

**Palaeontological Desktop Assessment of the proposed  
new 40478 Vaal-Gamagara water pipe line between  
Sishen and Black Rock Mine near Hotazel, NC Province.**

Report prepared for  
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## **Executive Summary**

A desktop palaeontological assessment was carried out for the new 40478 Vaal-Gamagara water pipe line and associated infrastructure between Sishen and the Blackrock Mine situated about 14 km northwest of Hotazel in the Northern Cape Province. Potential excavations into undisturbed overburden along the footprint at Gamagara 541, Sacha 468, Halliford 466 and Chersley 430 may result in the exposure of potentially fossil-capping calcretes and surface limestones. This can be regarded as a positive palaeontological impact provided that it is accompanied by appropriate mitigation measures during the construction phase of the project. Two alternative routes are proposed for the section that traverses the Kathu Pan Complex in order to avoid potential impact on palaeontologically sensitive deposits. The footprints for both deviation options running parallel to the R380 road are not considered to be palaeontologically sensitive and the likelihood of impact on intact surface sediments along the sections between the R380 road and the existing pipe line at Marsh 467 is considered as low. Further north the footprint between Walton 390 and N' Chwaning 267 is primarily underlain by unconsolidated aeolian sands. Furthermore, the footprint between Halliford 466 and N' Chwaning 267 is situated directly adjacent and parallel to an existing pipe line. The footprint between Halliford 466 and N' Chwaning 267 is not regarded as palaeontologically sensitive.

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## Introduction

A desktop palaeontological assessment was carried out for the new 40478 Vaal-Gamagara water pipe line and associated infrastructure between Sishen and Hotazel via Kathu in the Northern Cape Province.

The region's unique and non-renewable palaeontological heritage is generally protected in terms of the National Heritage Resources Act (Act No 25 of 1999). The Act identifies what is defined as a heritage resource, the criteria for establishing its significance and lists specific activities for which a heritage specialist study may be required. In this regard, categories of development listed in Section 38 (1) of the NHR Act are:

- The construction of a road, wall, power line, pipeline, canal or other similar form of linear development or barrier exceeding 300m in length;
- The construction of a bridge or similar structure exceeding 50m in length;
- Any development or other activity which will change the character of the site;
- Exceeding 5000 m<sup>2</sup> in extent;
- Involving three or more existing erven or subdivisions thereof;
- Involving three or more subdivisions thereof which have been consolidated within the past five years;
- The rezoning of a site exceeding 10 000 m<sup>2</sup>.
- Any other category of development provided for in regulations by the South African Heritage Resources Agency (SAHRA).

## Methodology

The palaeontological significance of the affected area was evaluated on the basis of existing field data, geological maps and published literature.

## Locality data

The proposed 700 – 900 mm Ø pipe line covers 1:50 000 topographic maps 2722 BD Sutton, 2722DB Dibeng, 2722DD Sishen and 2723CA Kathu and will run from Sishen to Blackrock Mine, situated about 14 km northwest of Hotazel (**Fig. 1**).

General pipe line coordinates are as follows:

- A) 27°53'40.09"S 22°57'47.35"E
- B) 27°49'48.29"S 22°58'45.38"E
- C) 27°46'36.38"S 22°55'17.64"E
- D) 27°41'51.85"S 22°55'28.98"E
- E) 27°39'59.29"S 23° 0'32.68"E

F) 27°12'43.68"S 22°57'32.12"E

G) 27° 8'4.60"S 22°50'24.50"E

Two alternative routes are proposed for the section that traverses the Kathu Pan in order to avoid potential impact on palaeontologically sensitive deposits (**Fig. 2**). Kathu Pan, which is situated at the confluence of the farms Sims 462, Sacha 468 and Marsh 467, has yielded several palaeontological localities and is in the process of being proclaimed a national heritage site. The pan is situated on a flat northward-sloping plain drained by the Ga-Mogara, a tributary of the Kuruman River, some 5,5 km north-west of Kathu Town. It covers about 30 ha and is shallow, with a rim only a few metres above the lowest point on its floor. The GPS coordinates of the two pipe line deviation options around Kathu Pan are as follows:

1) 27°40'17.54"S 23° 0'22.61"E

2) 27°39'39.84"S 22°59'59.71"E

3) 27°39'28.62"S 23° 0'29.52"E

4) 27°37'51.52"S 22°58'54.92"E

5) 27°37'55.58"S 23° 0'32.62"E

**Alternative 1** will result in a deviation of about 7 km and will run northwards along the R380 and then eastwards along the northern boundary of the landing strip (Sishen Airport) to join with an existing pipe line that goes to Hotazel (**Fig. 2**). **Alternative 2** is the preferred alternative and will result in deviation of about 2.3 km. It will run northwards along the R380 and then northeastwards along the northern boundary of the pan to join with an existing pipe line that goes to Hotazel.

The GPS coordinates for the palaeontologically sensitive no-go area are as follows (**Fig. 3**):

1) 27°40'27.21"S 23° 0'27.64"E

2) 27°39'40.67"S 23° 0'0.60"E

3) 27°39'30.05"S 23° 0'29.61"E

4) 27°39'38.61"S 23° 0'40.43"E

5) 27°39'57.65"S 23° 0'47.15"E

6) 27°40'21.33"S 23° 0'44.16"E

## Geology

The study area is underlain by the Transvaal Supergroup strata covered by Late Cenozoic sediments of the Kalahari Group. Rich deposits of haematite and banded ironstone, jaspillite, shale and ferruginised siltstone of the Asbestos Hills Subgroup

are exposed around Shishen to the south of Kathu. Superficial sediments are characterized by Kalahari Group surface limestones, calcretes and wind-blown sands (1: 250 000 scale geological map 2722 Kuruman). Terrace gravels and scree deposits are well-developed near streams and around areas of topographic relief.

## **Background**

Regionally, the Precambrian dolomites at the eastern edge of the Ghaap Plateau have been incised at various points by drainage lines that created gorges in which travertine deposits have formed. As a result, the tufas at Norlim (Buxton) near Taung contain solution caves which are fossiliferous, including the one within the Thabaseek Tufa that produced the type specimen of *Australopithecus australis* (Dart 1925). These tufa deposits also provided palaeoclimatic data for the late Tertiary and Pleistocene climates of the southern Kalahari region (Butzer *et al.* 1978) The banded iron formations at Sishen possibly reflect Early Proterozoic environmental conditions following iron deposition as a result of the build-up of free oxygen in the oceans by cyanobacterial photosynthesis. Further to the south, Paleogene fossil assemblages are known from a crater lake deposit within a volcanic pipe at Stompoor near Prieska and include a diversity of fish, frogs, reptiles, insects, and palynological remains (Smith 1988). Abundant macro- and microfossil remains are preserved within late Quaternary cave deposits at Wonderwerk Cave, situated halfway between Kuruman and Danielskuil. A fossilized horn core of an extinct alcelaphine has been retrieved from Quaternary alluvial sediments along the Ongers River near Britstown, while Florisian type faunal remains have been excavated from an archaeological site at Bundu Farm Pan near Copperton (Brink *et al.* 1995; Kiberd 2006).

Locally, Kathu Pan is characterized by a series of 12 dolines that are developed within the Tertiary sequence of the Kalahari Group. Investigated by Beaumont and colleagues (Butzer *et al.* 1978; Beaumont *et al.* 1984; Butzer, 1984; Beaumont 1990, 2004; Porat *et al.* 2010), the dolines contain Pleistocene and Holocene infills that offer an exceptional archaeological, palaeontological and palaeoclimatic sequence for the region.

Except for Kathu Pan, there is currently no record of palaeontological sites within the immediate vicinity of the pipe line footprint.

## Statement of Significance and Recommendations

Going from south to north, the pipe line at Parson 564 and Gamagara 541 will be placed directly adjacent and parallel to an existing line that runs directly next to the R325 road within an area that has been severely disturbed by earlier and ongoing mining activities (**Fig. 4 & 5**). The likelihood of palaeontological impact along this section is regarded as low. Potential excavations into undisturbed overburden along the footprint at Sacha 468, Halliford 466 and Chersley 430 may result in the exposure of potentially fossil-capping calcretes and surface limestones. This can be regarded as a positive palaeontological impact provided that it is accompanied by appropriate mitigation measures during the construction phase of the project. The footprints for both deviation options running parallel to the R380 road are not considered to be palaeontologically sensitive, and the likelihood of impact on intact surface sediments along the sections between the R380 road and the existing pipe line at Marsh 467 is considered as low. Further north the footprint between Walton 390 and N' Chwaning 267 is primarily underlain by unconsolidated aeolian sands. Furthermore, the footprint between Halliford 466 and N' Chwaning 267 is situated directly adjacent and parallel to an existing pipe line. The footprint between Halliford 466 and N' Chwaning 267 is not regarded as palaeontologically sensitive.

## References

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Figures

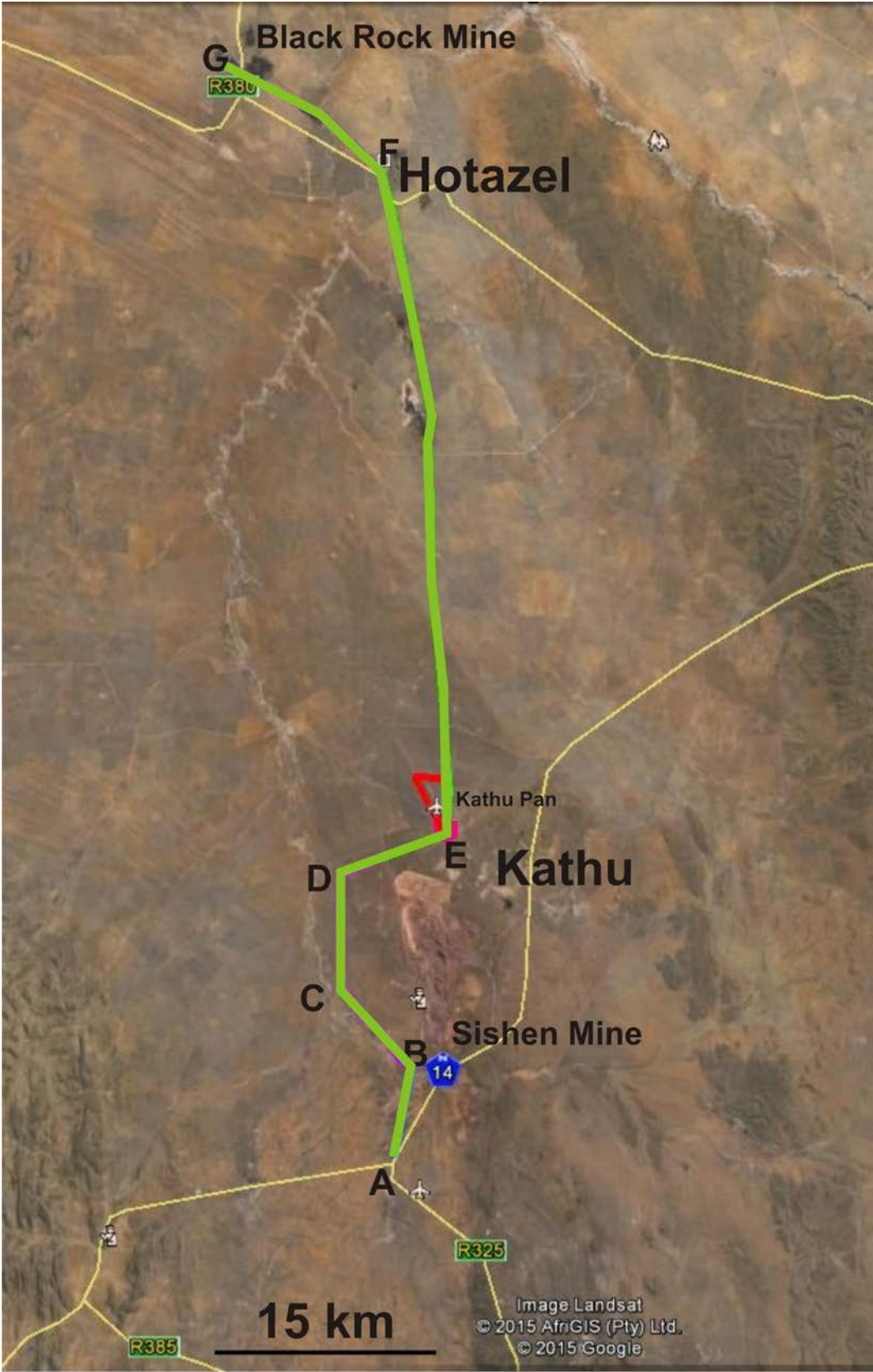


Figure 1. Aerial view of the proposed new pipe line route.

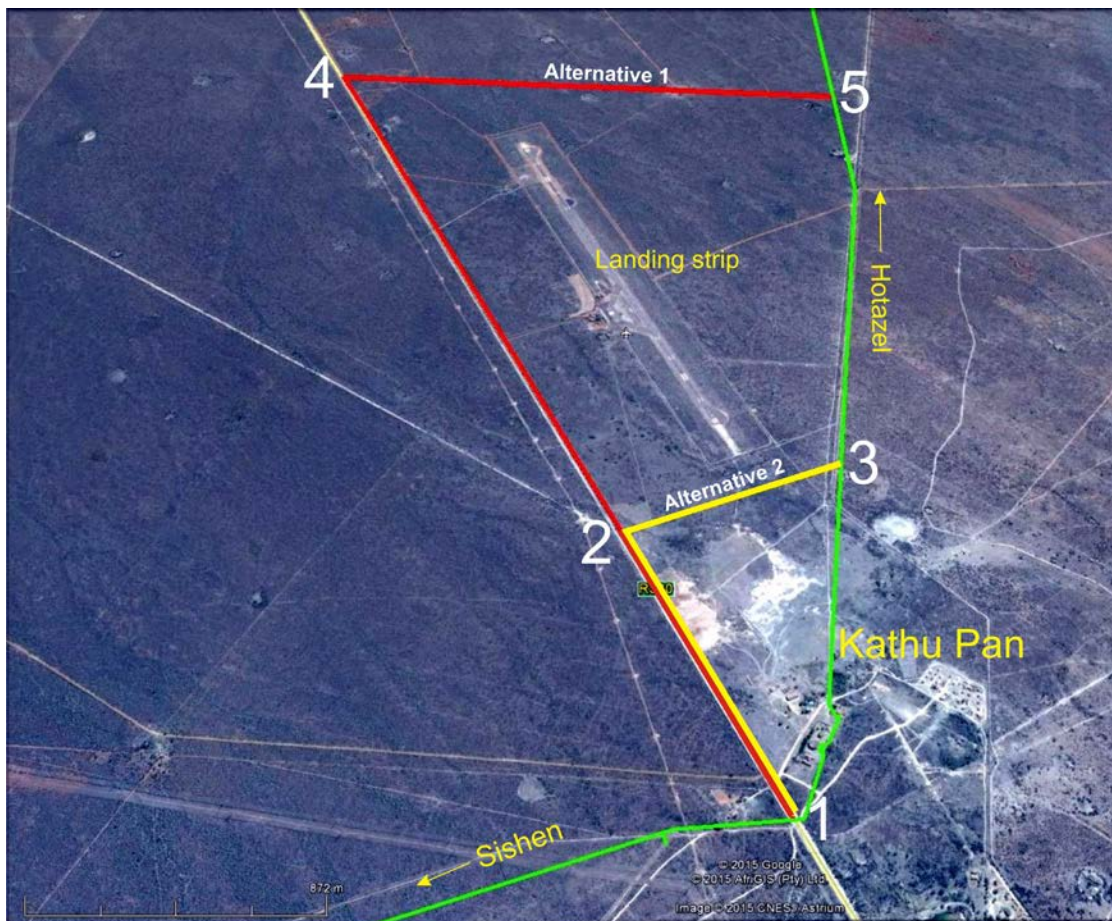


Figure 2. Layout of the two proposed alternative routes around Kathu Pan. Alternative 1 (red line) will result in a deviation of about 7 km and will run northwards along the R380 and then eastwards along the northern boundary of the landing strip (Sishen Airport) to connect with the existing pipe line (green line). Alternative 2 (yellow line) will result in a deviation of about 2.3 km and will run northwards along the R380 and then northeastwards along the northern boundary of the pan to connect with the existing pipe line (green line).

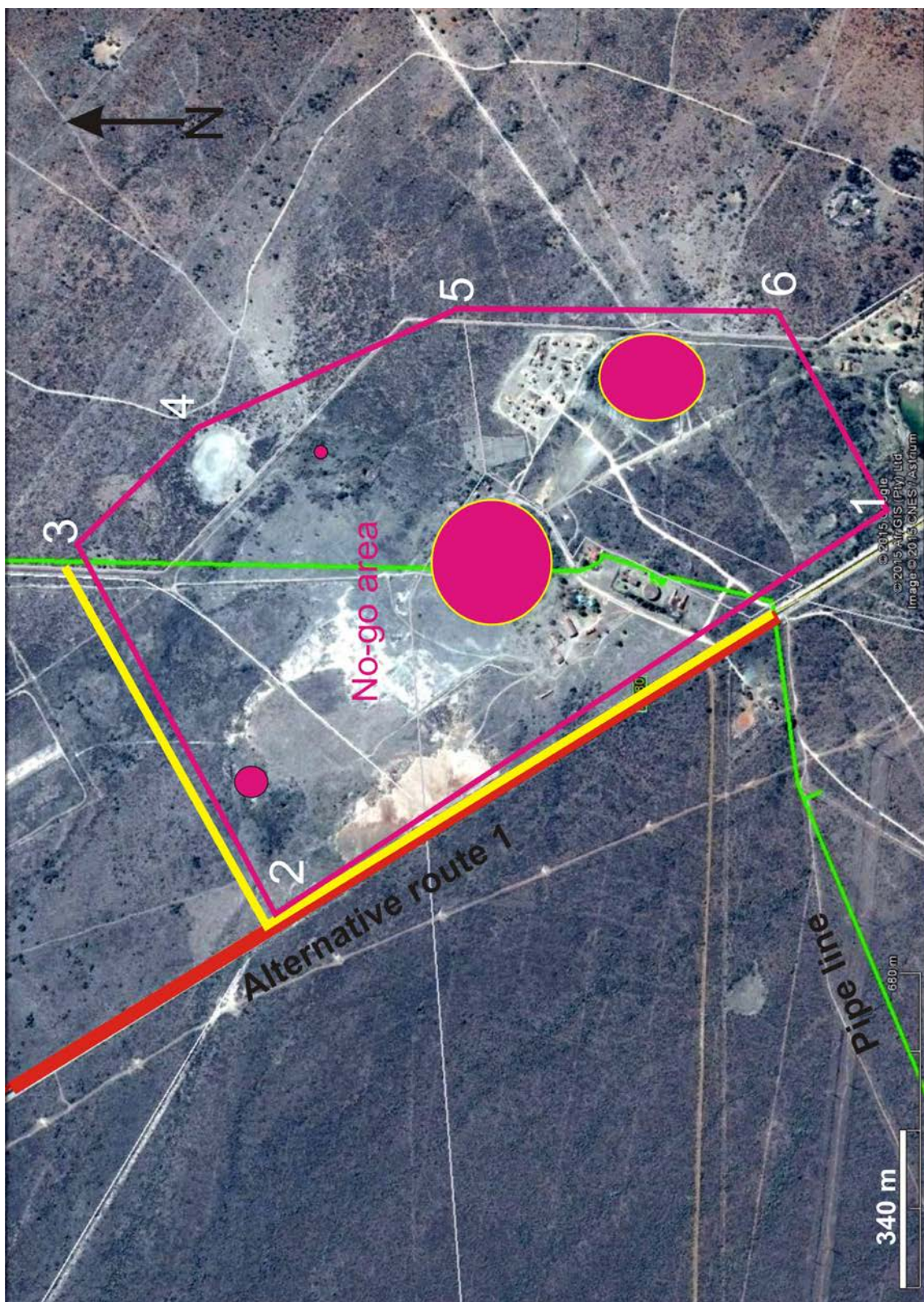


Figure 3. Aerial view of the palaeontologically sensitive no-go area and position of the fossil-bearing dolines at Kathu Pan.

# Potential Palaeontological Impact

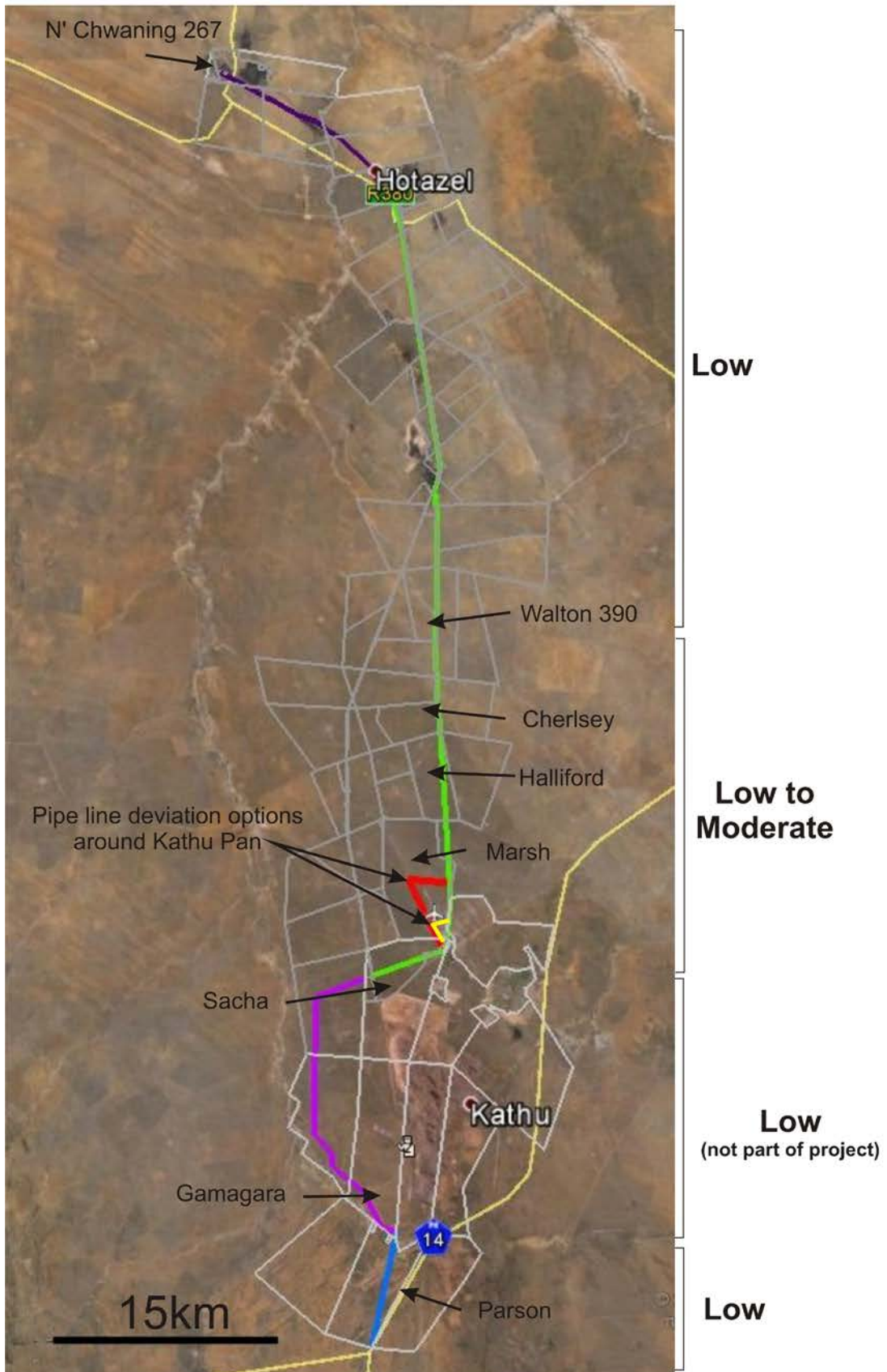


Figure 4. Summary of potential palaeontological impact along the proposed pipe line footprint.



Figure 5. Aerial view of the pipe line section at Parson 564 and Gamagara 541. The pipe line will be placed directly adjacent and parallel to an existing line that runs directly next to the R325 road within an area that has been severely disturbed by earlier and ongoing mining activities.