1577

The hydrogeological interpretation is based on Steynsrus

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II. PHOTO-INFERRED AQUIFERS AROUND STEYNSRUS

1. Position of Steynsrus and maps available (see fig. 1)

No geological maps are available on a scale larger than 1 : 10^6.

2. Area surveyed (fig.2)

For topographical and geological reasons the area is restricted to that within a radius of 10 km (6,2 miles) from Steynsrus.

3. Air cover

The area within 10 km of Steynsrus is covered by the following photos;-

Job 561 strip	21 photos	1604-09
	22	1625-33
	23	1068-75

All the selected borehole sites are covered by the following four photos from which overlays have been traced;-

Strip 22/1027	Sites 3 a and 5 b-f
1029	1 a and b, 2 and 3 b
23/1070	5 a and b and f
1072	4 a-c and 5 a

The photos of this job are dark and have poor contrast.

4. River system (fig. 2)

Steynsrus stands on the southern or Blomspruit side of the ESE-WNW trending ~~xxxx~~ watershed that separates the Blomspruit from the Valsrivier catchment areas. The Blomspruit is a ~~x~~ left bank tributary of the Valsrivier and joins it at Kroonstad. The Valsrivier is a left bank tributary of the Vaal which it joins a near Bothaville.

Most of the area within 10 km of Steynsrus and all the sites selected lie between the Blomspruit and the Blomspruit-Valsrivier watershed. This area is drained by the Jas se Spruit and its tributaries and all sites selected lie on this spruit~~s~~, on its right bank tributary referred to here as the Steynsrusspruit, and on a right bank tributary of the Steynsrusspruit.

5. Topographical relief

The area surveyed ranges from 1448 m (4750 ft) ~~near~~ *al-* Knapdaar *near* the mouth of the Jas se Spruit to 1592 m (5235 ft) at a trig. point on the watershed NE of Steynsrus giving a total relief of 148 m (485 ft). Steynsrus stands at 1520 m (5000 ft) which is at about the middle of the range.

In general the ground surface is smooth and the slopes gentle. Except for a few subdued scarps and escarpments the steepest slopes are where river meanders have cut into the valley sides. The incision of the valleys increases downstream but is nowhere deep.

6. Geology

Bedrock. The one-in-a-million geological map shows that Steynsrus lies in the middle of the Ecca outcrop. This Series consists of shales and mudstones with some interbedded sandstones. The smooth surface of the ground in the Steynsrus area is consistent with the bedrock being nearly horizontal shale or mudstone while the rare subdued scarps and escarpments are presumably formed by the interbedded sandstones.

With such dim photos, low relief and smooth ground, mapping on air photos without ground control is too unreliable to be justified. However, the country west of Steynsrus seems to be vaguely divided into darker areas with a slightly rougher surface and lighter areas with a smoother surface. The former may be outcrops of sandstone and the latter of shale or mudstone but the distinction is not definite enough to justify the choice of bore-hole sites in the rougher area in the hope that the sandstone may be permeable enough.

Structure. East of Steynsrus the beds appear to have a low dip to the north, south of the township to the west, and west of it to the east but as these observations are very scattered and the sandstone outcrops cannot be interpolated with confidence from one escarpment to another, synclines and anteclines cannot be definitely distinguished.

A reach of the Steynsrusspruit and two of its small tributary streams are so distributed and orientated as to form a line that runs WNW from the western corner of the township. Though there appears to be no definite lineament it is possible

that this line may be the trace of a fault or master joint (see sites 1 b and 3 b). A short N-S-trending, eastward-facing scarp south of the township may be a fault line scarp (see site 4 c). A few scarps facing the alluvial plain near the mouth of the Steynsrusspruit on the Jas se Spruit and other associated lineaments may be fault line features (sites 5 c to f). A distinct ~~XXXXXXX~~ NNE-WSW lineament with a line of pits upon it which passes east of the township must be a geological line of some kind but whether of structural significance is unknown (site 4 b).

The photos are crisscrossed with innumerable lineaments, a few of which have been traced but it seems probable that they are mainly if not all tracks, fences, irrigation furrows or other artifical constructions.

Alluvium. The main streams flow in narrow river plains which form continuous strips except for occasional constrictions and for the absence of appreciable alluvium in a reach of the Steynsrusspriut west of the township. Upstream of the SW arc of the 4 km radius circle the ~~river~~ stream beds are only slightly or not at all incised into the alluvium but downstream of this line incision is deeper and the step-like form of the river banks in some places suggests that the watercourses are here incised through the alluvium down into subsoil or bedrock.

7. Aquifers.

In view of doubt regarding the permeability of the sandstones and the disposition of their outcrops, the unidentified origin of most of the structural lineaments, and uncertainty regarding the thickness and permeability of the alluvium, as many as possible of the sites have been selected to lie both on alluvium and on the line or projected line of a lineament that may be of structural origin. Only a few sites have been chosen in the middle of river plain expansions without reference to lineaments.

Owing to the predominance of shale or mudstone it is very doubtful whether bore-holes at any of these 14 sites will strike material permeable enough to aqulify as an aquifer for township supply purposes. These sites all lie within 6 km (3·75 miles) of Steynsrus as as no feature more promising was seen while briefly scanning the photos covering the country up to between 10 and 20 km of Steynsrus, the area of this survey was not carried beyond the 10 km limit. (*Job 581 does not exclude sandstones beyond 10 km.).

SITES SELECTED

1 a. Steynsrusspruit near Steynsrus. Photo overlay 22/39.

Position of site: 1,1 km NW of Township centre.

Altitude of site: 1480 m (4950 ft), i.e. 30,5 m (100 ft) below the upper edge of the township at 1535 m (5050 ft).

Alluvial belt: length upstream of site 3,4 km.

average width 200 m, area 0,68 km².

Surface water catchment area: 6 X 4 km, i.e. 24 km².

Watercourse entrenchment: very slight.

Note: this alluvial belt extends 1,2 km further downstream below the dam but here stands at a level about 15 m (50 ft) lower 1 km at the site and the watercourse in this reach is considerably incised in the alluvium.

1 b. Steynsrusspruit on possible structural lineament

Position of site: 2km west of township centre.

Altitude of site: 1494 m (4900ft), i.e. 46 m (50 ft) lower than the township.

Note: this site is recommended only if on field examination it is found to lie on the trace of a fault or master joint.

2. Steynsrusspruit tributary at Vogelvlei. Photo overlay 22/39.

Position of site: 3,4 km NW of centre of township.

Altitude of site: 1490 m (4900 ft), i.e. 46 m (150 ft) lower than upper edge of township.

Alluvial belt: length upstream of site 2,6 km.

average width about 200 m, area 0,52 km^2.

Surface water catchment area: 4,5 X 3,5 km, i.e. 16 km^2.

Watercourse entrenchment: very slight.

Note: this alluvial belt extends 2 km downstream of the site but in this reach the watercourse is rather deeply incised in the alluvium in relation to the width of the alluvial belt.

3.a. Steynsrustspruit at Turfontein. Photo overlay 22/27.

Position of site: 4,3 km W of Steynsrus.

Altitude of site: 1472 m (4825 ft), i.e. 69 m (225 ft) lower than Steynsrus.

Alluvial belt: length about 1,6 km, width about 300 m, area 0,48 km^2.

Surface catchment area: about 50 km^2.

Watercourse entrenchment: considerable.

Note: although this alluvial belt is short, it is wide so that the entrenchment of the watercourse in it is perhaps not as serious as it would be if it were narrower. The surface catchment area is larger than the sum of those of sites 1 a and 2.

3 b. Steynsrusspruit at mouth of Vogelvlei. Photo overlay 22/29

Position of site: 3,8 km W of Steynsrus.

Altitude of site: 1479 m (4850 ft), i.e. 61 m (200 ft) lower than the township.

Note: this site is recommended only if on field examination it is found to lie on the trace of a fault or master joint.

4.a-c. Jas se Spruit upper sites. Photo overlay 23/72.

Position of sites: Three sites between 2,5 and 4,0 km S of Steynsrus.

Altitude of sites: between 1485 m (4875 ft) and 1490 m (4890 ft), i.e. from 50 m (164 ft) to 45 m (147 ft) lower than Steynsrus.

Alluvial belt: length 10,7 km plus tributary 2,2 km, total 13 km, average width about 300 m, area 3,9 km^2.

Surface catchment area: about 136 km^2.

Watercourse entrenchment: deep.

Note: Site a is at about the middel of the widest part of the alluvial plain and is on the projected line of a amall right bank N-S tributary in case this has been developed upon a fault trace or other stuructural line.

Site b is on the edge of the alluvium but is at the intersection of two lineaments of undetermined origin, viz. a NNE-SSW lineament with a line of pits upon it further north and an E-W lineament which is very faint and may be only an old track. This site should only be used if either of the lineaments is identified as of structural origin.

Site c is where two more or less N-S lineaments meet at a constriction of the alluvial plain. The western is an east-facing escarpment the straightness of which is suggestive of

a fault line scarp. The origin of the eastern lineament is not clear.

These three No. 4 sites have the advantage over sites Nos, 1 a, 2 and 3 a in the very much greater extent of the alluvium and of the surface catchment area, but suffer from the disadvantage that the watercourse is very much more deeply incised in the alluvium so that a much lesser thickness of the alluvium is likely to be an aquifer.

Site No. 4 c certainly and 4 b possibly has the advantage that a structural aquifer may underlie the alluvium.

5 a - f. Jas se Spruit lower sites. Photo overleys, site a 23/72, sites b tp f 22/27.

Position of sites: between 4 and 6 km (2½-3¾ miles) SW of Steynsrus.

Altitudes of sites: between 1456 m (4775 ft) and 1479 m (4850 ft), i.e. ~~bet~~ between 84 m (275 ft) and 61 m (200 ft) lower than Steynsrus.

Note: all these sites except b have been selected on lineaments that may be of structural origin as well as at the edge of the alluvial plain but the watercourse is deeply incised and seems to have entrenched itself in two stages, perhaps ~~first~~ first in alluvium and then in bedrock or subsoil, in which case the alluvium is unlikely to be an aquifer.

Site a, near Jaskraal, is immediately above a constriction of unknown origin in the alluvial plain, which might be due to a fault or dyke or outcrop of sandstone.

Site b is a point in the middle of this wide alluvial belt and about half way between a and c. It is accessible from the track to the farm Stella.

Sites ~~a~~, c, d and e are at the edge of the alluvium and on ~~lineaments~~ or at the intersection of lineaments that appear to be fault line scarps.

Site ~~f~~ f is at a constriction of the river plain and on what appears to be a fault line scarp.

A wide expanse of river plain occurs on the Jas se Spruit just above its mouth on the Blomspruit. It lies immediately west of Knapdaar on the Ventersburg road. (this is 8,5 km (5,2 miles) W of Steynsrus.) But as it seems probable that the river bed is incised down into bedrock no sites have been marked.

As the river plain of the Blomspruit, which passes Steynsrus at a distance of 10 km (6,2 miles), is broken and narrow and the river bed deeply incised it is unlikely to contain any aquifer suitable for mumicipal purposes.

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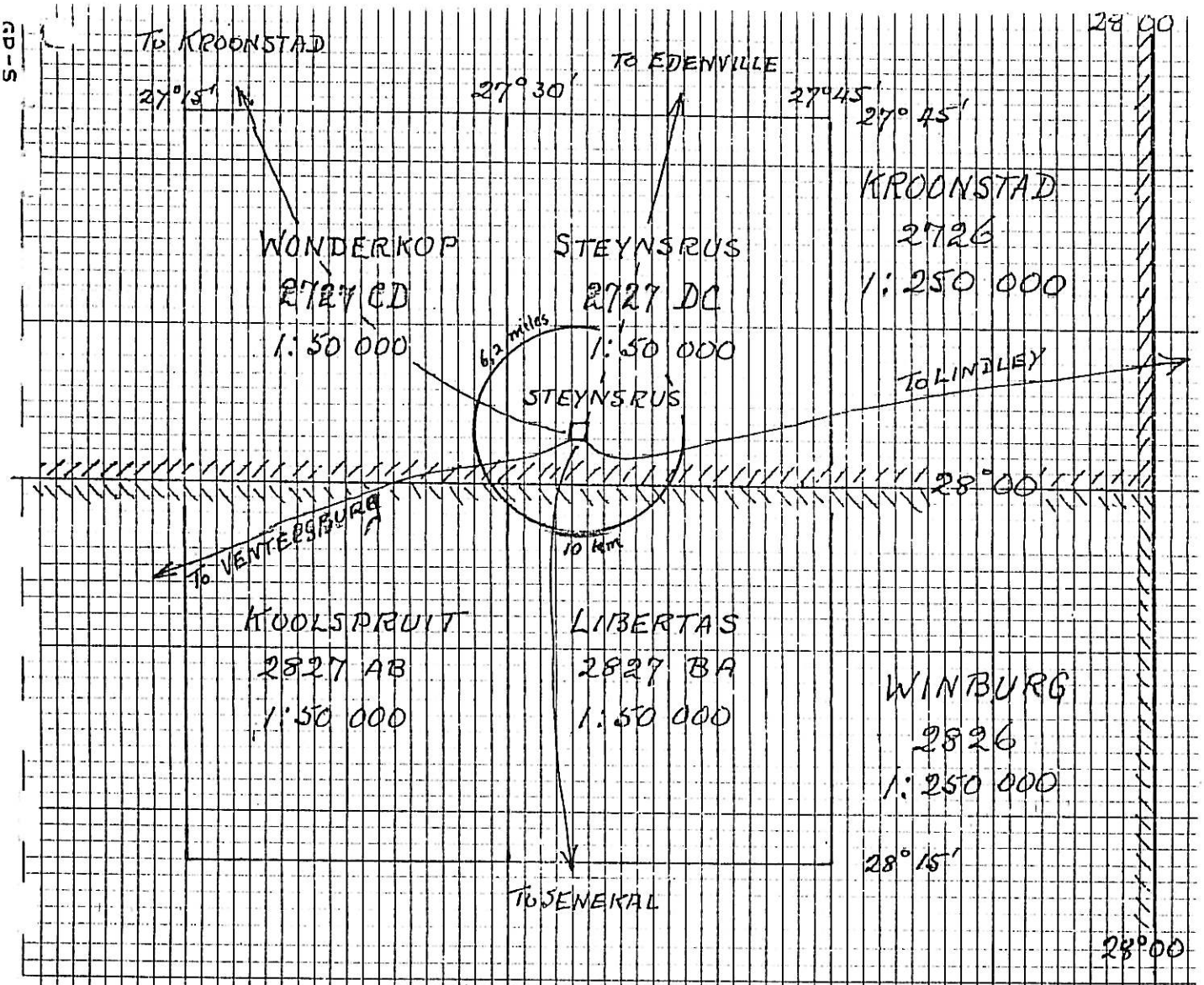


Fig. 1. Position of Steynsrus and available published maps

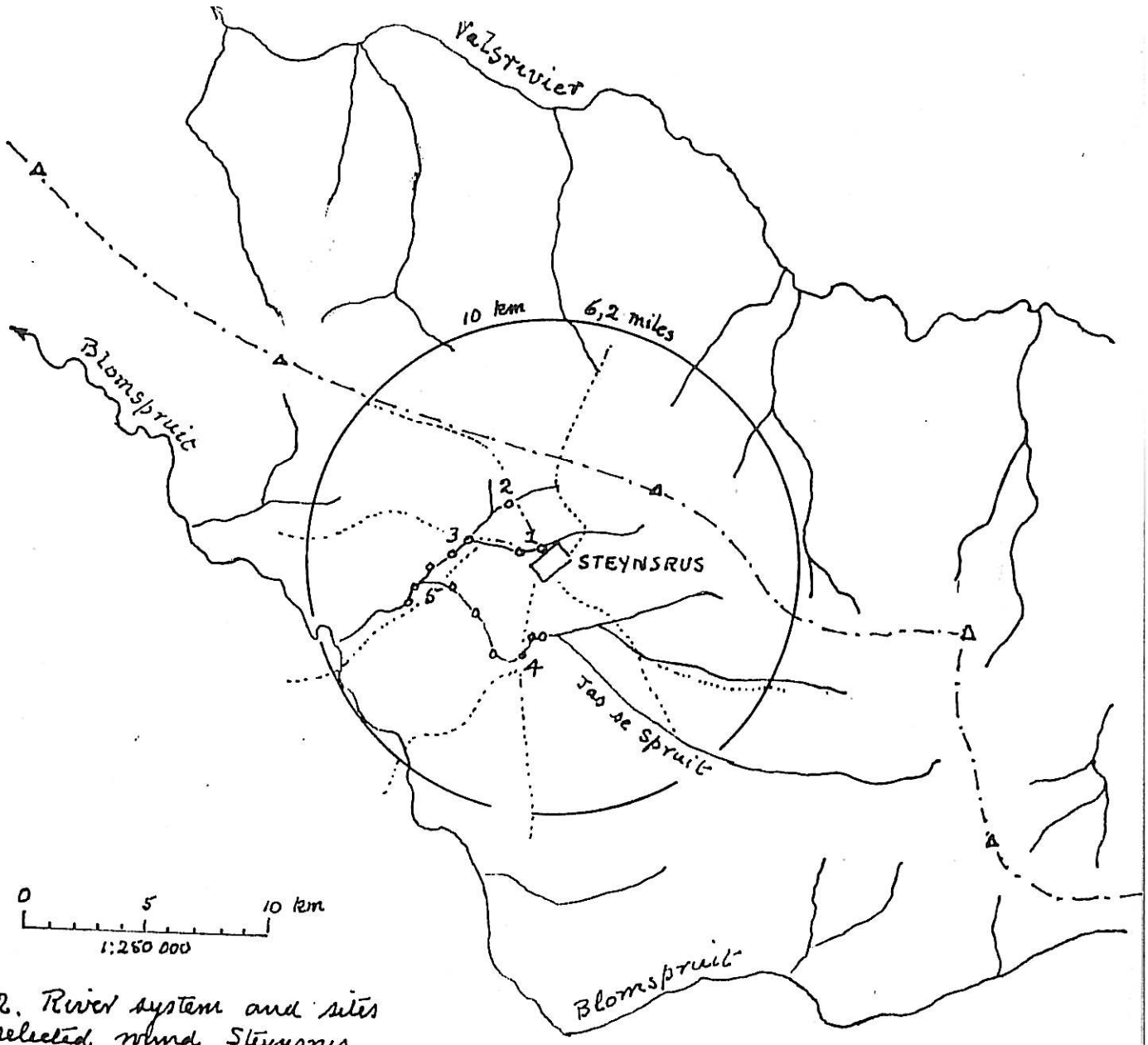
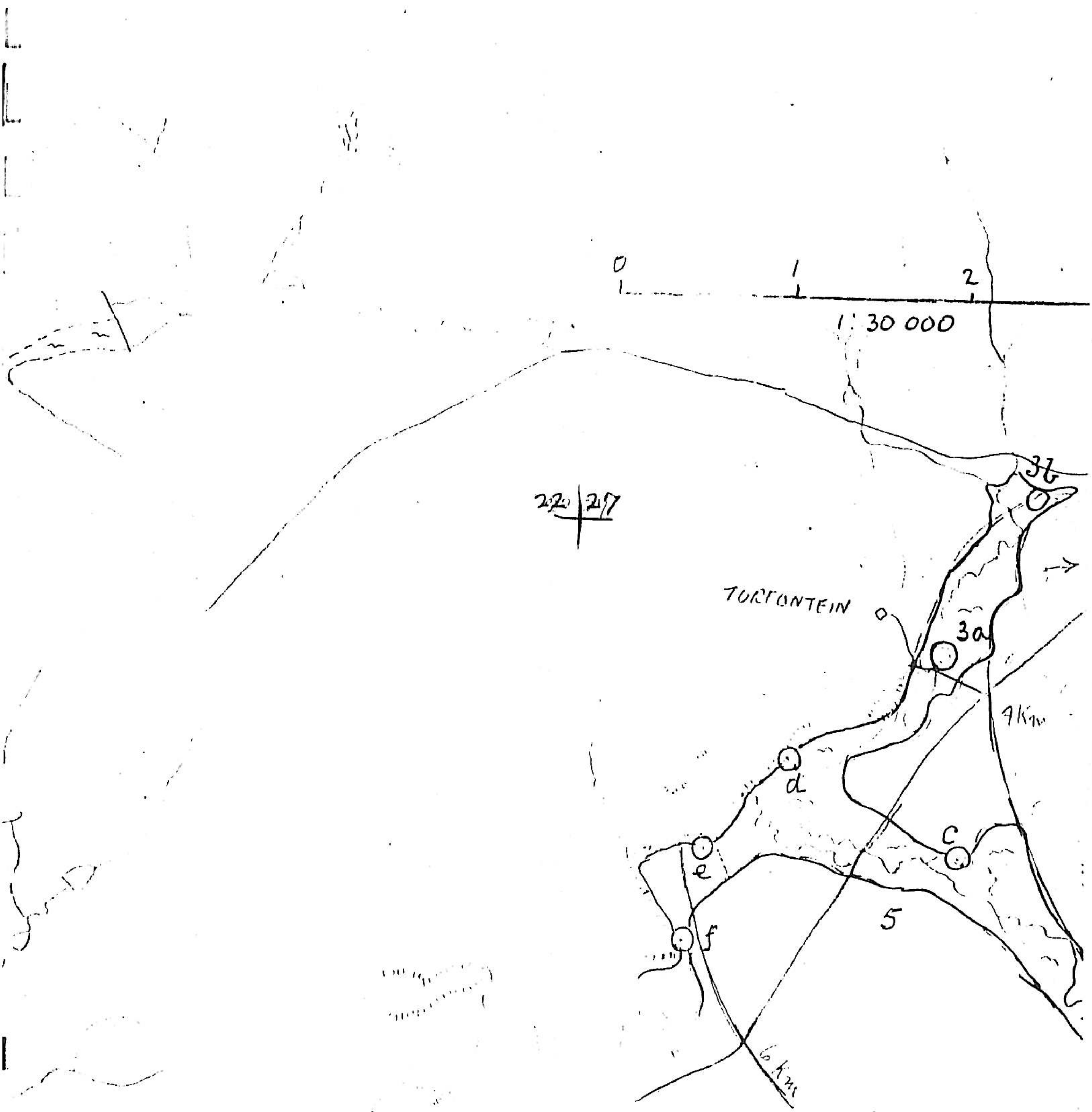


Fig. 2. River system and sites selected round Steynsrus.



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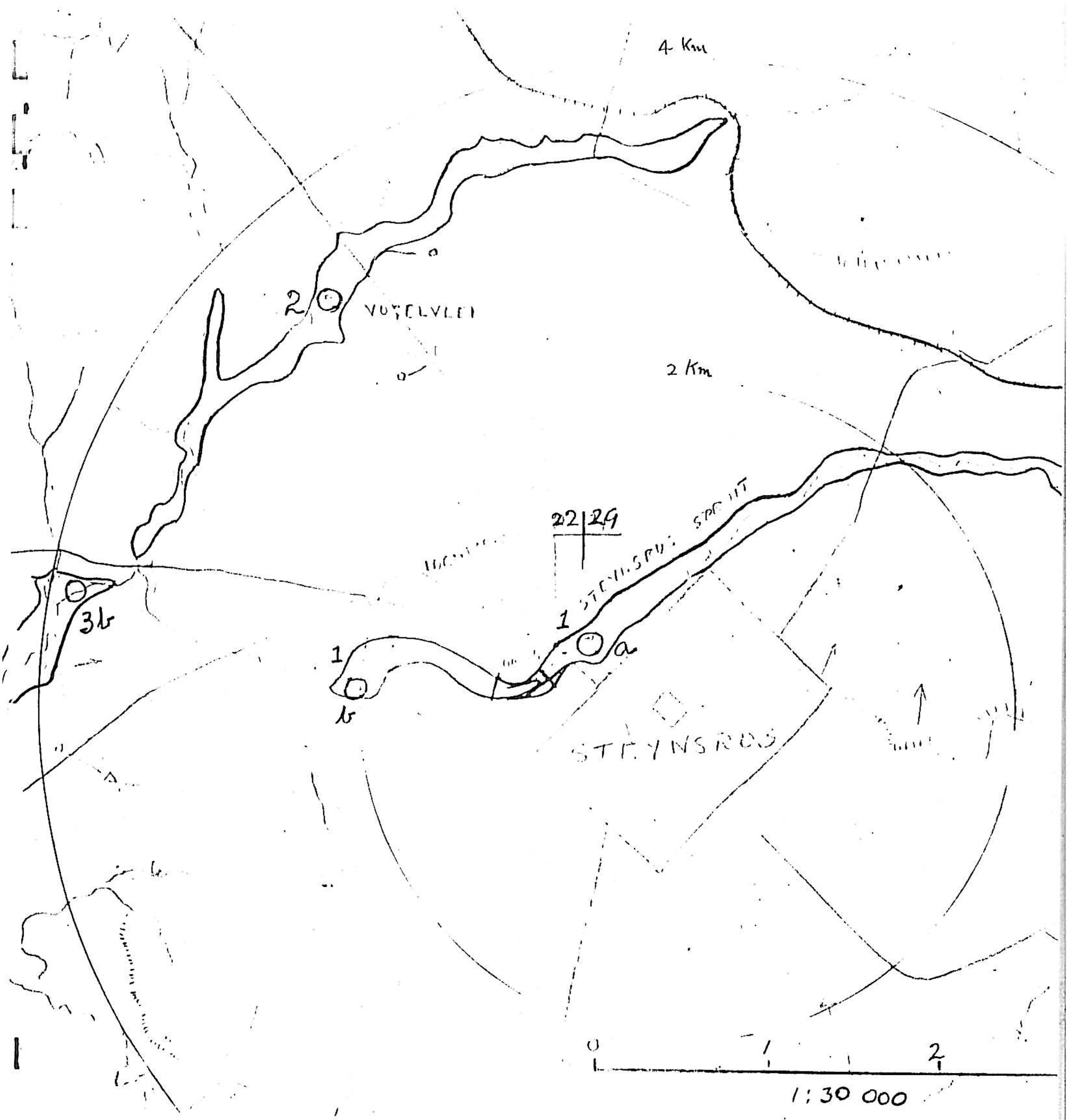
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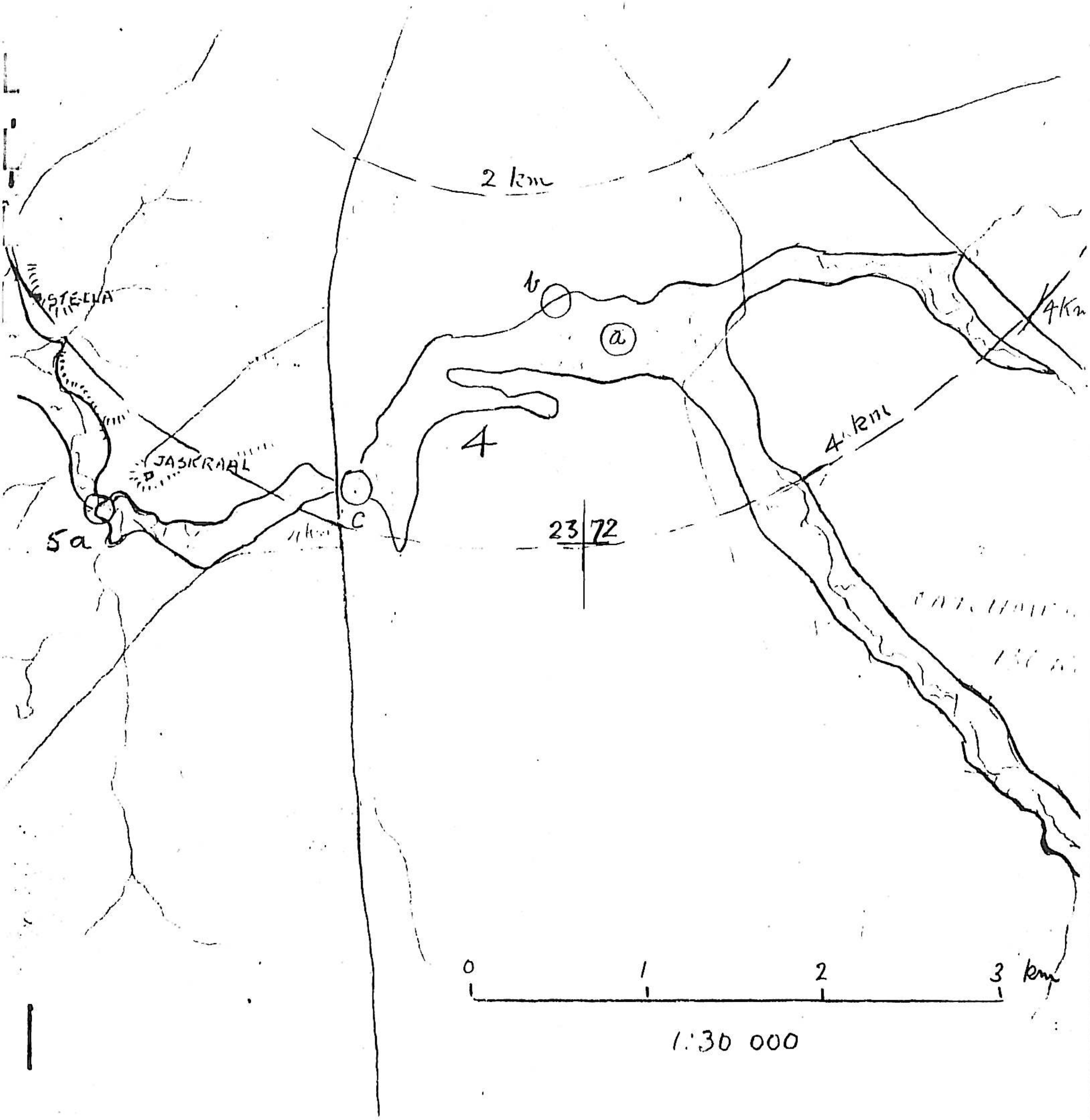

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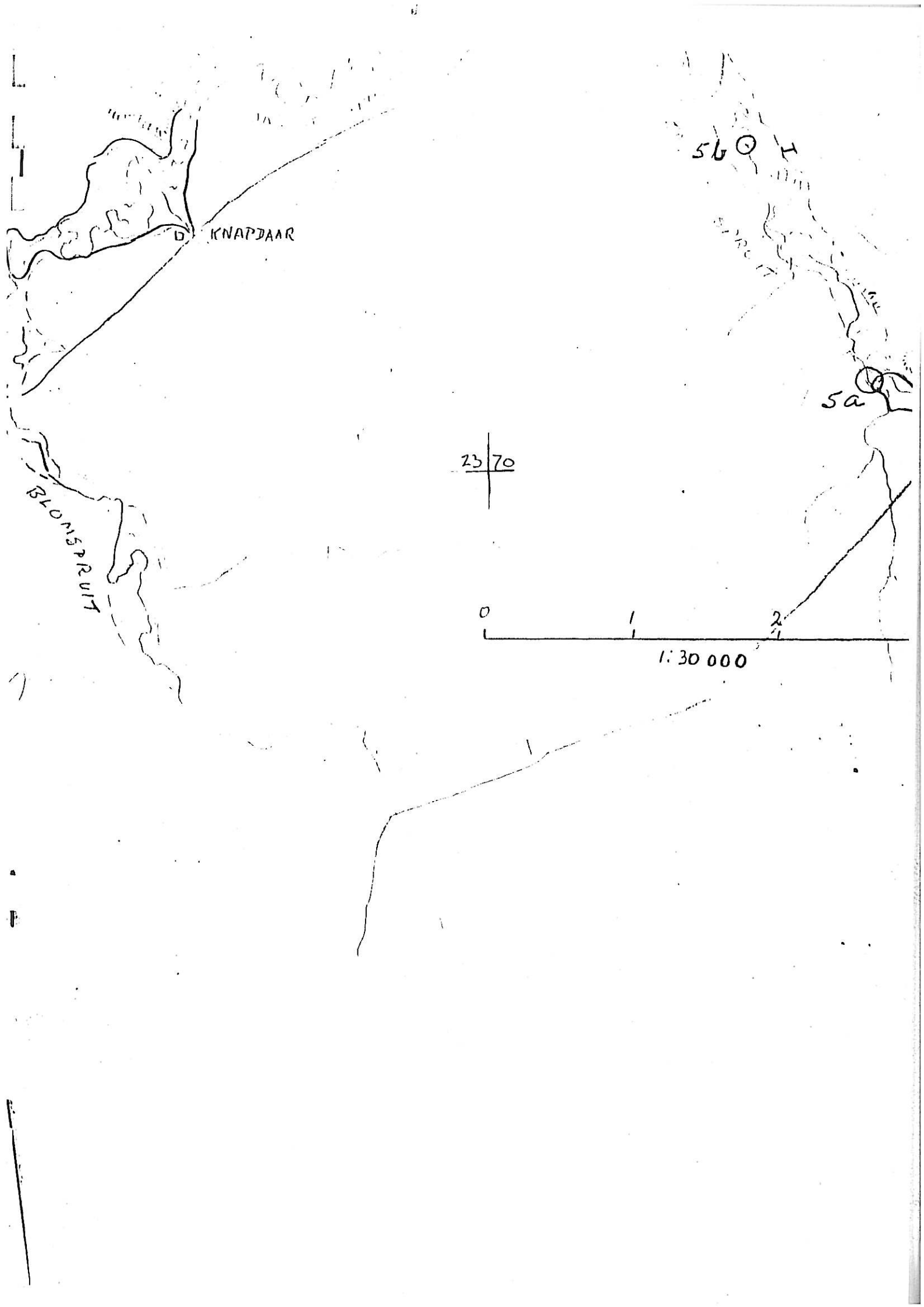
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