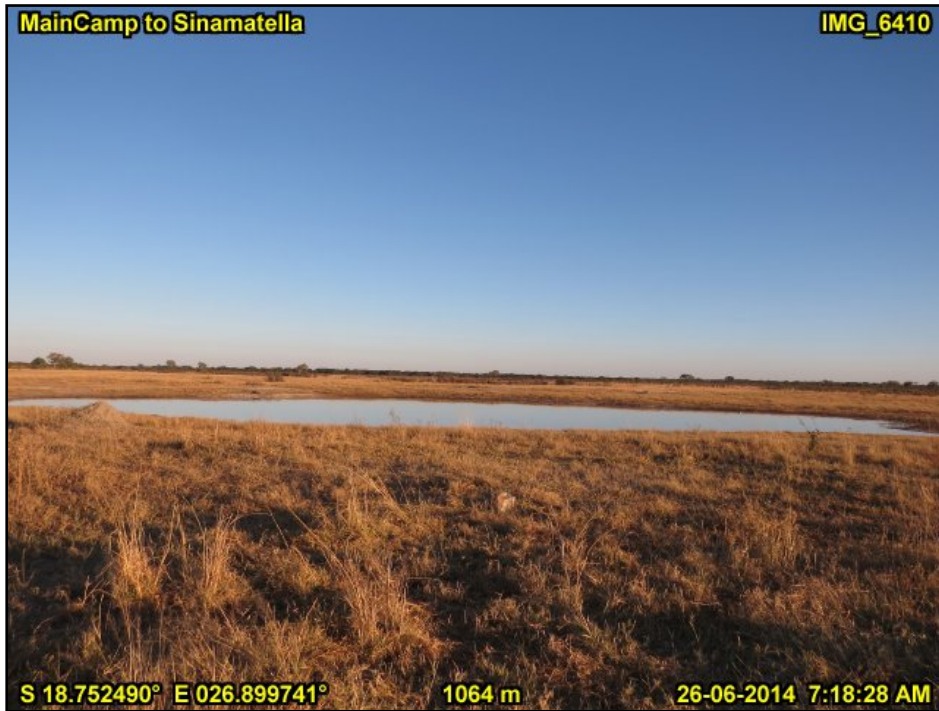
Drilled: 1973 (68m)

Responsibility:
Friends of Hwange

Comments:



DOM



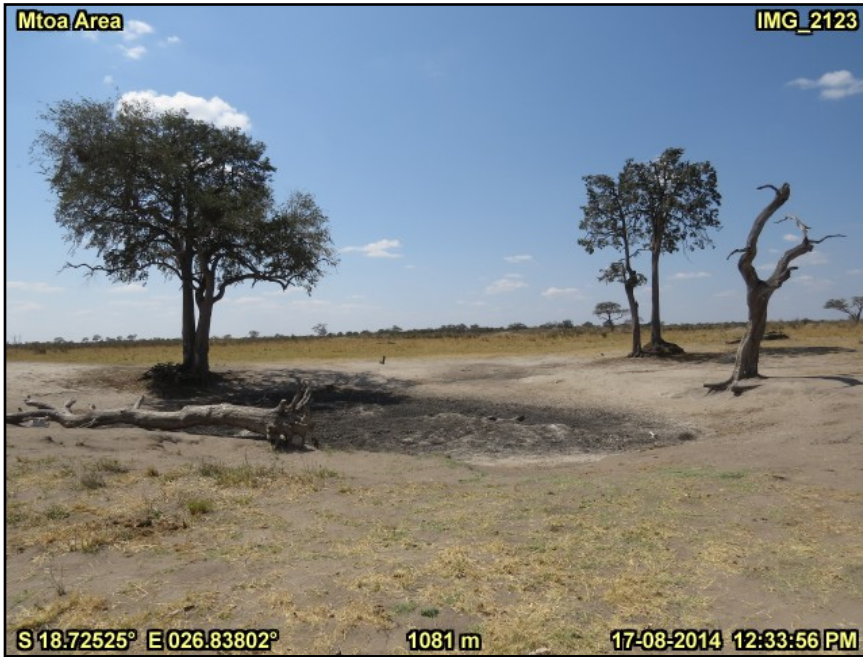
Drilled: 1936 (73m)

Responsibility:
ZPWMA

Comments:



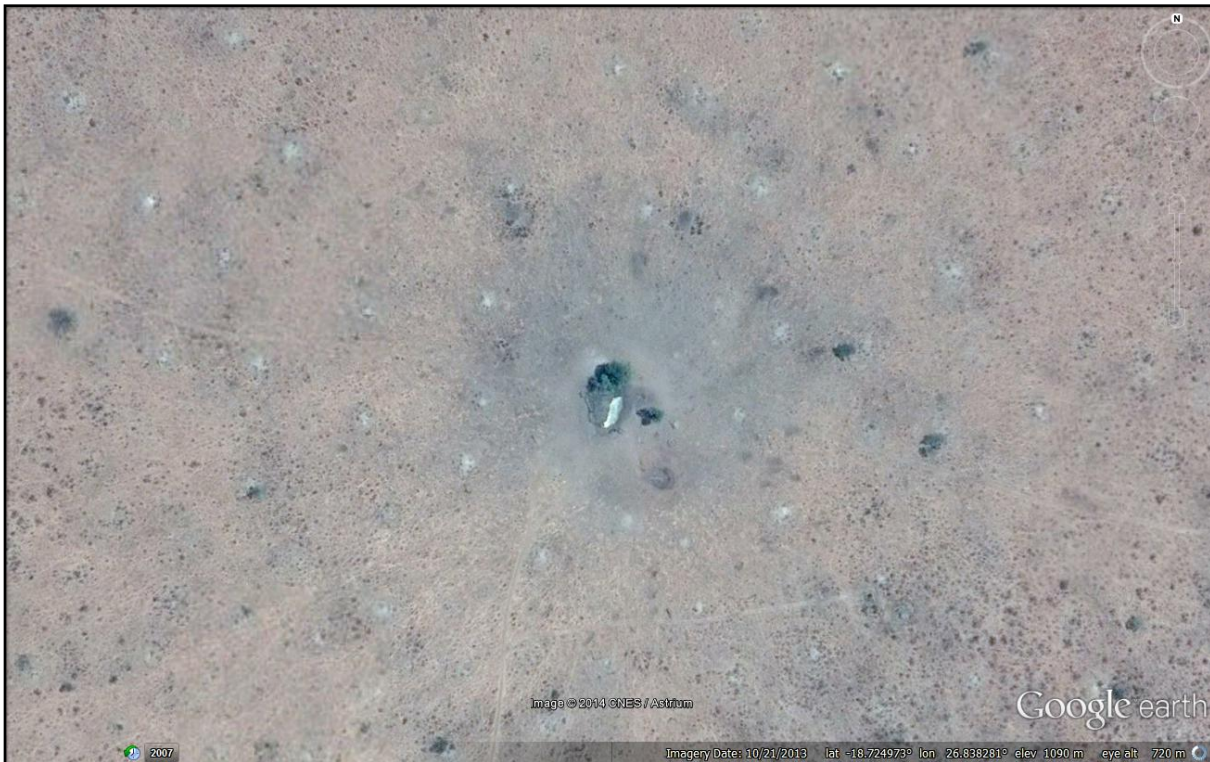
TSHEBE TSHEBE



Drilled: 1968

Responsibility:
Friends of Hwange

Comments: Is this
being pumped in 2014



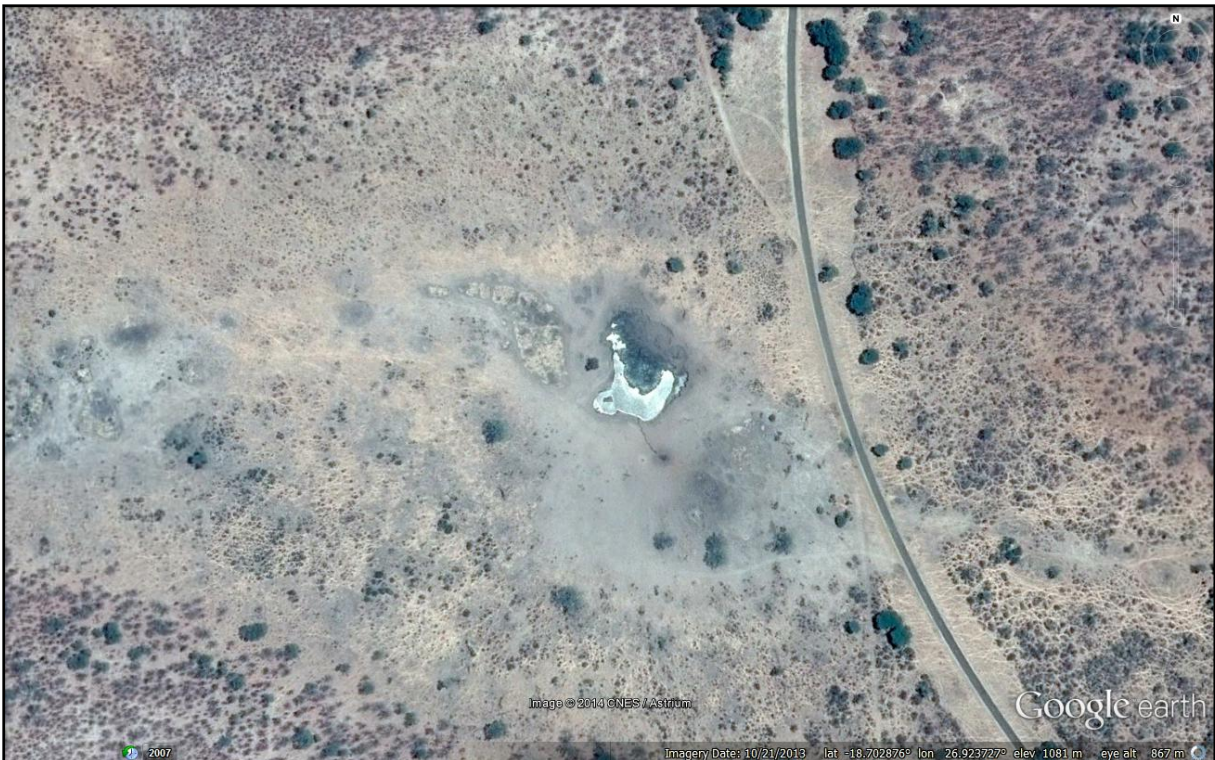
LIVINGI



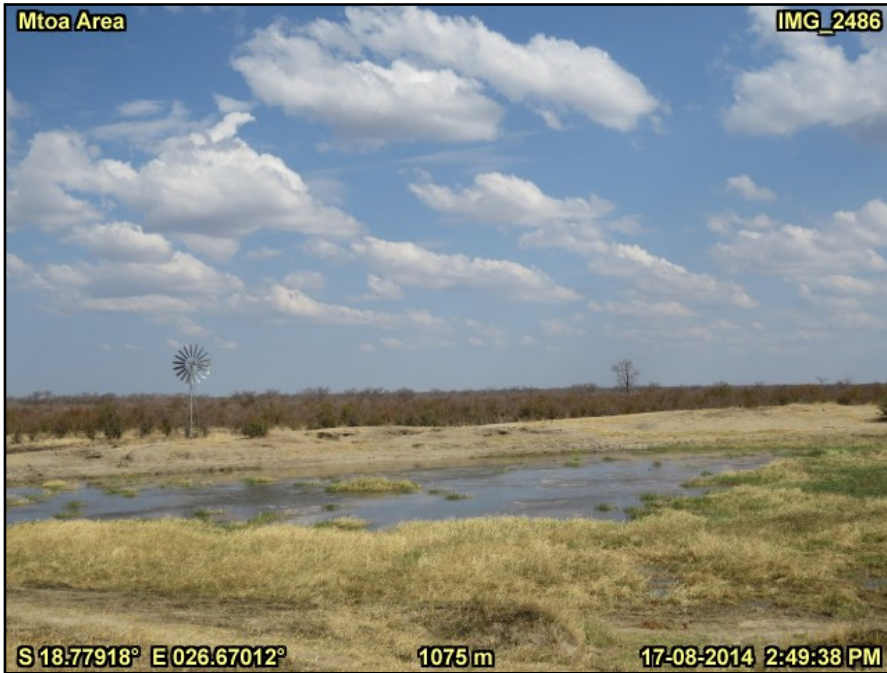
Drilled: 1973 (87m)

Responsibility:
ZPWMA

Comments: On main
road between Main
Camp and Gate



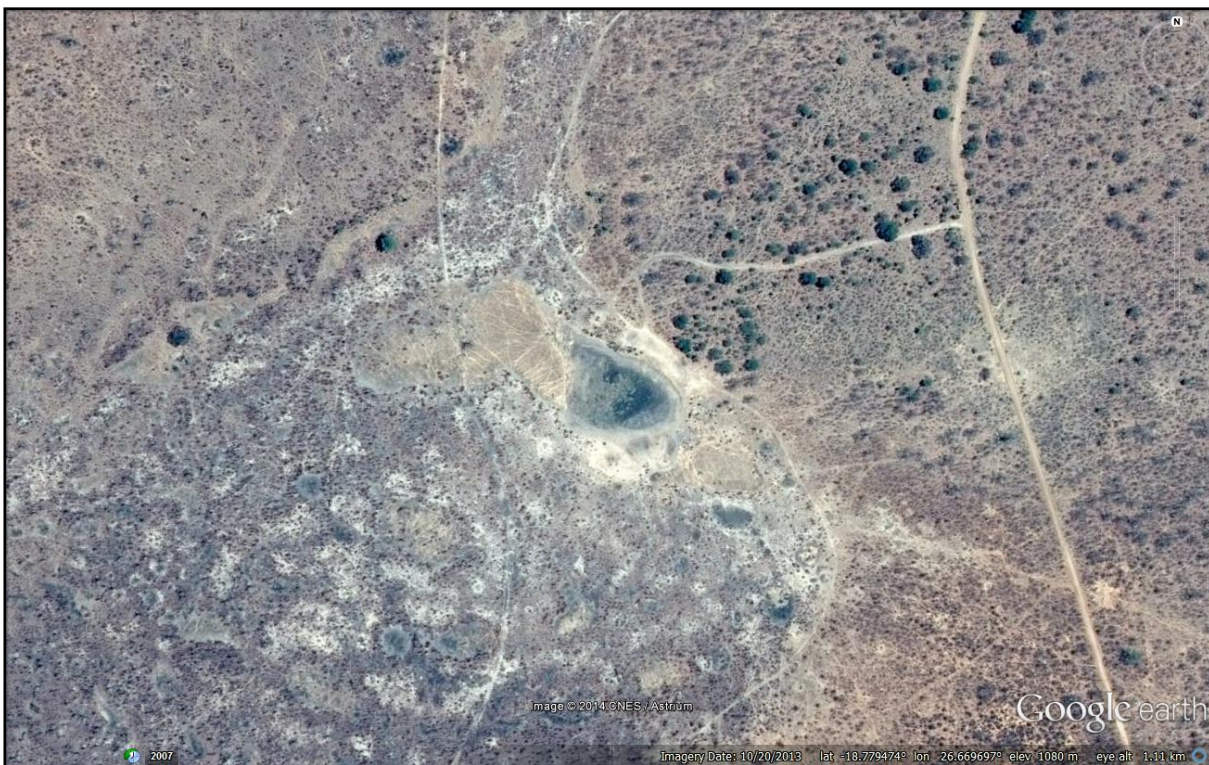
MABUYA MABENHA



Drilled: 1968 (78m)

Responsibility:
Friends of Hwange

Comments:



SHAPI



Drilled: 1936 (24m),
1952

Responsibility:
Friends of Hwange

Comments: Windmill
fed



DANGA



Drilled: ?

Responsibility:
Nehimba

Comments:



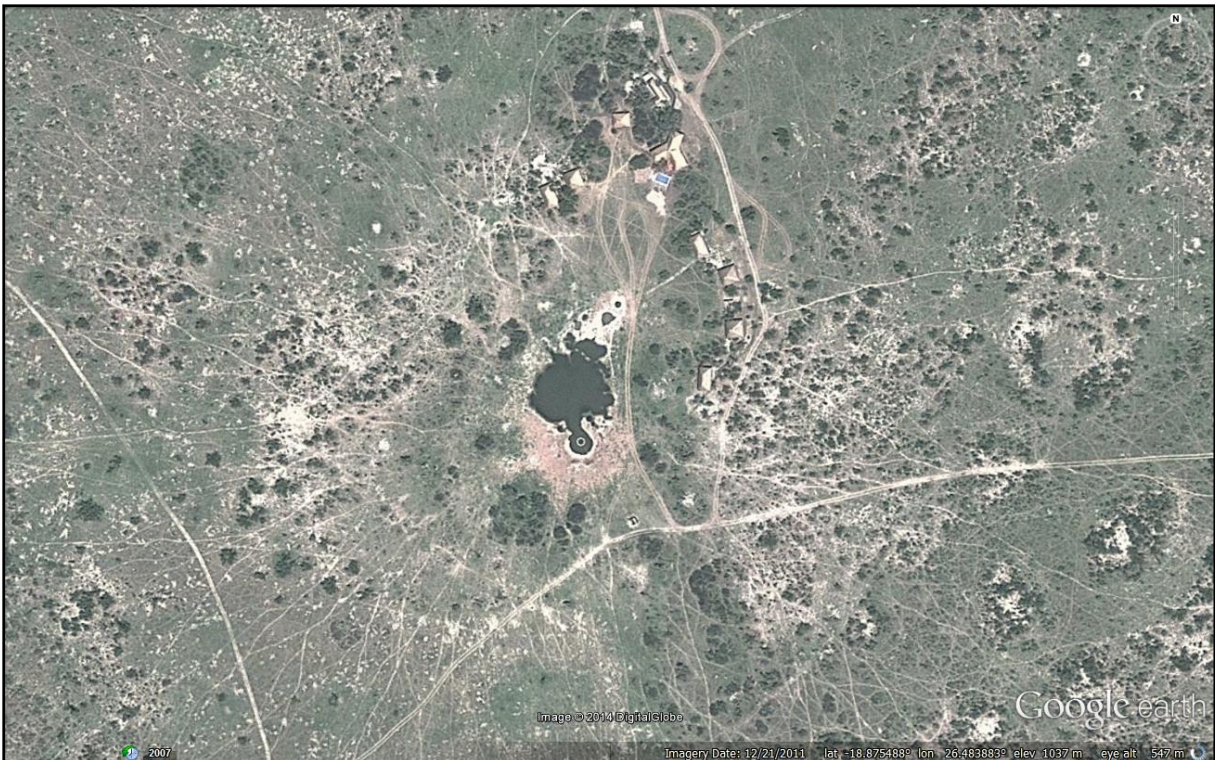
NEHIMBA CAMP



Drilled: Recent

Responsibility:
Nehimba

Comments: In front of
Nehimba Camp



GRANNIES



Drilled: Recent

Responsibility:
Nehimba

Comments: Has small platform



THREE JOHNNIES



Drilled: Recent

Responsibility:
Nehimba

Comments:



SHUMBA



Drilled: 1936 (37m)

Responsibility:
ZPWMA with assistance from Camp Hwange

Comments: In from of Shumba Picnic site. Has small platform



CAMP HWANGE



Drilled:2007?

Responsibility: Camp Hwange

Comments:
Established in front of Camp Hwange



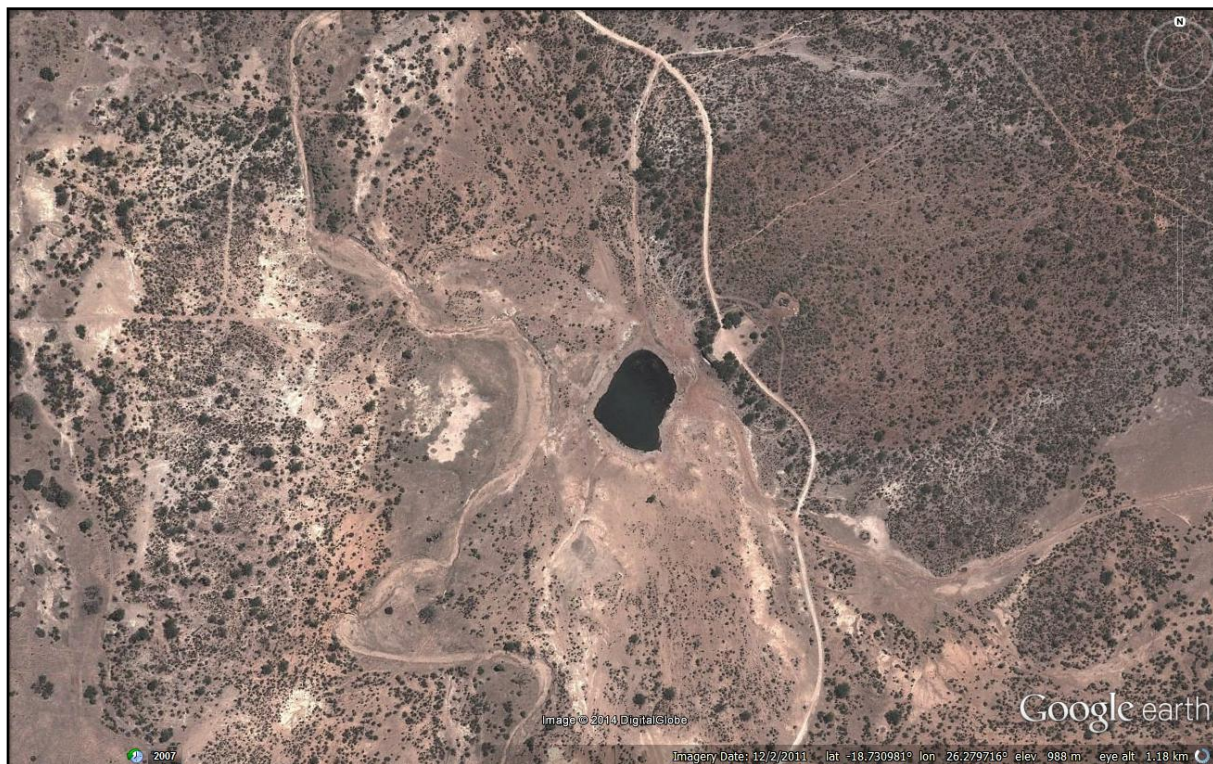
MASUMA



Drilled: 1936

Responsibility:
ZPWMA (in
association with
Makomo)

Comments: dam
established in 1936.
Pumped to maintain
levels



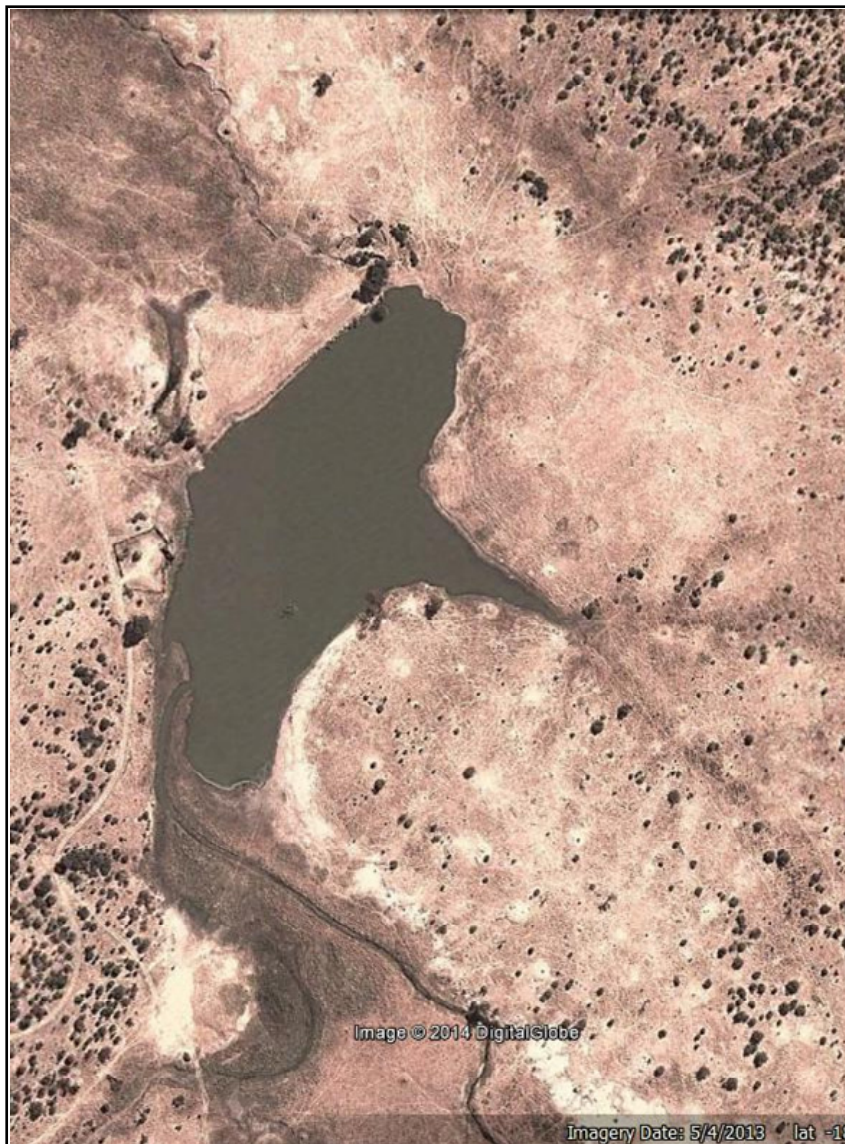
DETEEMA DAM



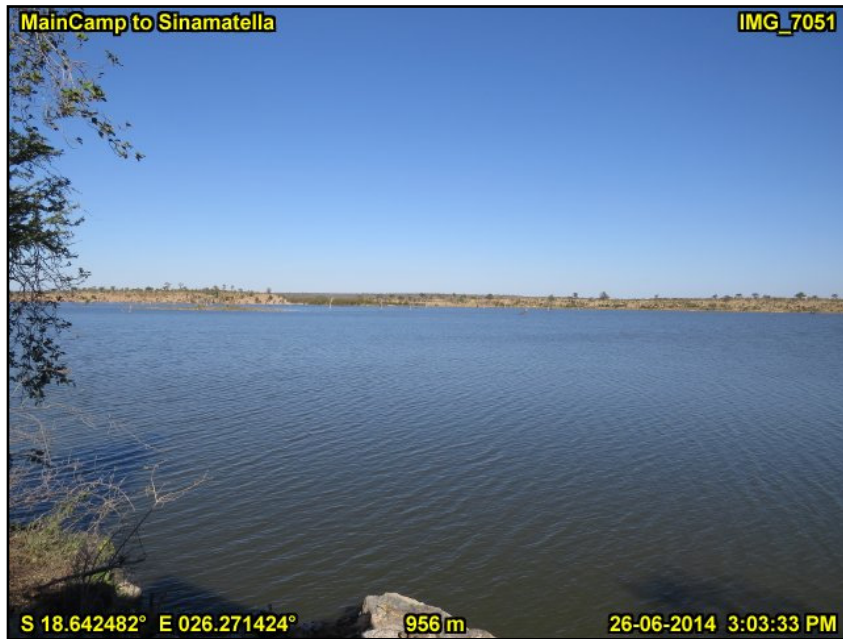
Drilled: 1964 (44m)

Responsibility:

Comments: Dam established in 1938



MANDAVU DAM



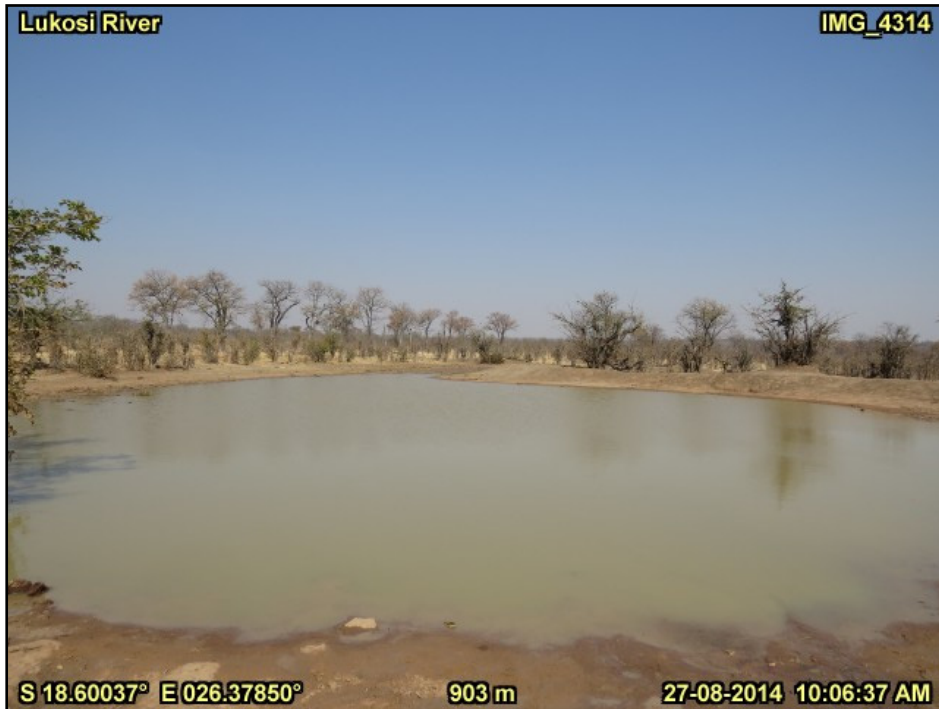
Drilled:

Responsibility:

Comments: Dam established in 1953



BAOBAB



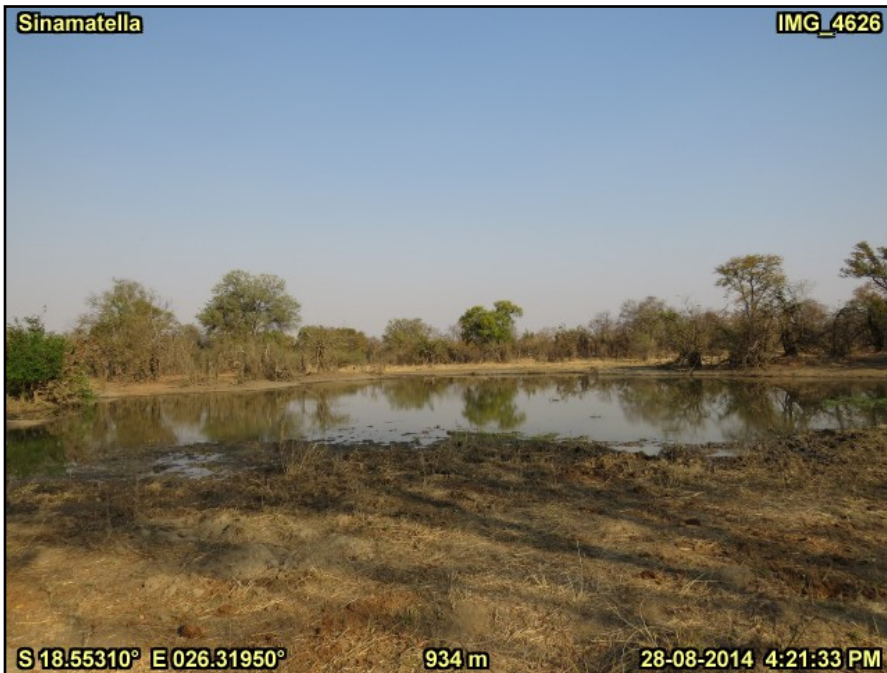
Drilled: 1969

Responsibility:
ZPWMA

Comments: Pumped
with solar installation
donated by Bhejane
Trust



BOREHOLE 5



Drilled:

Responsibility:
ZPWMA

Comments: Pumped
using ZESA



SALT PAN DAM



Drilled:

Responsibility:

Comments: Dam established in 1971



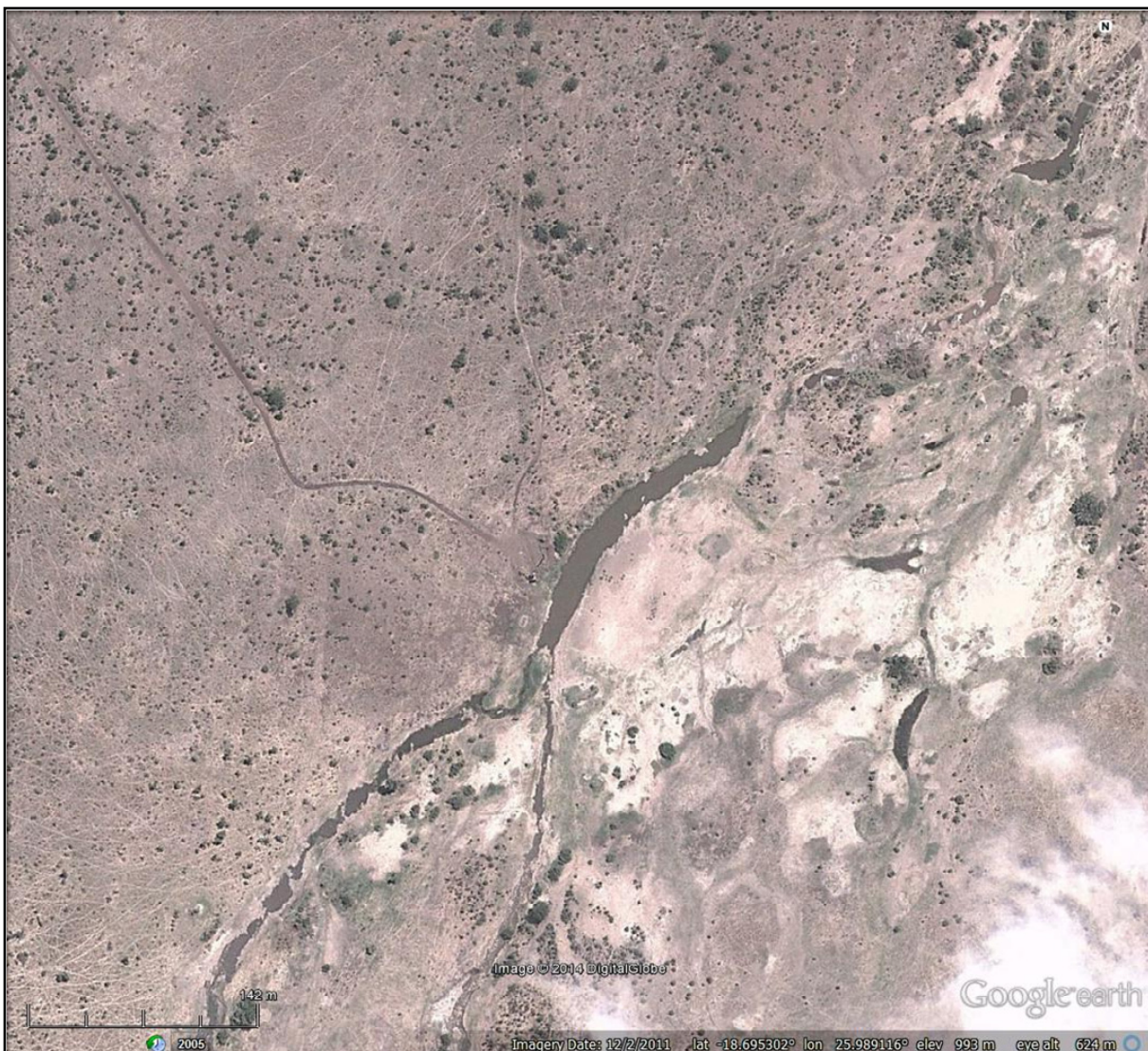
BIG TOMS



Drilled: 1936

Responsibility:
ZPWMA

Comments:



LITTLE TOMS



Drilled: 1936

Responsibility:
ZPWMA

Comments:



JOSIVANINI



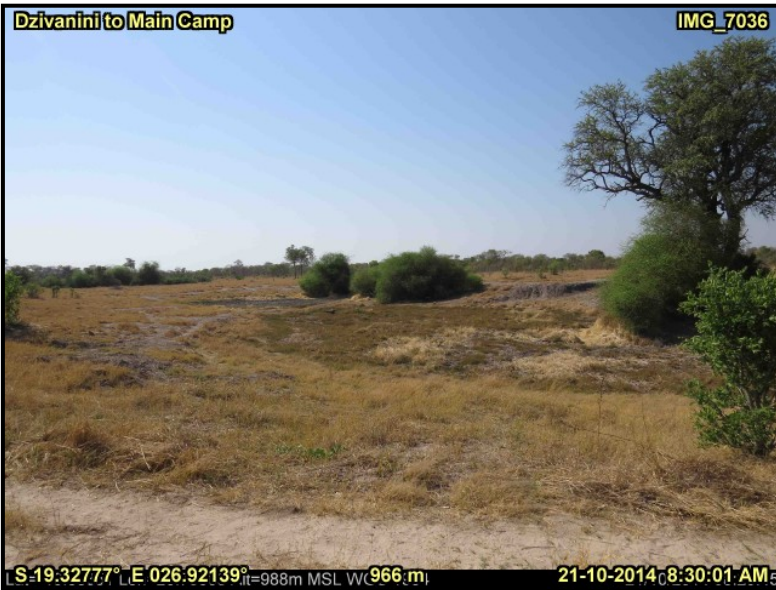
Drilled: 1965 (100m)

Responsibility:
Imvelo Safaris

Comments: Site of an old scout camp. Now part of a tourism concession. Pumping starting 2014



MAKONA



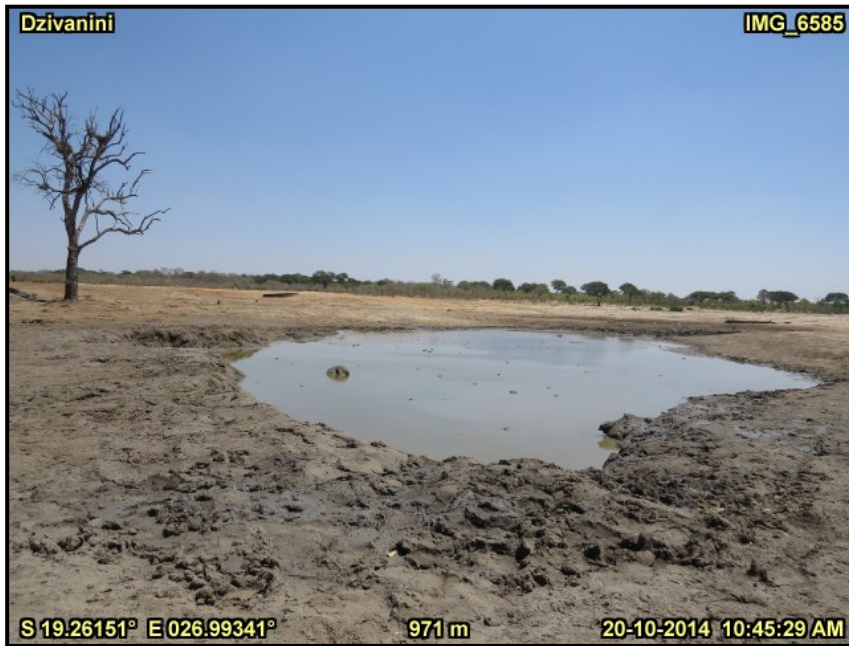
Drilled: 1963 (107 m)

Responsibility:
Imvelo Safaris

Comments:
Problematic hole.
Makona station get
water from another
source



SECHECHE



Drilled: 1963 (73m)

Responsibility:
Imvelo Safaris

Comments:



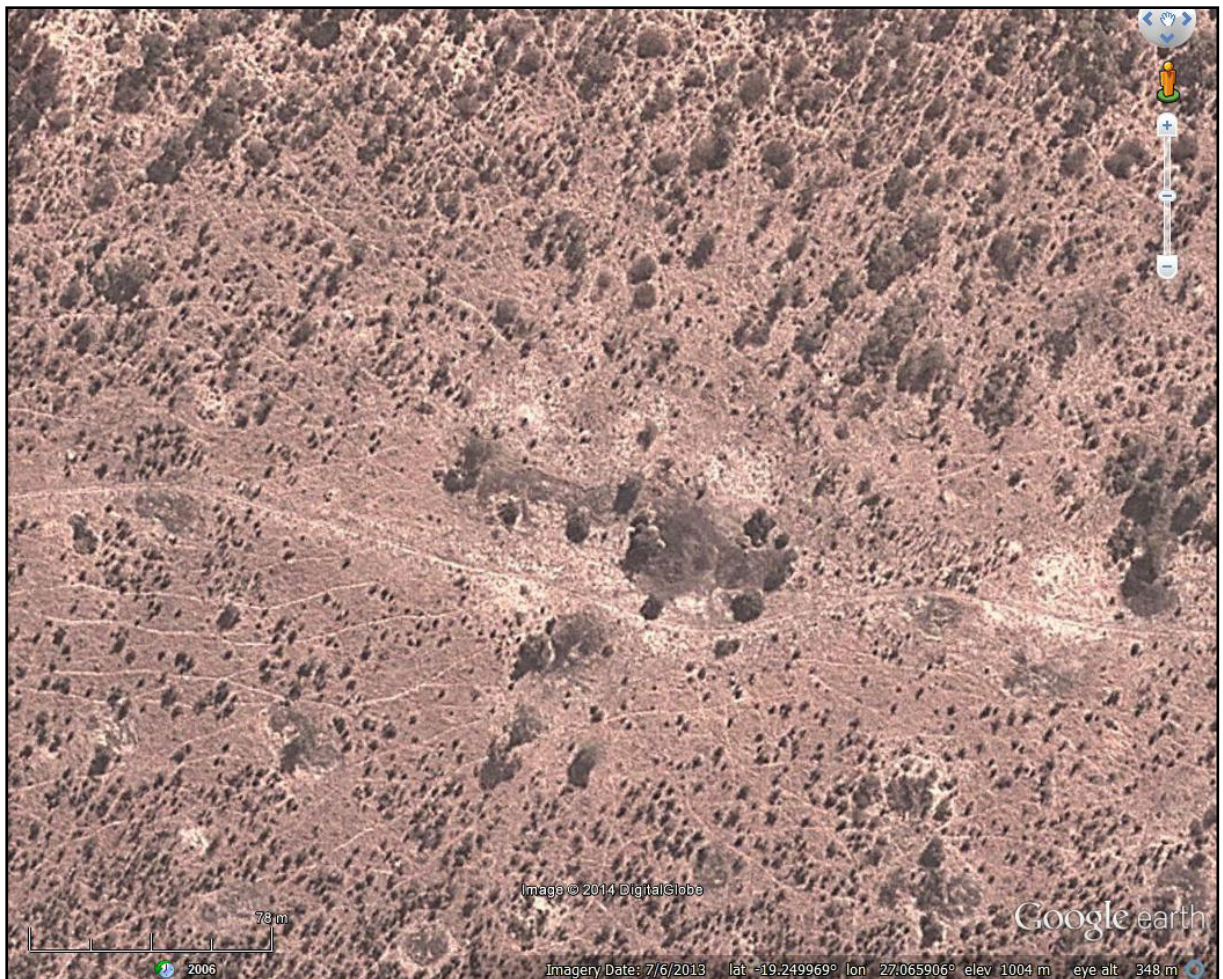
MBAZAU



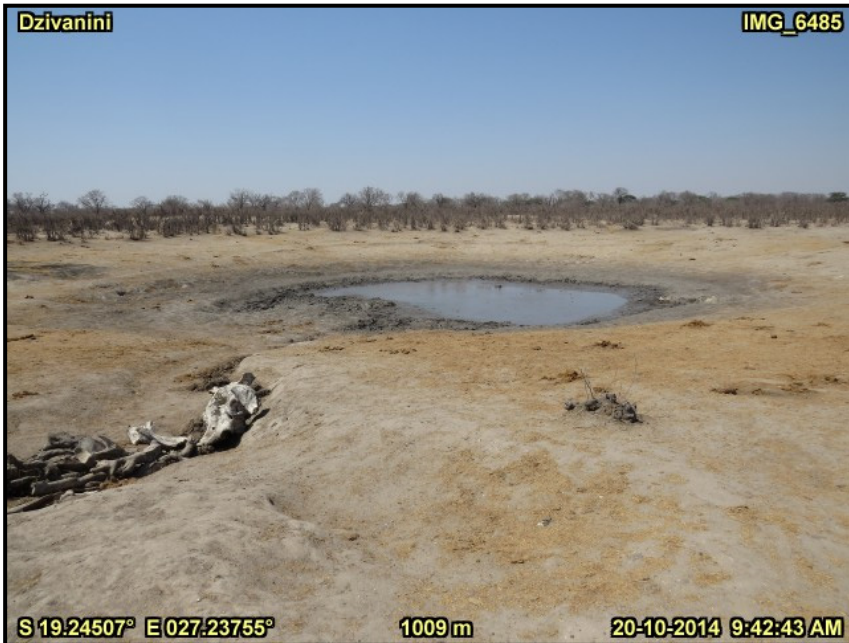
Drilled: 1963 (93m)

Responsibility:
Imvelo Safaris

Comments:



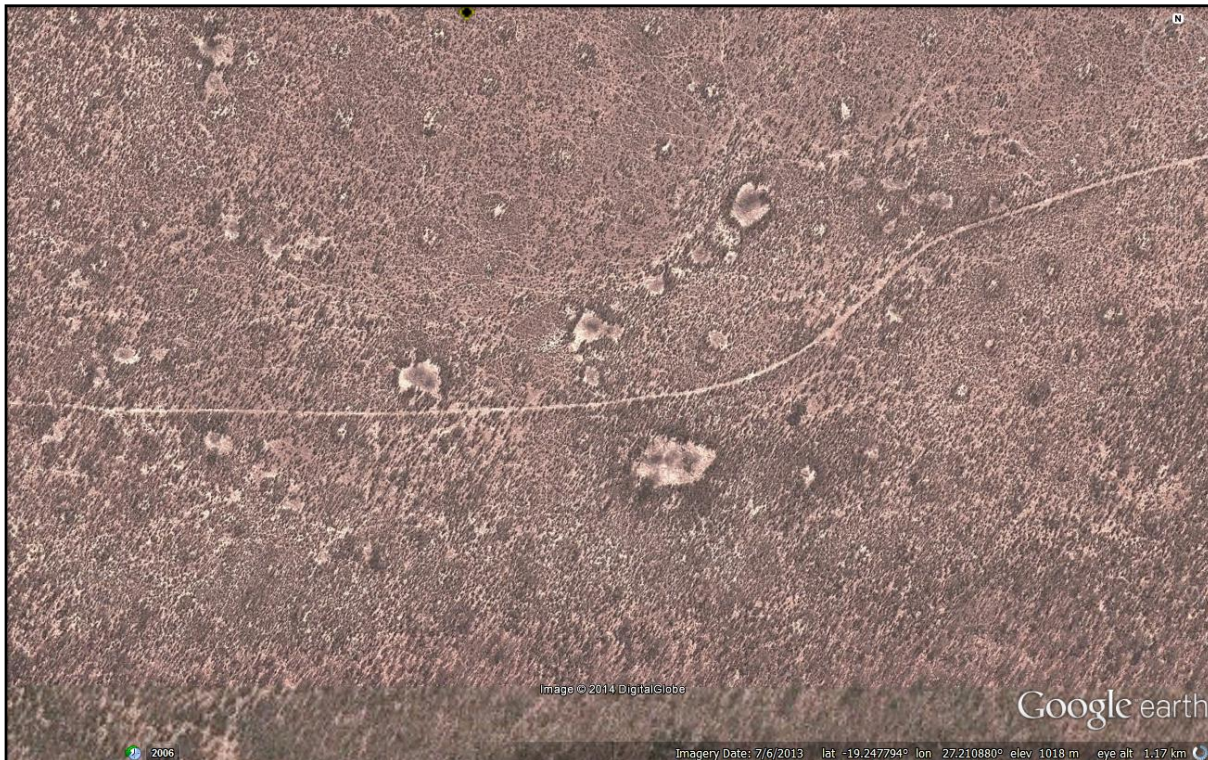
MANDISEKA



Drilled: 1963 (81m)

Responsibility:
Imvelo Safaris

Comments:



MPISA



Drilled: 2010?

Responsibility:
Imvelo Safaris

Comments: Google image is prior to recent pumping



MFAGAZANA

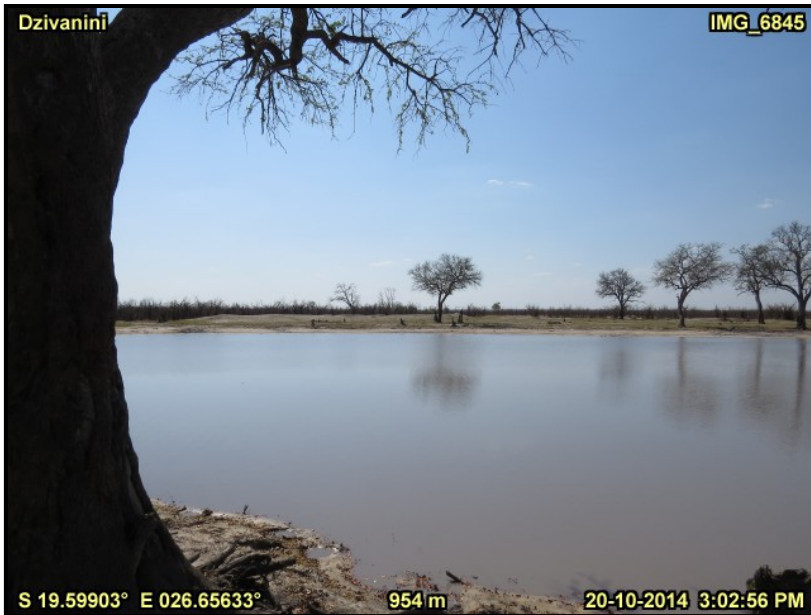
Drilled: 1963 (61m)

Responsibility:
Imvelo Safaris

Comments:



LEASHA DAM



Drilled:

Responsibility: Not pumped

Comments: Dam constructed 1965. Wall breached in centre but still holding water



GOMO DAM



Drilled:

Responsibility: Not pumped

Comments: Dam constructed 1955. Breach to the side of the main wall



ANNEX 11: REFERENCES

This reference list has been compiled from several sources. In many cases I did not have access to the original papers. I also was not able to locate some papers even when I did look for them. I think it would be a very valuable exercise to ensure that all of these documents are made available as digital files during the life of this plan.

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