# Steppe corridor facts (dock_steppe.facts v9, 2026-11-01T20:01:56Z)

6 corridors. Verified track km: 0. Not field checked. Model numbers, labelled with confidence.

**Contents**


Corridors side by side 1
Bulgan soum to Bayanzag (Flaming Cliffs), Ömnögovi 2
A0301 junction to Hustai National Park gate, Tuv 4
Khatgal to Jankhai pass, west shore of Lake Khövsgöl 6
Bat-Ölzii to Orkhon waterfall (Ulaan Tsutgalan), Övörkhangai 9
Mandalgovi to Dalanzadgad road toward Tsagaan Suvarga, Dundgovi 11
Tsenkher soum to Tsenkher hot springs, Arkhangai 13


## Corridors side by side

One row per corridor, every value copied from its facts; ranked by the share of cross-sections with 3 or more ruts in its last clear year, highest first, unknown last; last years and confidence differ by corridor, so a rank is a lead to check, not a finding; confidence is the ranked share's, each other value's is in the corridor's own lines.

| Corridor | Bulgan soum to Bayanzag (Flaming Cliffs), Ömnögovi | Bat-Ölzii to Orkhon waterfall (Ulaan Tsutgalan), Övörkhangai | A0301 junction to Hustai National Park gate, Tuv | Khatgal to Jankhai pass, west shore of Lake Khövsgöl | Tsenkher soum to Tsenkher hot springs, Arkhangai | Mandalgovi to Dalanzadgad road toward Tsagaan Suvarga, Dundgovi |
|---|---|---|---|---|---|---|
| Rank | 1 | 2 | 3 | 4 | 5 | 6 |
| Measured stretch: OSM line km, zone each side<br>the length of the OSM line every rut number counts, as mapped, not driven; a part of the road, not the road | 16.18, 500 m | 24.41, 500 m | 13.33, 500 m | 14.2, 500 m | 24.79, 500 m | 22.44, 500 m |
| Clear summers | 9 of 11, faint 2018 and 2021 | 9 of 11, faint 2017 and 2019 | 6 of 11, faint 2017, 2018, 2020 and 2025 | 11 of 11, none faint | 9 of 11, faint 2017 and 2019 | 11 of 11, none faint |
| Braid envelope km², share outside the OSM zone | 6.05, 14% outside 500 m | 6.56, 21% outside 500 m | 2.33, 0% outside 500 m | 1.43, 0% outside 500 m | 3.94, 0% outside 500 m | 1.25, 0% outside 500 m |
| Left out of the zone before counting: OSM rivers, villages, sand; masked by eye<br>OSM polygons as drawn and areas masked by eye, no rut number covers them; river beds are inside the share, masked areas apart | 3% of 500 m; masked 4% | 12% of 500 m | 10% of 500 m | 13% of 500 m, river beds 13% | 16% of 500 m | 0% of 500 m; masked 4% |
| Dropped in the zone by detection rules in turn, km, last clear year; ruts kept<br>slope, contrast, branch, soil and green, the green line floor, where a corridor has one; each run on what the one before kept, so never summed; likely false lines, real ruts there with them | 2026: slope 0.0, contrast 6.5, branch 3.6, soil 6.3; kept 74.5 | 2026: slope 2.5, contrast 24.9, branch 4.6, soil 2.2; kept 79.0 | 2026: slope 0.0, contrast 5.6, branch 13.0, soil 5.8; kept 43.5 | 2026: slope 11.0, contrast 4.1, branch 2.8, soil 1.8, green 18.6; kept 24.5 | 2026: slope 2.2, contrast 24.4, branch 0.9, soil 1.5; kept 44.8 | 2026: slope 0.0, contrast 17.8, branch 0.9, soil 7.6; kept 12.9 |
| Zone greenness, median NDVI: first and last clear year; lowest and highest<br>median NDVI from space, lower reads a drier summer with weaker rut contrast, not grass measured; faint years left out | 0.088 in 2016, 0.053 in 2026; 0.052 in 2020, 0.104 in 2025 | 0.591 in 2016, 0.553 in 2026; 0.466 in 2020, 0.591 in 2016 | 0.511 in 2019, 0.412 in 2026; 0.390 in 2024, 0.511 in 2019 | 0.640 in 2016, 0.664 in 2026; 0.592 in 2018, 0.682 in 2021 | 0.623 in 2016, 0.523 in 2026; 0.523 in 2026, 0.634 in 2021 | 0.113 in 2016, 0.064 in 2026; 0.064 in 2026, 0.120 in 2024 |
| Clear looks per pixel, median: first and last clear year; fewest and most; under the cap<br>scenes that saw the ground clear, median over the zone, counted from cloud masks; fewer looks, lower confidence; under the cap: clear years whose confidence is under the corridor cap | 7 in 2016, 11 in 2026; 7 in 2016, 14 in 2023; 2016 | 7 in 2016, 11 in 2026; 6 in 2018, 15 in 2021; 2016 and 2018 | 12 in 2019, 21 in 2026; 12 in 2019, 21 in 2026; none | 9 in 2016, 28 in 2026; 9 in 2016, 28 in 2021; none | 12 in 2016, 24 in 2026; 12 in 2016, 30 in 2024; none | 4 in 2016, 26 in 2026; 4 in 2016, 26 in 2026; 2016 |
| Archive collections of the pictures; first and last clear year from one<br>the hosts of the same Sentinel-2 product the year table names; years from different ones can differ with the processing as well as the ground | 3; 2016 and 2026 from different ones | 3; 2016 and 2026 from different ones | 2; 2019 and 2026 from one | 3; 2016 and 2026 from different ones | 3; 2016 and 2026 from different ones | 3; 2016 and 2026 from different ones |
| Rut signal, hysteresis k low and high in robust sigmas; detection defaults or not<br>the setting each corridor counts ruts with, red for soil on grass, pale for lines on orange ground; k is how far above each year's picture noise a rut must stand, high to start, low to grow; detection defaults: red, k 2 and 5, set on Orkhon, the basis line says whether they were checked on the road | pale, 1.5 and 3.5, not defaults | red, 2 and 5, defaults | red, 2 and 5, defaults | red, 2 and 5, defaults | red, 2 and 5, defaults | pale, 2 and 5, not defaults |
| Rut km in the braid envelope | 54.4 in 2016, 58.5 in 2026 | 51.8 in 2016, 63.2 in 2026 | 25.3 in 2019, 26.7 in 2026 | 16.1 in 2016, 18.5 in 2026 | 29.0 in 2016, 27.0 in 2026 | 6.9 in 2016, 6.1 in 2026 |
| Rut km, lowest and highest clear year | 43.2 in 2020, 67.5 in 2017 | 51.8 in 2016, 70.6 in 2022 | 21.3 in 2021, 26.7 in 2026 | 16.1 in 2016, 21.1 in 2021 | 27.0 in 2026, 32.9 in 2024 | 5.8 in 2020, 15.8 in 2019 |
| 3+ ruts share | 14% in 2026 | 9% in 2026 | 3.0% in 2026 | 2.1% in 2026 | 1.6% in 2026 | 0.0% in 2026 |
| 3+ ruts share, lowest and highest clear year | 3% in 2020, 14% in 2026 | 9% in 2024, 16% in 2020 | 0.8% in 2023, 3.8% in 2019 | 1.4% in 2016, 2.1% in 2019 | 0.0% in 2022, 2.8% in 2016 | 0.0% in 2016, 0.4% in 2019 |
| Braid width p90, m | 497 in 2016, 916 in 2026 | 464 in 2016, 787 in 2026 | 168 in 2019, 118 in 2026 | 10 in 2016, 10 in 2026 | 150 in 2016, 90 in 2026 | 10 in 2016, 0 in 2026 |
| Braid width p90, narrowest and widest clear year, m | 108 in 2020, 928 in 2025 | 464 in 2016, 837 in 2020 | 10 in 2021, 168 in 2019 | 10 in 2016, 99 in 2021 | 10 in 2018, 150 in 2016 | 0 in 2020, 10 in 2016 |
| Parallel ruts per cross-section, median and p90 | 1.0 and 2.0 in 2016, 1.0 and 3.0 in 2026 | 1.0 and 3.0 in 2016, 1.0 and 2.0 in 2026 | 1.0 and 2.0 in 2019, 1.0 and 2.0 in 2026 | 1.0 and 1.0 in 2016, 1.0 and 1.0 in 2026 | 0.0 and 2.0 in 2016, 0.0 and 2.0 in 2026 | 0.0 and 1.0 in 2016, 0.0 and 0.0 in 2026 |
| Ruts gone, km | 15.1 in 2025 and 2026 | 26.4 in 2025 and 2026 | 2.5 in 2024 and 2026 | 3.5 in 2025 and 2026 | 17.6 in 2025 and 2026 | 7.6 in 2025 and 2026 |
| Ruts gone where grass was green every year, km | unknown | 11.9 of 26.4 | unknown | 0.1 of 3.5 | 9.5 of 17.6 | unknown |

| Corridor | Bulgan soum to Bayanzag (Flaming Cliffs), Ömnögovi | Bat-Ölzii to Orkhon waterfall (Ulaan Tsutgalan), Övörkhangai | A0301 junction to Hustai National Park gate, Tuv | Khatgal to Jankhai pass, west shore of Lake Khövsgöl | Tsenkher soum to Tsenkher hot springs, Arkhangai | Mandalgovi to Dalanzadgad road toward Tsagaan Suvarga, Dundgovi |
|---|---|---|---|---|---|---|
| New ruts, km, last 2 years with clear neighbours | 2.7 in 2024, 0.7 in 2025 | 1.8 in 2024, 1.3 in 2025 | 2.3 in 2022, 1.2 in 2023 | 0.1 in 2024, 0.1 in 2025 | 2.1 in 2024, 0.7 in 2025 | 0.0 in 2024, 0.0 in 2025 |
| Hotspots | 7 of 16 | 7 of 24 | 1 of 13 | 1 of 14 | 1 of 25 | 0 of 22 |
| Pasture to rut ground, net ha of ha measured | 4.34 of 1664.37 | 17.77 of 2346.56 | 0.93 of 1285.32 | 4.39 of 1310.92 | -5.39 of 2131.95 | 3.47 of 2239.16 |
| Greenness on new rut ground beyond the control, NDVI<br>median NDVI from space against ground never near a rut, not grass measured on the ground | too sparse | -0.064, agrees | -0.049, agrees | -0.172, agrees | -0.105, agrees | too sparse |
| Rut ground in the pasture measured, ha: first and last clear year; lowest and highest<br>ground under ruts that summer, not pasture lost that year | 218.09 in 2016, 204.30 in 2026; 155.71 in 2020, 257.13 in 2017 | 194.58 in 2016, 245.75 in 2026; 194.58 in 2016, 260.58 in 2023 | 105.02 in 2019, 116.75 in 2026; 93.16 in 2023, 116.75 in 2026 | 53.12 in 2016, 67.02 in 2026; 53.12 in 2016, 76.84 in 2021 | 145.37 in 2016, 108.68 in 2026; 90.25 in 2025, 145.37 in 2016 | 31.45 in 2016, 29.15 in 2026; 19.75 in 2020, 73.88 in 2024 |
| Rut ground off the track band | 92% | 86% | 78% | 42% | 83% | 86% |
| Rut ground off the track band, ha: first and last clear year; lowest and highest<br>the band follows today's recommended track in every year, a baseline, not a before and after | 186.13 in 2016, 187.4 in 2026; 144.62 in 2020, 226.07 in 2017 | 169.56 in 2016, 211.22 in 2026; 169.56 in 2016, 224.49 in 2025 | 68.92 in 2019, 91.44 in 2026; 61.76 in 2023, 91.44 in 2026 | 17.05 in 2016, 28.32 in 2026; 17.05 in 2016, 34.72 in 2021 | 130.09 in 2016, 90.35 in 2026; 73.14 in 2025, 130.09 in 2016 | 17.4 in 2016, 25.1 in 2026; 11.79 in 2020, 56.05 in 2024 |
| Recommended track km<br>OSM ways and OSM tags, not field checked, confidence unknown | 16.196 | 24.603 | 13.348 | 14.185 | 23.577 | 22.429 |
| River crossings warned<br>OSM ways and OSM tags, not field checked, confidence unknown | 0 | 3 | 0 | 0 | 1 | 0 |
| OSM route as is, km and crossings warned<br>OSM ways and OSM tags, not field checked, confidence unknown | 21.09, 0 | 24.646, 5 | 13.348, 0 | 14.185, 0 | 24.875, 7 | 22.862, 0 |
| High water at warned crossings<br>months of the flow model at any warned river crossing, not a gauge; each corridor's crossing line has its confidence | no warned crossing | Jun, Jul, Aug | no warned crossing | no warned crossing | Jul, Aug | no warned crossing |
| On the track: wetland km, sand km, passes, water points<br>OSM ways and OSM tags, not field checked, confidence unknown | 0, 0, 0, 2 | 0, 0, 0, 0 | 0, 0, 0, 0 | 0, 0, 1, 0 | 0, 0, 0, 4 | 0, 0, 0, 0 |
| Fuel and ger camps near the track in OSM, listed<br>listed only when matched to an official registration, the rest counted | 2 fuel, 2 ger camps within 2 km, 0 listed | 1 fuel, 1 ger camp within 2 km, 0 listed | 0 fuel, 0 ger camps within 2 km, 0 listed | 0 fuel, 0 ger camps within 2 km, 0 listed | 2 fuel, 16 ger camps within 2 km, 0 listed | 0 fuel, 0 ger camps within 2 km, 0 listed |
| Wettest months, rain mm/day<br>NASA POWER reanalysis at one grid cell per corridor, not a gauge, rain and not the state of the track | Jul 1.49, Aug 1.13, Jun 0.6 | Jul 3.31, Aug 2.62, Jun 1.99 | Jul 2.88, Aug 2.72, Jun 1.94 | Jul 3.82, Aug 3.17, Jun 2.52 | Jul 3.49, Aug 2.73, Jun 2.07 | Jul 1.26, Aug 1.1, Sep 0.58 |
| Confidence of the 3+ share | 0.30 | 0.60 | 0.60 | 0.30 | 0.30 | 0.30 |

## Bulgan soum to Bayanzag (Flaming Cliffs), Ömnögovi

Confidence cap 0.30.

- Clear pictures in 9 of 11 summers, 2016 to 2026; every detection number below uses only those. Faint, left out: 2018 (z 3.55) and 2021 (z 3.65), under z 3.77. Last clear year 2026. Confidence unknown. Source: dashboard/bayanzag/data/data.json years[].visibility, visibility.threshold_z, page.held_years, page.missing_years. Visibility: median line response z on the steady ruts (envelope skeleton detected in >= 60% of years, rims of compact holes removed) in each composite; faint pictures when under 90% of the median year; a faint year's rut km fall with the picture, not only the ground; one composite a summer, 20 June to 10 September.
- Measured stretch: 16.18 km of the OSM line, Bulgan soum to Bayanzag (Flaming Cliffs), Ömnögovi, with a 500 m zone each side. Every rut number below counts this stretch only, not the whole road. Confidence unknown. Source: dashboard/bayanzag/data/data.json length_km, halfwidth_m, label. Length of the OSM line as mapped, in UTM metres, not driven or field measured; the zone follows the line where OSM draws it; the braid envelope can reach past the zone where ruts do.
- Left out of the 500 m zone around the OSM line before any rut is counted: 3%, OSM rivers and residential areas with a 50 m buffer and OSM sand and dunes as drawn. Also left out: 1 area drawn by eye on the pictures, 5.1 km², 4% of the zone. No rut number below covers that ground (15.8 km² left to measure). Confidence unknown. Source: dashboard/bayanzag/data/data.json excluded_share, page.exclude_buffer_m, mask_areas, zones.osm.area_km2. OSM polygons as drawn, not field checked: a river or village OSM does not draw counts as ground, one drawn too wide is left out; gravel banks, village streets and dune ripples look like ruts, so leaving them out keeps false ruts out and real ruts there with them.
- Rut km the detection rules dropped as likely false in the 500 m zone, 2016 and 2026, the first and last clear year, each rule on what the one before kept: slope mask 0.0 and 0.0, contrast floor 4.5 and 6.5, branch floor 1.8 and 3.6, soil check 6.4 and 6.3. Ruts kept: 72.5 and 74.5 km. Confidence 0.26. Source: dashboard/bayanzag/data/data.json years[].slope_dropped_km, contrast_dropped_km, branch_dropped_km, soil_dropped_km, years[].rut_km. Sentinel-2 detection, 10 m pixels, not field checked; rules applied in turn, so the drops are not summed; they drop hillside spurs, low contrast lines, short branches and bare soil that look like ruts, and real ruts there with them.
- Greenness of the 500 m zone, median NDVI, over 9 clear years, 2016 to 2026: 0.088 in 2016, 0.053 in 2026; lowest 0.052 in 2020 (55.2 rut km in the zone), highest 0.104 in 2025 (69.9 rut km). Faint years, left out: 0.073 in 2018 and 0.125 in 2021. Confidence 0.26. Source: dashboard/bayanzag/data/data.json years[].ndvi_background, years[].rut_km. Sentinel-2 detection, 10 m pixels, not field checked; median NDVI of the zone in each summer's picture, greenness seen from space, not grass measured on the ground; lower reads a drier summer, where ruts stand out less from the ground around them, so a dry year's rut km can fall with the picture as well as the ground; faint years left out; one picture a year.

- Clear looks per pixel in the 500 m zone, median, over 9 clear years, 2016 to 2026: 7 in 2016, 11 in 2026; fewest 7 in 2016 (8 scenes), most 14 in 2023 (14 scenes). Under the 0.30 confidence cap for few looks: 2016 (7 looks, confidence 0.26). Faint years, left out: 14 in 2018 and 13 in 2021. Confidence unknown. Source: dashboard/bayanzag/data/data.json years[].nobs_median, years[].scenes, years[].confidence, page.confidence_cap. Sentinel-2 summer scenes, one composite a summer, 20 June to 10 September; a look is a scene that saw the pixel clear of cloud and shadow; fewer looks give a noisier picture, so the year's detection confidence is lower, never above the cap; looks are counted from cloud masks, not the ground measured; faint years left out; scenes from 3 archive collections across the years, so a count can move with the archive.
- Summer pictures from 3 archive collections, each a host of the same Copernicus Sentinel-2 L2A product: copernicus-s2-l2a/planetary:sentinel-2-l2a in 2016; copernicus-s2-l2a/earthsearch:sentinel-2-l2a in 2017 and 2022; copernicus-s2-l2a/earthsearch:sentinel-2-c1-l2a in 2018 to 2021 and 2023 to 2026. The first and last clear year, 2016 and 2026, come from different collections. Confidence unknown. Source: dashboard/bayanzag/data/data.json years[].source. Archive names as the year table stores them, one composite a summer; the hosts serve the same product, processed at different times and baselines, so a change between years from different collections can move with the processing as well as the ground; collection names, not the pictures checked.
- Rut detection: pale signal (paler, less red lines on orange ground); a rut starts where the line response is 3.5 robust sigmas above the zone median and grows along it down to 1.5. Not the detection defaults (red, k 2 low and 5 high). Basis: label sweep on the 100 blind 2023 points (labels/bayanzag/sweep.json): chosen on odd ids, even ids est. true rut km 10.9 -> 20.3, precision 0.36 -> 0.42; 18 of 67 km in unsampled gaps; step 12 floor 0.8 kept after a floor sweep on the same blind points (labels/bayanzag/floor.json): no floor beats it on odd and even ids (label.setting_pick); floor 0.5 adds 4.6 km of 2023 mask, 1 rut and 1 not points (claude-visual-s2), the rut a steady-batch point outside the scored strata, so no scored rut is gained; floor 0.9 removes 0 rut points. Confidence unknown. Source: dashboard/bayanzag/data/data.json signal, hysteresis, page.hysteresis_note. A setting chosen per corridor, not measured; the sigmas are each year's own picture noise, so the same k finds fainter ruts in a clean picture than a noisy one; a lower k finds more faint ruts and more false ones; settings carried from another road, not checked against labels here, can miss or overcount ruts on this one.
- The braid envelope, one fixed area for all years drawn from the ruts, not the OSM line: 6.05 km², within 1400 m of the OSM line. 14% of it lies outside the 500 m zone around the OSM line (15.8 km²); it covers 33% of that zone. Confidence 0.26. Source: dashboard/bayanzag/data/data.json zones.envelope.area_km2, outside_osm_share, osm_zone_covered_share. Sentinel-2 detection, 10 m pixels, not field checked; envelope: rut pixels within 37 deg of track direction, seen in >= 3 years, chained to the OSM line through gaps <= 30 m, closed 100 m, within 1400 m; drawn from all 11 years, faint ones too; built from the same detections it measures, so it shows where the braids are, not an independent count; OSM rivers, residential areas, sand and dunes excluded; 3.42 km² near settlements removed.
- Rut km in the braid envelope: 54.4 in 2016, 58.5 in 2026. Confidence 0.26. Source: dashboard/bayanzag/data/data.json years[].envelope.rut_km. Sentinel-2 detection, 10 m pixels, not field checked; faint years left out.
- Rut km in the braid envelope over 9 clear years, 2016 to 2026: lowest 43.2 in 2020, highest 67.5 in 2017. First to last +4.1 km, lowest to highest 24.3 km. The first-to-last change is smaller than the spread: the clear years go up and down between the first and the last. Confidence 0.26. Source: dashboard/bayanzag/data/data.json years[].envelope.rut_km. Sentinel-2 detection, 10 m pixels, not field checked; faint years left out; one picture a year, so the spread holds the picture's noise as well as real change.
- 14% of cross-sections carry 3 or more ruts in 2026. Confidence 0.30. Source: dashboard/bayanzag/data/data.json years[].envelope.braided_share. Sentinel-2 detection, 10 m pixels, not field checked.
- Cross-sections with 3 or more ruts over 9 clear years, 2016 to 2026: lowest 3% in 2020, highest 14% in 2026. First to last +7 points, lowest to highest 11 points. The first-to-last change is smaller than the spread: the clear years go up and down between the first and the last. Confidence 0.26. Source: dashboard/bayanzag/data/data.json years[].envelope.braided_share. Sentinel-2 detection, 10 m pixels, not field checked; faint years left out; one picture a year, so the spread holds the picture's noise as well as real change.
- Braid width, 90th percentile of cross-sections, first rut to last: 497 m in 2016, 916 m in 2026. Confidence 0.26. Source: dashboard/bayanzag/data/data.json years[].envelope.width_p90_m. Sentinel-2 detection, 10 m pixels, not field checked; one rut reads 10 m, none 0 m; faint years left out.
- Braid width, 90th percentile, over 9 clear years, 2016 to 2026: narrowest 108 m in 2020, widest 928 m in 2025. First to last +419 m, narrowest to widest 820 m. The first-to-last change is smaller than the spread: the clear years go up and down between the first and the last. Confidence 0.26. Source: dashboard/bayanzag/data/data.json years[].envelope.width_p90_m. Sentinel-2 detection, 10 m pixels, not field checked; one rut reads 10 m, none 0 m; faint years left out; one picture a year, so the spread holds the picture's noise as well as real change.
- Parallel ruts per cross-section in the braid envelope, median and 90th percentile: 1.0 and 2.0 in 2016, 1.0 and 3.0 in 2026. Confidence 0.26. Source: dashboard/bayanzag/data/data.json years[].envelope.ruts_median, ruts_p90. Sentinel-2 detection, 10 m pixels, not field checked; ruts closer than about 20 m count as one; a cross-section with no rut counts 0; faint years left out.
- Ruts gone in the braid envelope: 15.1 km seen in 2 or more clear years from 2016 to 2023 and in neither 2025 nor 2026, the last 2 clear years. Confidence 0.26. Source: dashboard/bayanzag/data/data.json history_envelope.recovered_rut_km. Sentinel-2 detection, 10 m pixels, not field checked; gone means no rut detected within 20 m in either last year: grass back, or too faint to see; faint years left out.
- New ruts in the braid envelope by first year seen, seen again the next year: 2.1 km in 2023, 2.7 km in 2024, 0.7 km in 2025. Only years with a clear picture the year before and after; 2026 has no next picture yet. Confidence 0.30. Source: dashboard/bayanzag/data/data.json history_envelope.new_rut_km_by_year. Sentinel-2 detection, 10 m pixels, not field checked; a rut within 20 m of one seen in any earlier year is not new; faint years and their neighbours left out.
- 7 of 16 one-km stretches are braiding hotspots. Worst: km 0 to 1, 23% braided, steady. Not ranked, under 5 cross-sections: km 16 to 16.18 (2 cross-sections, 17% braided). Confidence 0.26. Source: dashboard/bayanzag/data/data.json hotspots. Sentinel-2 detection, 10 m pixels, not field checked; hotspot means at least 10% of cross-sections with 3 or more ruts.
- Pasture turned to rut ground: 29.96 ha new, 25.62 ha regained, net 4.34 ha of 1664.37 ha measured (2016-2026). Confidence 0.26. Source: dashboard/bayanzag/data/data.json pasture. Sentinel-2 detection, 10 m pixels, not field checked; greenness check on new rut ground: too sparse.
- Greenness too sparse to check on pasture turned to rut ground: median NDVI 0.086 on ground never near a rut in 2016, 2017 and 2019, under 0.2. The pasture hectares are new rut ground, not measured grass. Confidence 0.26. Source: dashboard/bayanzag/data/data.json pasture.ndvi. Sentinel-2 detection, 10 m pixels, not field checked; median NDVI on the same pictures, mean over each period's clear years; minus the change on ground never near a rut, which rules out a corridor-wide dry or wet year, not a detection error; NDVI is greenness seen from space, not grass measured on the ground; faint years left out.

- Rut ground in the 1664.37 ha measured over 9 clear years, 2016 to 2026: 218.09 ha (13.1%) in 2016, 204.30 ha (12.3%) in 2026; lowest 155.71 ha in 2020, highest 257.13 ha in 2017. First to last -13.79 ha, lowest to highest 101.42 ha. The first-to-last change is smaller than the spread: the clear years go up and down between the first and the last. Confidence 0.26. Source: dashboard/bayanzag/data/data.json pasture.rut_ha. Sentinel-2 detection, 10 m pixels, not field checked; rut ground is the year's detection mask inside the same measured zone every year; a year's hectares are ground under ruts that summer, not pasture lost that year: the net ha compares periods; faint years left out; one picture a year, so the spread holds the picture's noise as well as real change.
- Sentinel-1 radar neither confirms nor contradicts the ruts (median 0.01 dB). Confidence unknown. Source: dashboard/bayanzag/data/data.json radar. A check on detection only; it changes no number.
- Recommended track: 16.196 km, 0 river crossings warned. Confidence unknown. Source: dashboard/bayanzag/data/route.json scored. OSM ways and OSM crossing tags, not field checked.
- The OSM route as is takes other ways: 21.09 km against 16.196 km recommended, 0 river crossings warned against 0. No km carries a trace score yet: the recommended track is OSM with fords and crossings with no bridge in OSM slowed, every unpaved track at the same low score. Confidence unknown. Source: dashboard/bayanzag/data/route.json base. OSM ways and OSM crossing tags, not field checked; cost minutes are a routing cost, not an ETA, and are left out.
- On the recommended track: 0 wetland stretches, 0 sand stretches, 0 passes, 2 water points within 2000 m, 0 marked drinkable in OSM. Confidence unknown. Source: dashboard/bayanzag/data/route.json scored. OSM tags, not field checked; a wetland, sand area, pass or water point OSM does not draw is not here; a well may be dry, broken or locked; DEM heights are a 2010 to 2015 surface model beside OSM's, never mixed.
- Within 2 km of the recommended track, OSM has 2 fuel stations and 2 ger camps. 0 listed. 4 not listed: not matched to an official registration. Confidence unknown. Source: dashboard/bayanzag/data/route.json pois.counts, pois.shown. OSM amenity=fuel, and tourism=camp_site or guest_house with a ger name, not field checked; a place OSM does not draw is not here; business places are published only when matched to an official registration, the rest are counted with no name and no place.
- 92% of rut ground in 2026 lies off a 25 m band along the recommended track; 49% of the track runs on detected ruts. Confidence 0.30. Source: dashboard/bayanzag/data/route.json designate. A recommendation to check with the soum, herders and on the ground before any sign, not a decision. Rut hectares are 10 m satellite pixels and include false positives (see the detection confidence).
- Rut ground off the 25 m band along the recommended track over 9 clear years: 186.13 ha in 2016, 187.4 ha in 2026; lowest 144.62 ha in 2020, highest 226.07 ha in 2017. First to last +1.27 ha, lowest to highest 81.45 ha. The first-to-last change is smaller than the spread: the clear years go up and down between the first and the last. Confidence 0.26. Source: dashboard/bayanzag/data/route.json designate.years[].off_band_ha. A recommendation to check with the soum, herders and on the ground before any sign, not a decision. Rut hectares are 10 m satellite pixels and include false positives (see the detection confidence); the band follows the recommended track of the route day in every year, so the years show where ruts lay against today's line, not which line drivers took then: a baseline for a sign or grading, not a before and after; faint years left out; one picture a year, so the spread holds the picture's noise as well as real change.
- Rain at the corridor by month, mm/day, mean of Jan to Sep 2016 to 2026 (11 years), Oct to Dec 2016 to 2025 (10 years) at one grid cell of 0.5 x 0.625 degrees: wettest Jul 1.49, Aug 1.13, Jun 0.6; driest Dec 0.05. Confidence 0.30. Source: dashboard/bayanzag/data/route.json weather.normals, weather.normal_years. Reanalysis at one grid cell for the whole corridor, not a gauge; rain, not the state of the track: wet ground and high fords are likelier in a wet month, not certain, and a dry month can still flood after one storm; a month's mean over its years, so one wet summer moves it; confidence is the weather source's, never above the corridor cap; the page's weather caveat gives the reader's month; Precipitation: NASA Langley Research Center POWER Project, MERRA-2.
- Verified track km: 0. Confidence unknown. Source: data/steppe/corridors/bayanzag/traces/score.json verified_km. No consented GPS traces yet.

Attribution: Contains modified Copernicus Sentinel data 2016-2026. Sentinel-2 L2A for 2016 hosted by Microsoft Planetary Computer. Sentinel-1 GRD for 2016, 2017, 2018, 2019, 2020, 2021, 2022, 2024, 2025, 2026 hosted by Microsoft Planetary Computer. Track centerline and rivers: (c) OpenStreetMap contributors, ODbL. Copernicus DEM GLO-30. Produced using Copernicus WorldDEM-30 (c) DLR e.V. 2010-2014 and (c) Airbus Defence and Space GmbH 2014-2018, provided under COPERNICUS by the European Union and ESA; all rights reserved.

### A0301 junction to Hustai National Park gate, Tuv

Confidence cap 0.60.

- Clear pictures in 6 of 11 summers, 2016 to 2026; every detection number below uses only those. Faint, left out: 2017 (z 4.14), 2018 (z 4.64), 2020 (z 4.34) and 2025 (z 5.14), under z 5.36. Last clear year 2026. Held out of the numbers: 2016. Confidence unknown. Source: dashboard/hustai/data/data.json years[].visibility, visibility.threshold_z, page.held_years, page.missing_years. Visibility: median line response z on the steady ruts (envelope skeleton detected in >= 60% of years, rims of compact holes removed) in each composite; faint pictures when under 90% of the median year; a faint year's rut km fall with the picture, not only the ground; one composite a summer, 20 June to 10 September; 2016 held out: One clear date, 2016-07-27 (median 2 views a pixel), too few for the first year that every later year is compared with. Sentinel-2B started in 2017. One orbit (R004) covers the corridor: 4 passes, 2016-07-07 to 2016-09-05, 3 of them cloudy. The other orbit's scenes fall outside it. All 12 scenes of the summer, no cloud limit, give the same one date.
- Measured stretch: 13.33 km of the OSM line, A0301 junction to Hustai National Park gate, Tuv, with a 500 m zone each side. Every rut number below counts this stretch only, not the whole road. Confidence unknown. Source: dashboard/hustai/data/data.json length_km, halfwidth_m, label. Length of the OSM line as mapped, in UTM metres, not driven or field measured; the zone follows the line where OSM draws it; the braid envelope can reach past the zone where ruts do.
- Left out of the 500 m zone around the OSM line before any rut is counted: 10%, OSM rivers and residential areas with a 50 m buffer and OSM sand and dunes as drawn. No rut number below covers that ground (12.85 km² left to measure). Confidence unknown. Source: dashboard/hustai/data/data.json excluded_share, page.exclude_buffer_m, zones.osm.area_km2. OSM polygons as drawn, not field checked: a river or village OSM does not draw counts as ground, one drawn too wide is left out; gravel banks, village streets and dune ripples look like ruts, so leaving them out keeps false ruts out and real ruts there with them.
- Rut km the detection rules dropped as likely false in the 500 m zone, 2019 and 2026, the first and last clear year, each rule on what the one before kept: slope mask 0.1 and 0.0, contrast floor 14.2 and 5.6, branch floor 2.9 and 13.0, soil check 1.5 and 5.8. Ruts kept: 37.2 and 43.5 km. Confidence 0.60. Source: dashboard/hustai/data/data.json years[].slope_dropped_km, contrast_dropped_km, branch_dropped_km, soil_dropped_km, years[].rut_km. Sentinel-2 detection, 10 m pixels, not field checked; rules applied in turn, so the drops are not summed; they drop hillside spurs, low contrast lines, short branches and bare soil that look like ruts, and real ruts there with them.

- Greenness of the 500 m zone, median NDVI, over 6 clear years, 2019 to 2026: 0.511 in 2019, 0.412 in 2026; lowest 0.390 in 2024 (34.8 rut km in the zone), highest 0.511 in 2019 (37.2 rut km). Faint years, left out: 0.233 in 2017, 0.412 in 2018, 0.197 in 2020 and 0.206 in 2025. Confidence 0.60. Source: dashboard/hustai/data/data.json years[].ndvi_background, years[].rut_km. Sentinel-2 detection, 10 m pixels, not field checked; median NDVI of the zone in each summer's picture, greenness seen from space, not grass measured on the ground; lower reads a drier summer, where ruts stand out less from the ground around them, so a dry year's rut km can fall with the picture as well as the ground; faint years left out; one picture a year.
- Clear looks per pixel in the 500 m zone, median, over 6 clear years, 2019 to 2026: 12 in 2019, 21 in 2026; fewest 12 in 2019 (14 scenes), most 21 in 2026 (26 scenes). No clear year under the 0.60 confidence cap. Faint years, left out: 8 in 2017, 8 in 2018, 17 in 2020 and 21 in 2025. Confidence unknown. Source: dashboard/hustai/data/data.json years[].nobs_median, years[].scenes, years[].confidence, page.confidence_cap. Sentinel-2 summer scenes, one composite a summer, 20 June to 10 September; a look is a scene that saw the pixel clear of cloud and shadow; fewer looks give a noisier picture, so the year's detection confidence is lower, never above the cap; looks are counted from cloud masks, not the ground measured; faint years left out; scenes from 2 archive collections across the years, so a count can move with the archive.
- Summer pictures from 2 archive collections, each a host of the same Copernicus Sentinel-2 L2A product: copernicus-s2-l2a/earthsearch:sentinel-2-l2a in 2017 and 2022; copernicus-s2-l2a/earthsearch:sentinel-2-c1-l2a in 2018 to 2021 and 2023 to 2026. The first and last clear year, 2019 and 2026, come from one collection. Confidence unknown. Source: dashboard/hustai/data/data.json years[].source. Archive names as the year table stores them, one composite a summer; the hosts serve the same product, processed at different times and baselines, so a change between years from different collections can move with the processing as well as the ground; collection names, not the pictures checked.
- Rut detection: red signal (redder, brighter lines of soil on grass); a rut starts where the line response is 5 robust sigmas above the zone median and grows along it down to 2. The detection defaults. Basis: Orkhon defaults (red signal, grassland), kept after a seed sweep (labels/hustai/sweep.json) and a step 12 floor sweep (labels/hustai/floor.json) on this corridor's blind labels, both passes: no pair or floor beats them on odd and even ids (label.setting_pick); low 1.5 adds up to 19.9 km of 2026 mask and 22.4 km of 2023, and 2023 precision falls from 0.74 and 0.70 to at most 0.46 and 0.50; floor 0.5 adds 0 rut and 2 not points in 2023, 0 rut and 5 not in 2026 (claude-visual-s8); floor 0.9 removes 2 rut points in 2026; blind labels 2023 and 2026 scored (labels/hustai/score.json). Confidence unknown. Source: dashboard/hustai/data/data.json signal, hysteresis, page.hysteresis_note. A setting chosen per corridor, not measured; the sigmas are each year's own picture noise, so the same k finds fainter ruts in a clean picture than a noisy one; a lower k finds more faint ruts and more false ones; settings carried from another road, not checked against labels here, can miss or overcount ruts on this one.
- The braid envelope, one fixed area for all years drawn from the ruts, not the OSM line: 2.33 km², within 1400 m of the OSM line. 0% of it lies outside the 500 m zone around the OSM line (12.85 km²); it covers 18% of that zone. Confidence 0.60. Source: dashboard/hustai/data/data.json zones.envelope.area_km2, outside_osm_share, osm_zone_covered_share. Sentinel-2 detection, 10 m pixels, not field checked; envelope: rut pixels within 37 deg of track direction, seen in >= 3 years, chained to the OSM line through gaps <= 30 m, closed 100 m, within 1400 m; drawn from all 10 years, faint ones too; built from the same detections it measures, so it shows where the braids are, not an independent count; OSM rivers, residential areas, sand and dunes excluded.
- Rut km in the braid envelope: 25.3 in 2019, 26.7 in 2026. Confidence 0.60. Source: dashboard/hustai/data/data.json years[].envelope.rut_km. Sentinel-2 detection, 10 m pixels, not field checked; faint years left out.
- Rut km in the braid envelope over 6 clear years, 2019 to 2026: lowest 21.3 in 2021, highest 26.7 in 2026. First to last +1.4 km, lowest to highest 5.4 km. The first-to-last change is smaller than the spread: the clear years go up and down between the first and the last. Confidence 0.60. Source: dashboard/hustai/data/data.json years[].envelope.rut_km. Sentinel-2 detection, 10 m pixels, not field checked; faint years left out; one picture a year, so the spread holds the picture's noise as well as real change.
- 3.0% of cross-sections carry 3 or more ruts in 2026. Confidence 0.60. Source: dashboard/hustai/data/data.json years[].envelope.braided_share. Sentinel-2 detection, 10 m pixels, not field checked.
- Cross-sections with 3 or more ruts over 6 clear years, 2019 to 2026: lowest 0.8% in 2023, highest 3.8% in 2019. First to last -0.8 points, lowest to highest 3.0 points. The first-to-last change is smaller than the spread: the clear years go up and down between the first and the last. Confidence 0.60. Source: dashboard/hustai/data/data.json years[].envelope.braided_share. Sentinel-2 detection, 10 m pixels, not field checked; faint years left out; one picture a year, so the spread holds the picture's noise as well as real change.
- Braid width, 90th percentile of cross-sections, first rut to last: 168 m in 2019, 118 m in 2026. Confidence 0.60. Source: dashboard/hustai/data/data.json years[].envelope.width_p90_m. Sentinel-2 detection, 10 m pixels, not field checked; one rut reads 10 m, none 0 m; faint years left out.
- Braid width, 90th percentile, over 6 clear years, 2019 to 2026: narrowest 10 m in 2021, widest 168 m in 2019. First to last -50 m, narrowest to widest 158 m. The first-to-last change is smaller than the spread: the clear years go up and down between the first and the last. Confidence 0.60. Source: dashboard/hustai/data/data.json years[].envelope.width_p90_m. Sentinel-2 detection, 10 m pixels, not field checked; one rut reads 10 m, none 0 m; faint years left out; one picture a year, so the spread holds the picture's noise as well as real change.
- Parallel ruts per cross-section in the braid envelope, median and 90th percentile: 1.0 and 2.0 in 2019, 1.0 and 2.0 in 2026. Confidence 0.60. Source: dashboard/hustai/data/data.json years[].envelope.ruts_median, ruts_p90. Sentinel-2 detection, 10 m pixels, not field checked; ruts closer than about 20 m count as one; a cross-section with no rut counts 0; faint years left out.
- Ruts gone in the braid envelope: 2.5 km seen in 2 or more clear years from 2019 to 2022 and in neither 2024 nor 2026, the last 2 clear years. Confidence 0.60. Source: dashboard/hustai/data/data.json history_envelope.recovered_rut_km. Sentinel-2 detection, 10 m pixels, not field checked; gone means no rut detected within 20 m in either last year: grass back, or too faint to see; faint years left out.
- New ruts in the braid envelope by first year seen, seen again the next year: 2.3 km in 2022, 1.2 km in 2023. Only years with a clear picture the year before and after; 2026 has no next picture yet. Confidence 0.60. Source: dashboard/hustai/data/data.json history_envelope.new_rut_km_by_year. Sentinel-2 detection, 10 m pixels, not field checked; a rut within 20 m of one seen in any earlier year is not new; faint years and their neighbours left out.
- 1 of 13 one-km stretches is a braiding hotspot. Worst: km 7 to 8, 23% braided, steady. Confidence 0.60. Source: dashboard/hustai/data/data.json hotspots. Sentinel-2 detection, 10 m pixels, not field checked; hotspot means at least 10% of cross-sections with 3 or more ruts.
- Pasture turned to rut ground: 9.14 ha new, 8.21 ha regained, net 0.93 ha of 1285.32 ha measured (2019-2026). Confidence 0.60. Source: dashboard/hustai/data/data.json pasture. Sentinel-2 detection, 10 m pixels, not field checked; greenness check on new rut ground: agrees.
- Greenness on pasture turned to rut ground, median NDVI, 2019, 2021 and 2022 against 2023, 2024 and 2026: new rut ground 0.448 to 0.359, ground never near a rut (control) 0.450 to 0.410; -0.049 beyond the control: agrees, it lost more green than the control. Rut ground regained 0.397 to 0.369, +0.012 beyond the control: within 0.02 NDVI of the control, no confirmation either way. Confidence 0.60. Source: dashboard/hustai/data/data.json pasture.ndvi. Sentinel-2 detection, 10 m pixels, not field checked; median NDVI on the same pictures, mean over each period's clear years; minus the change on ground never near a rut, which rules out a corridor-wide dry or wet year, not a detection error; NDVI is greenness seen from space, not grass measured on the ground; faint years left out.

- Rut ground in the 1285.32 ha measured over 6 clear years, 2019 to 2026: 105.02 ha (8.2%) in 2019, 116.75 ha (9.1%) in 2026; lowest 93.16 ha in 2023, highest 116.75 ha in 2026. First to last +11.73 ha, lowest to highest 23.59 ha. The first-to-last change is smaller than the spread: the clear years go up and down between the first and the last. Confidence 0.60. Source: dashboard/hustai/data/data.json pasture.rut_ha. Sentinel-2 detection, 10 m pixels, not field checked; rut ground is the year's detection mask inside the same measured zone every year; a year's hectares are ground under ruts that summer, not pasture lost that year: the net ha compares periods; faint years left out; one picture a year, so the spread holds the picture's noise as well as real change.
- Sentinel-1 radar on the detected ruts: darker, median -0.14 dB. Confidence unknown. Source: dashboard/hustai/data/data.json radar. A check on detection only; it changes no number.
- Recommended track: 13.348 km, 0 river crossings warned. Confidence unknown. Source: dashboard/hustai/data/route.json scored. OSM ways and OSM crossing tags, not field checked.
- The OSM route as is uses the same ways: 13.348 km against 13.348 km recommended, 0 river crossings warned against 0. No km carries a trace score yet: the recommended track is OSM with fords and crossings with no bridge in OSM slowed, every unpaved track at the same low score. Confidence unknown. Source: dashboard/hustai/data/route.json base. OSM ways and OSM crossing tags, not field checked; cost minutes are a routing cost, not an ETA, and are left out.
- On the recommended track: 0 wetland stretches, 0 sand stretches, 0 passes, 0 water points within 2000 m. Confidence unknown. Source: dashboard/hustai/data/route.json scored. OSM tags, not field checked; a wetland, sand area, pass or water point OSM does not draw is not here; a well may be dry, broken or locked; DEM heights are a 2010 to 2015 surface model beside OSM's, never mixed.
- Within 2 km of the recommended track, OSM has 0 fuel stations and 0 ger camps. 0 listed. Confidence unknown. Source: dashboard/hustai/data/route.json pois.counts, pois.shown. OSM amenity=fuel, and tourism=camp_site or guest_house with a ger name, not field checked; a place OSM does not draw is not here; business places are published only when matched to an official registration, the rest are counted with no name and no place.
- 78% of rut ground in 2026 lies off a 25 m band along the recommended track; 80% of the track runs on detected ruts. Confidence 0.60. Source: dashboard/hustai/data/route.json designate. A recommendation to check with the soum, herders and on the ground before any sign, not a decision. Rut hectares are 10 m satellite pixels and include false positives (see the detection confidence).
- Rut ground off the 25 m band along the recommended track over 6 clear years: 68.92 ha in 2019, 91.44 ha in 2026; lowest 61.76 ha in 2023, highest 91.44 ha in 2026. First to last +22.52 ha, lowest to highest 29.68 ha. The first-to-last change is smaller than the spread: the clear years go up and down between the first and the last. Confidence 0.60. Source: dashboard/hustai/data/route.json designate.years[].off_band_ha. A recommendation to check with the soum, herders and on the ground before any sign, not a decision. Rut hectares are 10 m satellite pixels and include false positives (see the detection confidence); the band follows the recommended track of the route day in every year, so the years show where ruts lay against today's line, not which line drivers took then: a baseline for a sign or grading, not a before and after; faint years left out; one picture a year, so the spread holds the picture's noise as well as real change.
- Rain at the corridor by month, mm/day, mean of Jan to Sep 2016 to 2026 (11 years), Oct to Dec 2016 to 2025 (10 years) at one grid cell of 0.5 x 0.625 degrees: wettest Jul 2.88, Aug 2.72, Jun 1.94; driest Jan 0.08. Confidence 0.60. Source: dashboard/hustai/data/route.json weather.normals, weather.normal_years. Reanalysis at one grid cell for the whole corridor, not a gauge; rain, not the state of the track: wet ground and high fords are likelier in a wet month, not certain, and a dry month can still flood after one storm; a month's mean over its years, so one wet summer moves it; confidence is the weather source's, never above the corridor cap; the page's weather caveat gives the reader's month; Precipitation: NASA Langley Research Center POWER Project, MERRA-2.
- Verified track km: 0. Confidence unknown. Source: data/steppe/corridors/hustai/traces/score.json verified_km. No consented GPS traces yet.

Attribution: Contains modified Copernicus Sentinel data 2017-2026. Sentinel-1 GRD for 2017, 2018, 2019, 2020, 2021, 2025, 2026 hosted by Microsoft Planetary Computer. Track centerline and rivers: (c) OpenStreetMap contributors, ODbL. Copernicus DEM GLO-30. Produced using Copernicus WorldDEM-30 (c) DLR e.V. 2010-2014 and (c) Airbus Defence and Space GmbH 2014-2018, provided under COPERNICUS by the European Union and ESA; all rights reserved.

## Khatgal to Jankhai pass, west shore of Lake Khövsgöl

Confidence cap 0.30.

- Clear pictures in 11 of 11 summers, 2016 to 2026; every detection number below uses only those. No year faint. Last clear year 2026. Confidence unknown. Source: dashboard/khovsgol/data/data.json years[].visibility, visibility.threshold_z, page.held_years, page.missing_years. Visibility: median line response z on the steady ruts (envelope skeleton detected in >= 60% of years, rims of compact holes removed) in each composite; faint pictures when under 90% of the median year; a faint year's rut km fall with the picture, not only the ground; one composite a summer, 20 June to 10 September.
- Measured stretch: 14.2 km of the OSM line, Khatgal to Jankhai pass, west shore of Lake Khövsgöl, with a 500 m zone each side. Every rut number below counts this stretch only, not the whole road. Confidence unknown. Source: dashboard/khovsgol/data/data.json length_km, halfwidth_m, label. Length of the OSM line as mapped, in UTM metres, not driven or field measured; the zone follows the line where OSM draws it; the braid envelope can reach past the zone where ruts do.
- Left out of the 500 m zone around the OSM line before any rut is counted: 13%, OSM rivers and residential areas with a 50 m buffer and OSM sand and dunes as drawn. River beds OSM does not draw are among them: 13% of the zone. No rut number below covers that ground (13.11 km² left to measure). Confidence unknown. Source: dashboard/khovsgol/data/data.json excluded_share, page.exclude_buffer_m, gravel_beds.zone_share, zones.osm.area_km2. OSM polygons as drawn, not field checked: a river or village OSM does not draw counts as ground, one drawn too wide is left out; gravel banks, village streets and dune ripples look like ruts, so leaving them out keeps false ruts out and real ruts there with them.
- Rut km the detection rules dropped as likely false in the 500 m zone, 2016 and 2026, the first and last clear year, each rule on what the one before kept: slope mask 11.6 and 11.0, contrast floor 4.4 and 4.1, branch floor 2.0 and 2.8, soil check 0.6 and 1.8, green line floor 16.6 and 18.6. Ruts kept: 20.0 and 24.5 km. Confidence 0.30. Source: dashboard/khovsgol/data/data.json years[].slope_dropped_km, contrast_dropped_km, branch_dropped_km, soil_dropped_km, green_dropped_km, years[].rut_km. Sentinel-2 detection, 10 m pixels, not field checked; rules applied in turn, so the drops are not summed; they drop hillside spurs, low contrast lines, short branches and bare soil, and faint lines on ground green every year, that look like ruts, and real ruts there with them.

- Greenness of the 500 m zone, median NDVI, over 11 clear years, 2016 to 2026: 0.640 in 2016, 0.664 in 2026; lowest 0.592 in 2018 (21.5 rut km in the zone), highest 0.682 in 2021 (26.3 rut km). Confidence 0.30. Source: dashboard/khovsgol/data/data.json years[].ndvi_background, years[].rut_km. Sentinel-2 detection, 10 m pixels, not field checked; median NDVI of the zone in each summer's picture, greenness seen from space, not grass measured on the ground; lower reads a drier summer, where ruts stand out less from the ground around them, so a dry year's rut km can fall with the picture as well as the ground; faint years left out; one picture a year.
- Clear looks per pixel in the 500 m zone, median, over 11 clear years, 2016 to 2026: 9 in 2016, 28 in 2026; fewest 9 in 2016 (11 scenes), most 28 in 2021 (30 scenes). No clear year under the 0.30 confidence cap. Confidence unknown. Source: dashboard/khovsgol/data/data.json years[].nobs_median, years[].scenes, years[].confidence, page.confidence_cap. Sentinel-2 summer scenes, one composite a summer, 20 June to 10 September; a look is a scene that saw the pixel clear of cloud and shadow; fewer looks give a noisier picture, so the year's detection confidence is lower, never above the cap; looks are counted from cloud masks, not the ground measured; faint years left out; scenes from 3 archive collections across the years, so a count can move with the archive.
- Summer pictures from 3 archive collections, each a host of the same Copernicus Sentinel-2 L2A product: copernicus-s2-l2a/planetary:sentinel-2-l2a in 2016; copernicus-s2-l2a/earthsearch:sentinel-2-l2a in 2017 and 2022; copernicus-s2-l2a/earthsearch:sentinel-2-c1-l2a in 2018 to 2021 and 2023 to 2026. The first and last clear year, 2016 and 2026, come from different collections. Confidence unknown. Source: dashboard/khovsgol/data/data.json years[].source. Archive names as the year table stores them, one composite a summer; the hosts serve the same product, processed at different times and baselines, so a change between years from different collections can move with the processing as well as the ground; collection names, not the pictures checked.
- Rut detection: red signal (redder, brighter lines of soil on grass); a rut starts where the line response is 5 robust sigmas above the zone median and grows along it down to 2. The detection defaults. Basis: Orkhon defaults (red signal, grassland), kept after a sweep on this corridor's blind labels, both passes (labels/khovsgol/sweep.json): seeds 3.0 to 4.5 cover 1 more blind point, a rut, in 2026, and seeds 3.0 to 4.0 cover 1 more blind point, a rut, in 2023; low 1.5 adds up to 7.7 km of 2023 mask that holds 1 more blind point, a rut; on ground green every year the green line floor (green_min_z) instead; blind labels 2023 and 2026 scored (labels/khovsgol/score.json); floor 0.5 beats 0.8 on points, and the pooled variant passes on the pixels it adds (claude-visual-s6 and claude-visual-s10+claude-visual-s9, labels/khovsgol/variant.json and variant2.json, label.variant_pool) find rut shares of 1.00 and 0.93 (8 of 8, 38 of 41) in 2023 and 2026, against the blind precision 0.93 and 0.93, so the labels pick floor 0.5, and detect runs it (min_red_frac, detect step 26). Confidence unknown. Source: dashboard/khovsgol/data/data.json signal, hysteresis, page.hysteresis_note. A setting chosen per corridor, not measured; the sigmas are each year's own picture noise, so the same k finds fainter ruts in a clean picture than a noisy one; a lower k finds more faint ruts and more false ones; settings carried from another road, not checked against labels here, can miss or overcount ruts on this one.
- The braid envelope, one fixed area for all years drawn from the ruts, not the OSM line: 1.43 km², within 1400 m of the OSM line. 0% of it lies outside the 500 m zone around the OSM line (13.11 km²); it covers 11% of that zone. Confidence 0.30. Source: dashboard/khovsgol/data/data.json zones.envelope.area_km2, outside_osm_share, osm_zone_covered_share. Sentinel-2 detection, 10 m pixels, not field checked; envelope: rut pixels within 37 deg of track direction, seen in >= 3 years, chained to the OSM line through gaps <= 30 m, closed 100 m, within 1400 m; drawn from all 11 years, faint ones too; built from the same detections it measures, so it shows where the braids are, not an independent count; OSM rivers, residential areas, sand and dunes excluded; river beds OSM does not draw are masked, set by eye on the 2026 picture: a braided river north of Khatgal, not in OSM, runs beside and across the road; its channels made km 5 to 6 read 72% braided, 8 of 15 stretches hotspots. Not on labels. Not caught: a channel within 20 m of the road, as south of the junction at km 12 to 13, so that hotspot may be part river.
- Rut km in the braid envelope: 16.1 in 2016, 18.5 in 2026. Confidence 0.30. Source: dashboard/khovsgol/data/data.json years[].envelope.rut_km. Sentinel-2 detection, 10 m pixels, not field checked; faint years left out.
- Rut km in the braid envelope over 11 clear years, 2016 to 2026: lowest 16.1 in 2016, highest 21.1 in 2021. First to last +2.4 km, lowest to highest 5.0 km. The first-to-last change is smaller than the spread: the clear years go up and down between the first and the last. Confidence 0.30. Source: dashboard/khovsgol/data/data.json years[].envelope.rut_km. Sentinel-2 detection, 10 m pixels, not field checked; faint years left out; one picture a year, so the spread holds the picture's noise as well as real change.
- 2.1% of cross-sections carry 3 or more ruts in 2026. Confidence 0.30. Source: dashboard/khovsgol/data/data.json years[].envelope.braided_share. Sentinel-2 detection, 10 m pixels, not field checked; river beds OSM does not draw are masked, set by eye on the 2026 picture: a braided river north of Khatgal, not in OSM, runs beside and across the road; its channels made km 5 to 6 read 72% braided, 8 of 15 stretches hotspots. Not on labels. Not caught: a channel within 20 m of the road, as south of the junction at km 12 to 13, so that hotspot may be part river.
- Cross-sections with 3 or more ruts over 11 clear years, 2016 to 2026: lowest 1.4% in 2016, highest 2.1% in 2019. First to last +0.7 points, lowest to highest 0.7 points. Confidence 0.30. Source: dashboard/khovsgol/data/data.json years[].envelope.braided_share. Sentinel-2 detection, 10 m pixels, not field checked; faint years left out; one picture a year, so the spread holds the picture's noise as well as real change; river beds OSM does not draw are masked, set by eye on the 2026 picture: a braided river north of Khatgal, not in OSM, runs beside and across the road; its channels made km 5 to 6 read 72% braided, 8 of 15 stretches hotspots. Not on labels. Not caught: a channel within 20 m of the road, as south of the junction at km 12 to 13, so that hotspot may be part river.
- Braid width, 90th percentile of cross-sections, first rut to last: 10 m in 2016, 10 m in 2026. Confidence 0.30. Source: dashboard/khovsgol/data/data.json years[].envelope.width_p90_m. Sentinel-2 detection, 10 m pixels, not field checked; one rut reads 10 m, none 0 m; faint years left out; river beds OSM does not draw are masked, set by eye on the 2026 picture: a braided river north of Khatgal, not in OSM, runs beside and across the road; its channels made km 5 to 6 read 72% braided, 8 of 15 stretches hotspots. Not on labels. Not caught: a channel within 20 m of the road, as south of the junction at km 12 to 13, so that hotspot may be part river.
- Braid width, 90th percentile, over 11 clear years, 2016 to 2026: narrowest 10 m in 2016, widest 99 m in 2021. First to last +0 m, narrowest to widest 89 m. The first-to-last change is smaller than the spread: the clear years go up and down between the first and the last. Confidence 0.30. Source: dashboard/khovsgol/data/data.json years[].envelope.width_p90_m. Sentinel-2 detection, 10 m pixels, not field checked; one rut reads 10 m, none 0 m; faint years left out; one picture a year, so the spread holds the picture's noise as well as real change; river beds OSM does not draw are masked, set by eye on the 2026 picture: a braided river north of Khatgal, not in OSM, runs beside and across the road; its channels made km 5 to 6 read 72% braided, 8 of 15 stretches hotspots. Not on labels. Not caught: a channel within 20 m of the road, as south of the junction at km 12 to 13, so that hotspot may be part river.
- Parallel ruts per cross-section in the braid envelope, median and 90th percentile: 1.0 and 1.0 in 2016, 1.0 and 1.0 in 2026. Confidence 0.30. Source: dashboard/khovsgol/data/data.json years[].envelope.ruts_median, ruts_p90. Sentinel-2 detection, 10 m pixels, not field checked; ruts closer than about 20 m count as one; a cross-section with no rut counts 0; faint years left out; river beds OSM does not draw are masked, set by eye on the 2026 picture: a braided river north of Khatgal, not in OSM, runs beside and across the road; its channels made km 5 to 6 read 72% braided, 8 of 15 stretches hotspots. Not on labels. Not caught: a channel within 20 m of the road, as south of the junction at km 12 to 13, so that hotspot may be part river.

- Ruts gone in the braid envelope: 3.5 km seen in 2 or more clear years from 2016 to 2023 and in neither 2025 nor 2026, the last 2 clear years. Confidence 0.30. Source: dashboard/khovsgol/data/data.json history_envelope.recovered_rut_km. Sentinel-2 detection, 10 m pixels, not field checked; gone means no rut detected within 20 m in either last year: grass back, or too faint to see; faint years left out.
- Of the 3.5 km of ruts gone in the braid envelope, 0.1 km lie where grass was green every year (48% of the envelope): there a dry summer cannot make a rut look gone. Confidence 0.30. Source: dashboard/khovsgol/data/data.json green_control.history.envelope.recovered_rut_km. Sentinel-2 detection, 10 m pixels, not field checked; green ground: pixels whose 210 m median NDVI is >= 0.40 in every year 2016-2026; there the counts still rise and fall with greenness, the floor removes dry patches, it does not correct contrast.
- New ruts in the braid envelope by first year seen, seen again the next year: 1.2 km in 2017, 0.8 km in 2018, 0.2 km in 2019, 0.3 km in 2020, 0.2 km in 2021, 0.6 km in 2022, 0.2 km in 2023, 0.1 km in 2024, 0.1 km in 2025. Only years with a clear picture the year before and after; 2026 has no next picture yet. Confidence 0.30. Source: dashboard/khovsgol/data/data.json history_envelope.new_rut_km_by_year. Sentinel-2 detection, 10 m pixels, not field checked; a rut within 20 m of one seen in any earlier year is not new; faint years and their neighbours left out.
- 1 of 14 one-km stretches is a braiding hotspot. Worst: km 12 to 13, 24% braided, steady. Confidence 0.30. Source: dashboard/khovsgol/data/data.json hotspots. Sentinel-2 detection, 10 m pixels, not field checked; hotspot means at least 10% of cross-sections with 3 or more ruts; river beds OSM does not draw are masked, set by eye on the 2026 picture: a braided river north of Khatgal, not in OSM, runs beside and across the road; its channels made km 5 to 6 read 72% braided, 8 of 15 stretches hotspots. Not on labels. Not caught: a channel within 20 m of the road, as south of the junction at km 12 to 13, so that hotspot may be part river.
- Pasture turned to rut ground: 5.66 ha new, 1.27 ha regained, net 4.39 ha of 1310.92 ha measured (2016-2026). Confidence 0.30. Source: dashboard/khovsgol/data/data.json pasture. Sentinel-2 detection, 10 m pixels, not field checked; greenness check on new rut ground: agrees.
- Greenness on pasture turned to rut ground, median NDVI, 2016, 2017 and 2018 against 2024, 2025 and 2026: new rut ground 0.440 to 0.294, ground never near a rut (control) 0.671 to 0.697; -0.172 beyond the control: agrees, it lost more green than the control. Rut ground regained 0.305 to 0.368, +0.037 beyond the control: agrees, it greened more than the control. Confidence 0.30. Source: dashboard/khovsgol/data/data.json pasture.ndvi. Sentinel-2 detection, 10 m pixels, not field checked; median NDVI on the same pictures, mean over each period's clear years; minus the change on ground never near a rut, which rules out a corridor-wide dry or wet year, not a detection error; NDVI is greenness seen from space, not grass measured on the ground; faint years left out.
- Rut ground in the 1310.92 ha measured over 11 clear years, 2016 to 2026: 53.12 ha (4.1%) in 2016, 67.02 ha (5.1%) in 2026; lowest 53.12 ha in 2016, highest 76.84 ha in 2021. First to last +13.90 ha, lowest to highest 23.72 ha. The first-to-last change is smaller than the spread: the clear years go up and down between the first and the last. Confidence 0.30. Source: dashboard/khovsgol/data/data.json pasture.rut_ha. Sentinel-2 detection, 10 m pixels, not field checked; rut ground is the year's detection mask inside the same measured zone every year; a year's hectares are ground under ruts that summer, not pasture lost that year: the net ha compares periods; faint years left out; one picture a year, so the spread holds the picture's noise as well as real change.
- Sentinel-1 radar neither confirms nor contradicts the ruts (median 0.02 dB). Confidence unknown. Source: dashboard/khovsgol/data/data.json radar. A check on detection only; it changes no number.
- Recommended track: 14.185 km, 0 river crossings warned. Confidence unknown. Source: dashboard/khovsgol/data/route.json scored. OSM ways and OSM crossing tags, not field checked.
- The OSM route as is uses the same ways: 14.185 km against 14.185 km recommended, 0 river crossings warned against 0. No km carries a trace score yet: the recommended track is OSM with fords and crossings with no bridge in OSM slowed, every unpaved track at the same low score. Confidence unknown. Source: dashboard/khovsgol/data/route.json base. OSM ways and OSM crossing tags, not field checked; cost minutes are a routing cost, not an ETA, and are left out.
- On the recommended track: 0 wetland stretches, 0 sand stretches, 1 pass (жанхайн даваа at km 14.166; highest 1911 m on the Copernicus DEM), 0 water points within 2000 m. Confidence unknown. Source: dashboard/khovsgol/data/route.json scored. OSM tags, not field checked; a wetland, sand area, pass or water point OSM does not draw is not here; a well may be dry, broken or locked; DEM heights are a 2010 to 2015 surface model beside OSM's, never mixed.
- Within 2 km of the recommended track, OSM has 0 fuel stations and 0 ger camps. 0 listed. Confidence unknown. Source: dashboard/khovsgol/data/route.json pois.counts, pois.shown. OSM amenity=fuel, and tourism=camp_site or guest_house with a ger name, not field checked; a place OSM does not draw is not here; business places are published only when matched to an official registration, the rest are counted with no name and no place.
- 42% of rut ground in 2026 lies off a 25 m band along the recommended track; 94% of the track runs on detected ruts. Confidence 0.30. Source: dashboard/khovsgol/data/route.json designate. A recommendation to check with the soum, herders and on the ground before any sign, not a decision. Rut hectares are 10 m satellite pixels and include false positives (see the detection confidence).
- Rut ground off the 25 m band along the recommended track over 11 clear years: 17.05 ha in 2016, 28.32 ha in 2026; lowest 17.05 ha in 2016, highest 34.72 ha in 2021. First to last +11.27 ha, lowest to highest 17.67 ha. The first-to-last change is smaller than the spread: the clear years go up and down between the first and the last. Confidence 0.30. Source: dashboard/khovsgol/data/route.json designate.years[].off_band_ha. A recommendation to check with the soum, herders and on the ground before any sign, not a decision. Rut hectares are 10 m satellite pixels and include false positives (see the detection confidence); the band follows the recommended track of the route day in every year, so the years show where ruts lay against today's line, not which line drivers took then: a baseline for a sign or grading, not a before and after; faint years left out; one picture a year, so the spread holds the picture's noise as well as real change.
- Rain at the corridor by month, mm/day, mean of Jan to Sep 2016 to 2026 (11 years), Oct to Dec 2016 to 2025 (10 years) at one grid cell of 0.5 x 0.625 degrees: wettest Jul 3.82, Aug 3.17, Jun 2.52; driest Jan 0.09. Confidence 0.30. Source: dashboard/khovsgol/data/route.json weather.normals, weather.normal_years. Reanalysis at one grid cell for the whole corridor, not a gauge; rain, not the state of the track: wet ground and high fords are likelier in a wet month, not certain, and a dry month can still flood after one storm; a month's mean over its years, so one wet summer moves it; confidence is the weather source's, never above the corridor cap; the page's weather caveat gives the reader's month; Precipitation: NASA Langley Research Center POWER Project, MERRA-2.
- Verified track km: 0. Confidence unknown. Source: data/steppe/corridors/khovsgol/traces/score.json verified_km. No consented GPS traces yet.

Attribution: Contains modified Copernicus Sentinel data 2016-2026. Sentinel-2 L2A for 2016 hosted by Microsoft Planetary Computer. Sentinel-1 GRD for 2016, 2017, 2018, 2019, 2020, 2021, 2025, 2026 hosted by Microsoft Planetary Computer. Track centerline and rivers: (c) OpenStreetMap contributors, ODbL. Copernicus DEM GLO-30. Produced using Copernicus WorldDEM-30 (c) DLR e.V. 2010-2014 and (c) Airbus Defence and Space GmbH 2014-2018, provided under COPERNICUS by the European Union and ESA; all rights reserved.

## Bat-Ölzii to Orkhon waterfall (Ulaan Tsutgalan), Övörkhangai

Confidence cap 0.60.

- Clear pictures in 9 of 11 summers, 2016 to 2026; every detection number below uses only those. Faint, left out: 2017 (z 3.92) and 2019 (z 4.54), under z 4.81. Last clear year 2026. Confidence unknown. Source: dashboard/orkhon_waterfall/data/data.json years[].visibility, visibility.threshold_z, page.held_years, page.missing_years. Visibility: median line response z on the steady ruts (envelope skeleton detected in >= 60% of years, rims of compact holes removed) in each composite; faint pictures when under 90% of the median year; a faint year's rut km fall with the picture, not only the ground; one composite a summer, 20 June to 10 September.
- Measured stretch: 24.41 km of the OSM line, Bat-Ölzii to Orkhon waterfall (Ulaan Tsutgalan), Övörkhangai, with a 500 m zone each side. Every rut number below counts this stretch only, not the whole road. Confidence unknown. Source: dashboard/orkhon_waterfall/data/data.json length_km, halfwidth_m, label. Length of the OSM line as mapped, in UTM metres, not driven or field measured; the zone follows the line where OSM draws it; the braid envelope can reach past the zone where ruts do.
- Left out of the 500 m zone around the OSM line before any rut is counted: 12%, OSM rivers and residential areas with a 50 m buffer and OSM sand and dunes as drawn. No rut number below covers that ground (22.12 km² left to measure). Confidence unknown. Source: dashboard/orkhon_waterfall/data/data.json excluded_share, page.exclude_buffer_m, zones.osm.area_km2. OSM polygons as drawn, not field checked: a river or village OSM does not draw counts as ground, one drawn too wide is left out; gravel banks, village streets and dune ripples look like ruts, so leaving them out keeps false ruts out and real ruts there with them.
- Rut km the detection rules dropped as likely false in the 500 m zone, 2016 and 2026, the first and last clear year, each rule on what the one before kept: slope mask 1.9 and 2.5, contrast floor 43.4 and 24.9, branch floor 2.4 and 4.6, soil check 0.8 and 2.2. Ruts kept: 62.4 and 79.0 km. Confidence 0.53. Source: dashboard/orkhon_waterfall/data/data.json years[].slope_dropped_km, contrast_dropped_km, branch_dropped_km, soil_dropped_km, years[].rut_km. Sentinel-2 detection, 10 m pixels, not field checked; rules applied in turn, so the drops are not summed; they drop hillside spurs, low contrast lines, short branches and bare soil that look like ruts, and real ruts there with them.
- Greenness of the 500 m zone, median NDVI, over 9 clear years, 2016 to 2026: 0.591 in 2016, 0.553 in 2026; lowest 0.466 in 2020 (77.3 rut km in the zone), highest 0.591 in 2016 (62.4 rut km). Faint years, left out: 0.454 in 2017 and 0.429 in 2019. Confidence 0.45. Source: dashboard/orkhon_waterfall/data/data.json years[].ndvi_background, years[].rut_km. Sentinel-2 detection, 10 m pixels, not field checked; median NDVI of the zone in each summer's picture, greenness seen from space, not grass measured on the ground; lower reads a drier summer, where ruts stand out less from the ground around them, so a dry year's rut km can fall with the picture as well as the ground; faint years left out; one picture a year.
- Clear looks per pixel in the 500 m zone, median, over 9 clear years, 2016 to 2026: 7 in 2016, 11 in 2026; fewest 6 in 2018 (12 scenes), most 15 in 2021 (25 scenes). Under the 0.60 confidence cap for few looks: 2016 (7 looks, confidence 0.53) and 2018 (6 looks, confidence 0.45). Faint years, left out: 9 in 2017 and 12 in 2019. Confidence unknown. Source: dashboard/orkhon_waterfall/data/data.json years[].nobs_median, years[].scenes, years[].confidence, page.confidence_cap. Sentinel-2 summer scenes, one composite a summer, 20 June to 10 September; a look is a scene that saw the pixel clear of cloud and shadow; fewer looks give a noisier picture, so the year's detection confidence is lower, never above the cap; looks are counted from cloud masks, not the ground measured; faint years left out; scenes from 3 archive collections across the years, so a count can move with the archive.
- Summer pictures from 3 archive collections, each a host of the same Copernicus Sentinel-2 L2A product: copernicus-s2-l2a/planetary:sentinel-2-l2a in 2016; copernicus-s2-l2a/earthsearch:sentinel-2-l2a in 2017 and 2022; copernicus-s2-l2a/earthsearch:sentinel-2-c1-l2a in 2018 to 2021 and 2023 to 2026. The first and last clear year, 2016 and 2026, come from different collections. Confidence unknown. Source: dashboard/orkhon_waterfall/data/data.json years[].source. Archive names as the year table stores them, one composite a summer; the hosts serve the same product, processed at different times and baselines, so a change between years from different collections can move with the processing as well as the ground; collection names, not the pictures checked.
- Rut detection: red signal (redder, brighter lines of soil on grass); a rut starts where the line response is 5 robust sigmas above the zone median and grows along it down to 2. The detection defaults. Basis: tuned by eye on 2023 overlays, then scored on 300 blind points (claude-visual-s2) in a seed sweep (labels/orkhon_waterfall/sweep.json) and a step 12 floor sweep (labels/orkhon_waterfall/floor.json): seeds (2.0, 3.0) and (2.0, 4.0) and floor 0.7 beat them on points (label.setting_pick); a variant pass (claude-visual-s7, labels/orkhon_waterfall/variant.json) on the pixels floor 0.7 and seeds (2.0, 3.0) add finds rut shares of 0.71, 0.31, 0.81 and 0.33, 0.31, 0.92 in 2023, 2026, 2019, against the blind precision 0.86, 0.83, 0.89; both fall short in 2023 and 2026, so neither is taken; seeds (2.0, 4.0) waits for a variant pass; floor 0.7 adds 5 rut, 1 not and 1 unsure point in 2019 and no decided point in 2023 or 2026; seeds (2.0, 3.0) add 8.9 km of 2019 mask and hold 4 more rut points that year; low 1.5 adds up to 41.0 km of 2023 mask and 2023 precision falls from 0.86 to at most 0.64. Confidence unknown. Source: dashboard/orkhon_waterfall/data/data.json signal, hysteresis, page.hysteresis_note. A setting chosen per corridor, not measured; the sigmas are each year's own picture noise, so the same k finds fainter ruts in a clean picture than a noisy one; a lower k finds more faint ruts and more false ones; settings carried from another road, not checked against labels here, can miss or overcount ruts on this one.
- The braid envelope, one fixed area for all years drawn from the ruts, not the OSM line: 6.56 km², within 1400 m of the OSM line. 21% of it lies outside the 500 m zone around the OSM line (22.12 km²); it covers 24% of that zone. Confidence 0.45. Source: dashboard/orkhon_waterfall/data/data.json zones.envelope.area_km2, outside_osm_share, osm_zone_covered_share. Sentinel-2 detection, 10 m pixels, not field checked; envelope: rut pixels within 37 deg of track direction, seen in >= 3 years, chained to the OSM line through gaps <= 30 m, closed 100 m, within 1400 m; drawn from all 11 years, faint ones too; built from the same detections it measures, so it shows where the braids are, not an independent count; OSM rivers, residential areas, sand and dunes excluded.
- Rut km in the braid envelope: 51.8 in 2016, 63.2 in 2026. Confidence 0.53. Source: dashboard/orkhon_waterfall/data/data.json years[].envelope.rut_km. Sentinel-2 detection, 10 m pixels, not field checked; faint years left out.
- Rut km in the braid envelope over 9 clear years, 2016 to 2026: lowest 51.8 in 2016, highest 70.6 in 2022. First to last +11.4 km, lowest to highest 18.8 km. The first-to-last change is smaller than the spread: the clear years go up and down between the first and the last. Confidence 0.45. Source: dashboard/orkhon_waterfall/data/data.json years[].envelope.rut_km. Sentinel-2 detection, 10 m pixels, not field checked; faint years left out; one picture a year, so the spread holds the picture's noise as well as real change.
- 9% of cross-sections carry 3 or more ruts in 2026. Confidence 0.60. Source: dashboard/orkhon_waterfall/data/data.json years[].envelope.braided_share. Sentinel-2 detection, 10 m pixels, not field checked.
- Cross-sections with 3 or more ruts over 9 clear years, 2016 to 2026: lowest 9% in 2024, highest 16% in 2020. First to last -2 points, lowest to highest 7 points. The first-to-last change is smaller than the spread: the clear years go up and down between the first and the last. Confidence 0.45. Source: dashboard/orkhon_waterfall/data/data.json years[].envelope.braided_share. Sentinel-2 detection, 10 m pixels, not field checked; faint years left out; one picture a year, so the spread holds the picture's noise as well as real change.

- Braid width, 90th percentile of cross-sections, first rut to last: 464 m in 2016, 787 m in 2026. Confidence 0.53. Source: dashboard/orkhon_waterfall/data/data.json years[].envelope.width_p90_m. Sentinel-2 detection, 10 m pixels, not field checked; one rut reads 10 m, none 0 m; faint years left out.
- Braid width, 90th percentile, over 9 clear years, 2016 to 2026: narrowest 464 m in 2016, widest 837 m in 2020. First to last +323 m, narrowest to widest 373 m. The first-to-last change is smaller than the spread: the clear years go up and down between the first and the last. Confidence 0.45. Source: dashboard/orkhon_waterfall/data/data.json years[].envelope.width_p90_m. Sentinel-2 detection, 10 m pixels, not field checked; one rut reads 10 m, none 0 m; faint years left out; one picture a year, so the spread holds the picture's noise as well as real change.
- Parallel ruts per cross-section in the braid envelope, median and 90th percentile: 1.0 and 3.0 in 2016, 1.0 and 2.0 in 2026. Confidence 0.53. Source: dashboard/orkhon_waterfall/data/data.json years[].envelope.ruts_median, ruts_p90. Sentinel-2 detection, 10 m pixels, not field checked; ruts closer than about 20 m count as one; a cross-section with no rut counts 0; faint years left out.
- Ruts gone in the braid envelope: 26.4 km seen in 2 or more clear years from 2016 to 2023 and in neither 2025 nor 2026, the last 2 clear years. Confidence 0.45. Source: dashboard/orkhon_waterfall/data/data.json history_envelope.recovered_rut_km. Sentinel-2 detection, 10 m pixels, not field checked; gone means no rut detected within 20 m in either last year: grass back, or too faint to see; faint years left out.
- Of the 26.4 km of ruts gone in the braid envelope, 11.9 km lie where grass was green every year (62% of the envelope): there a dry summer cannot make a rut look gone. Confidence 0.45. Source: dashboard/orkhon_waterfall/data/data.json green_control.history.envelope.recovered_rut_km. Sentinel-2 detection, 10 m pixels, not field checked; green ground: pixels whose 210 m median NDVI is >= 0.40 in every year 2016-2026; there the counts still rise and fall with greenness, the floor removes dry patches, it does not correct contrast.
- New ruts in the braid envelope by first year seen, seen again the next year: 4.1 km in 2021, 1.8 km in 2022, 1.6 km in 2023, 1.8 km in 2024, 1.3 km in 2025. Only years with a clear picture the year before and after; 2026 has no next picture yet. Confidence 0.60. Source: dashboard/orkhon_waterfall/data/data.json history_envelope.new_rut_km_by_year. Sentinel-2 detection, 10 m pixels, not field checked; a rut within 20 m of one seen in any earlier year is not new; faint years and their neighbours left out.
- 7 of 24 one-km stretches are braiding hotspots. Worst: km 22 to 23, 57% braided, shrinking. Confidence 0.45. Source: dashboard/orkhon_waterfall/data/data.json hotspots. Sentinel-2 detection, 10 m pixels, not field checked; hotspot means at least 10% of cross-sections with 3 or more ruts.
- Pasture turned to rut ground: 45.32 ha new, 27.55 ha regained, net 17.77 ha of 2346.56 ha measured (2016-2026). Confidence 0.45. Source: dashboard/orkhon_waterfall/data/data.json pasture. Sentinel-2 detection, 10 m pixels, not field checked; greenness check on new rut ground: agrees.
- Greenness on pasture turned to rut ground, median NDVI, 2016, 2018 and 2020 against 2024, 2025 and 2026: new rut ground 0.519 to 0.443, ground never near a rut (control) 0.556 to 0.544; -0.064 beyond the control: agrees, it lost more green than the control. Rut ground regained 0.466 to 0.495, +0.041 beyond the control: agrees, it greened more than the control. Confidence 0.45. Source: dashboard/orkhon_waterfall/data/data.json pasture.ndvi. Sentinel-2 detection, 10 m pixels, not field checked; median NDVI on the same pictures, mean over each period's clear years; minus the change on ground never near a rut, which rules out a corridor-wide dry or wet year, not a detection error; NDVI is greenness seen from space, not grass measured on the ground; faint years left out.
- Rut ground in the 2346.56 ha measured over 9 clear years, 2016 to 2026: 194.58 ha (8.3%) in 2016, 245.75 ha (10.5%) in 2026; lowest 194.58 ha in 2016, highest 260.58 ha in 2023. First to last +51.17 ha, lowest to highest 66.00 ha. The first-to-last change is smaller than the spread: the clear years go up and down between the first and the last. Confidence 0.45. Source: dashboard/orkhon_waterfall/data/data.json pasture.rut_ha. Sentinel-2 detection, 10 m pixels, not field checked; rut ground is the year's detection mask inside the same measured zone every year; a year's hectares are ground under ruts that summer, not pasture lost that year: the net ha compares periods; faint years left out; one picture a year, so the spread holds the picture's noise as well as real change.
- Sentinel-1 radar on the detected ruts: darker, median -0.51 dB. Confidence unknown. Source: dashboard/orkhon_waterfall/data/data.json radar. A check on detection only; it changes no number.
- Recommended track: 24.603 km, 3 river crossings warned. Confidence unknown. Source: dashboard/orkhon_waterfall/data/route.json scored. OSM ways and OSM crossing tags, not field checked.
- The OSM route as is takes other ways: 24.646 km against 24.603 km recommended, 5 river crossings warned against 3. No km carries a trace score yet: the recommended track is OSM with fords and crossings with no bridge in OSM slowed, every unpaved track at the same low score. Confidence unknown. Source: dashboard/orkhon_waterfall/data/route.json base. OSM ways and OSM crossing tags, not field checked; cost minutes are a routing cost, not an ETA, and are left out.
- Warned river crossings on the recommended track: km 20.294, unnamed river, flows into Орхон гол, ford in OSM, high water Jun, Jul, Aug; km 24.418, unnamed stream, flows into Улаан гол, intermittent in OSM, ford in OSM, no flow model for a stream; km 24.488, unnamed channel of Улаан гол, ford in OSM, high water Jul, Aug. High water at one or more of them: Jun, Jul, Aug. Confidence 0.40. Source: dashboard/orkhon_waterfall/data/route.json crossings.scored, crossings.flow. OSM ways, OSM waterway and crossing tags, not field checked; high water: a month whose 1991 to 2020 mean flow is at least 1.5 times the mean of the 12 monthly means; modelled monthly flow at a model reach, not a gauge; streams are below the model's scale; confidence is the flow model's, the lowest of these crossings, never above the corridor cap; high water now is judged on the page for the reader's month; River flow: GEOGLOWS ECMWF Streamflow Service v2, CC BY 4.0.
- On the recommended track: 0 wetland stretches, 0 sand stretches, 0 passes, 0 water points within 2000 m. Confidence unknown. Source: dashboard/orkhon_waterfall/data/route.json scored. OSM tags, not field checked; a wetland, sand area, pass or water point OSM does not draw is not here; a well may be dry, broken or locked; DEM heights are a 2010 to 2015 surface model beside OSM's, never mixed.
- Within 2 km of the recommended track, OSM has 1 fuel station and 1 ger camp. 0 listed. 2 not listed: not matched to an official registration. Confidence unknown. Source: dashboard/orkhon_waterfall/data/route.json pois.counts, pois.shown. OSM amenity=fuel, and tourism=camp_site or guest_house with a ger name, not field checked; a place OSM does not draw is not here; business places are published only when matched to an official registration, the rest are counted with no name and no place.
- 86% of rut ground in 2026 lies off a 25 m band along the recommended track; 61% of the track runs on detected ruts. Confidence 0.60. Source: dashboard/orkhon_waterfall/data/route.json designate. A recommendation to check with the soum, herders and on the ground before any sign, not a decision. Rut hectares are 10 m satellite pixels and include false positives (see the detection confidence).

- Rut ground off the 25 m band along the recommended track over 9 clear years: 169.56 ha in 2016, 211.22 ha in 2026; lowest 169.56 ha in 2016, highest 224.49 ha in 2025. First to last +41.66 ha, lowest to highest 54.93 ha. The first-to-last change is smaller than the spread: the clear years go up and down between the first and the last. Confidence 0.45. Source: dashboard/orkhon_waterfall/data/route.json designate.years[].off_band_ha. A recommendation to check with the soum, herders and on the ground before any sign, not a decision. Rut hectares are 10 m satellite pixels and include false positives (see the detection confidence); the band follows the recommended track of the route day in every year, so the years show where ruts lay against today's line, not which line drivers took then: a baseline for a sign or grading, not a before and after; faint years left out; one picture a year, so the spread holds the picture's noise as well as real change.
- Rain at the corridor by month, mm/day, mean of Jan to Sep 2016 to 2026 (11 years), Oct to Dec 2016 to 2025 (10 years) at one grid cell of 0.5 x 0.625 degrees: wettest Jul 3.31, Aug 2.62, Jun 1.99; driest Jan 0.09. Confidence 0.60. Source: dashboard/orkhon_waterfall/data/route.json weather.normals, weather.normal_years. Reanalysis at one grid cell for the whole corridor, not a gauge; rain, not the state of the track: wet ground and high fords are likelier in a wet month, not certain, and a dry month can still flood after one storm; a month's mean over its years, so one wet summer moves it; confidence is the weather source's, never above the corridor cap; the page's weather caveat gives the reader's month; Precipitation: NASA Langley Research Center POWER Project, MERRA-2.
- Verified track km: 0. Confidence unknown. Source: data/steppe/corridors/orkhon_waterfall/traces/score.json verified_km. No consented GPS traces yet.

Attribution: Contains modified Copernicus Sentinel data 2016-2026. Sentinel-2 L2A for 2016 hosted by Microsoft Planetary Computer. Sentinel-1 GRD for 2016, 2017, 2018, 2019, 2020, 2021, 2022, 2024, 2025, 2026 hosted by Microsoft Planetary Computer. Track centerline and rivers: (c) OpenStreetMap contributors, ODbL. Copernicus DEM GLO-30. Produced using Copernicus WorldDEM-30 (c) DLR e.V. 2010-2014 and (c) Airbus Defence and Space GmbH 2014-2018, provided under COPERNICUS by the European Union and ESA; all rights reserved.

### Mandalgovi to Dalanzadgad road toward Tsagaan Suvarga, Dundgovi

Confidence cap 0.30.

- Clear pictures in 11 of 11 summers, 2016 to 2026; every detection number below uses only those. No year faint. Last clear year 2026. Confidence unknown. Source: dashboard/tsagaan_suvarga/data/data.json years[].visibility, visibility.threshold_z, page.held_years, page.missing_years. Visibility: median line response z on the steady ruts (envelope skeleton detected in >= 60% of years, rims of compact holes removed) in each composite; faint pictures when under 90% of the median year; a faint year's rut km fall with the picture, not only the ground; one composite a summer, 20 June to 10 September.
- Measured stretch: 22.44 km of the OSM line, Mandalgovi to Dalanzadgad road toward Tsagaan Suvarga, Dundgovi, with a 500 m zone each side. Every rut number below counts this stretch only, not the whole road. Confidence unknown. Source: dashboard/tsagaan_suvarga/data/data.json length_km, halfwidth_m, label. Length of the OSM line as mapped, in UTM metres, not driven or field measured; the zone follows the line where OSM draws it; the braid envelope can reach past the zone where ruts do.
- Left out of the 500 m zone around the OSM line before any rut is counted: 0%, OSM rivers and residential areas with a 50 m buffer and OSM sand and dunes as drawn. Also left out: 1 area drawn by eye on the pictures, 3.55 km², 4% of the zone. No rut number below covers that ground (22.39 km² left to measure). Confidence unknown. Source: dashboard/tsagaan_suvarga/data/data.json excluded_share, page.exclude_buffer_m, mask_areas, zones.osm.area_km2. OSM polygons as drawn, not field checked: a river or village OSM does not draw counts as ground, one drawn too wide is left out; gravel banks, village streets and dune ripples look like ruts, so leaving them out keeps false ruts out and real ruts there with them.
- Rut km the detection rules dropped as likely false in the 500 m zone, 2016 and 2026, the first and last clear year, each rule on what the one before kept: slope mask 0.0 and 0.0, contrast floor 19.2 and 17.8, branch floor 0.5 and 0.9, soil check 1.5 and 7.6. Ruts kept: 11.5 and 12.9 km. Confidence 0.15. Source: dashboard/tsagaan_suvarga/data/data.json years[].slope_dropped_km, contrast_dropped_km, branch_dropped_km, soil_dropped_km, years[].rut_km. Sentinel-2 detection, 10 m pixels, not field checked; rules applied in turn, so the drops are not summed; they drop hillside spurs, low contrast lines, short branches and bare soil that look like ruts, and real ruts there with them.
- Greenness of the 500 m zone, median NDVI, over 11 clear years, 2016 to 2026: 0.113 in 2016, 0.064 in 2026; lowest 0.064 in 2026 (12.9 rut km in the zone), highest 0.120 in 2024 (28.0 rut km). Confidence 0.15. Source: dashboard/tsagaan_suvarga/data/data.json years[].ndvi_background, years[].rut_km. Sentinel-2 detection, 10 m pixels, not field checked; median NDVI of the zone in each summer's picture, greenness seen from space, not grass measured on the ground; lower reads a drier summer, where ruts stand out less from the ground around them, so a dry year's rut km can fall with the picture as well as the ground; faint years left out; one picture a year.
- Clear looks per pixel in the 500 m zone, median, over 11 clear years, 2016 to 2026: 4 in 2016, 26 in 2026; fewest 4 in 2016 (5 scenes), most 26 in 2026 (30 scenes). Under the 0.30 confidence cap for few looks: 2016 (4 looks, confidence 0.15). Confidence unknown. Source: dashboard/tsagaan_suvarga/data/data.json years[].nobs_median, years[].scenes, years[].confidence, page.confidence_cap. Sentinel-2 summer scenes, one composite a summer, 20 June to 10 September; a look is a scene that saw the pixel clear of cloud and shadow; fewer looks give a noisier picture, so the year's detection confidence is lower, never above the cap; looks are counted from cloud masks, not the ground measured; faint years left out; scenes from 3 archive collections across the years, so a count can move with the archive.
- Summer pictures from 3 archive collections, each a host of the same Copernicus Sentinel-2 L2A product: copernicus-s2-l2a/planetary:sentinel-2-l2a in 2016; copernicus-s2-l2a/earthsearch:sentinel-2-l2a in 2017 and 2022; copernicus-s2-l2a/earthsearch:sentinel-2-c1-l2a in 2018 to 2021 and 2023 to 2026. The first and last clear year, 2016 and 2026, come from different collections. Confidence unknown. Source: dashboard/tsagaan_suvarga/data/data.json years[].source. Archive names as the year table stores them, one composite a summer; the hosts serve the same product, processed at different times and baselines, so a change between years from different collections can move with the processing as well as the ground; collection names, not the pictures checked.
- Rut detection: pale signal (paler, less red lines on orange ground); a rut starts where the line response is 5 robust sigmas above the zone median and grows along it down to 2. Not the detection defaults (red, k 2 low and 5 high). Basis: pale signal, chosen on the OSM line in 2019, 2021 and 2023 (within 10 m): redness contrast -0.07, +0.47 and -0.24 sigma, brightness +0.57, +1.48 and +1.42, so the redness half of the red signal changes sign; default hysteresis 2.0/5.0 kept: 24 pairs swept on 100 blind 2023 labels (labels/tsagaan_suvarga/sweep.json), chosen on odd ids, the default gives the most true rut km; only 9 rut labels, too few to tune; step 12 floor 0.8 kept after a floor sweep on the same blind points (labels/tsagaan_suvarga/floor.json): no floor beats it on odd and even ids (label.setting_pick); floor 0.5 adds 8.5 km of 2023 mask, 1 rut and 1 not points (claude-visual-s2), and odd-id precision falls from 0.16 to 0.04; floor 0.9 removes 3 rut points. Confidence unknown. Source: dashboard/tsagaan_suvarga/data/data.json signal, hysteresis, page.hysteresis_note. A setting chosen per corridor, not measured; the sigmas are each year's own picture noise, so the same k finds fainter ruts in a clean picture than a noisy one; a lower k finds more faint ruts and more false ones; settings carried from another road, not checked against labels here, can miss or overcount ruts on this one.

- The braid envelope, one fixed area for all years drawn from the ruts, not the OSM line: 1.25 km², within 1400 m of the OSM line. 0% of it lies outside the 500 m zone around the OSM line (22.39 km²); it covers 6% of that zone. Confidence 0.15. Source: dashboard/tsagaan_suvarga/data/data.json zones.envelope.area_km2, outside_osm_share, osm_zone_covered_share. Sentinel-2 detection, 10 m pixels, not field checked; envelope: rut pixels within 37 deg of track direction, seen in >= 3 years, chained to the OSM line through gaps <= 30 m, closed 100 m, within 1400 m; drawn from all 11 years, faint ones too; built from the same detections it measures, so it shows where the braids are, not an independent count; OSM rivers, residential areas, sand and dunes excluded.
- Rut km in the braid envelope: 6.9 in 2016, 6.1 in 2026. Within 25 m of the OSM line: 4.8 and 2.1; beyond it at confidence 0.04: 2.1 and 4.0. Confidence 0.15. Source: dashboard/tsagaan_suvarga/data/data.json years[].envelope.rut_km. Sentinel-2 detection, 10 m pixels, not field checked; faint years left out.
- Rut km in the braid envelope over 11 clear years, 2016 to 2026: lowest 5.8 in 2020, highest 15.8 in 2019. First to last -0.8 km, lowest to highest 10.0 km. The first-to-last change is smaller than the spread: the clear years go up and down between the first and the last. Confidence 0.15. Source: dashboard/tsagaan_suvarga/data/data.json years[].envelope.rut_km. Sentinel-2 detection, 10 m pixels, not field checked; faint years left out; one picture a year, so the spread holds the picture's noise as well as real change; ruts beyond 25 m of the OSM line counted too, that class at confidence 0.04.
- 0.0% of cross-sections carry 3 or more ruts in 2026. Within 25 m of the OSM line alone: 0.0%. Confidence 0.30. Source: dashboard/tsagaan_suvarga/data/data.json years[].envelope.braided_share. Sentinel-2 detection, 10 m pixels, not field checked.
- Cross-sections with 3 or more ruts over 11 clear years, 2016 to 2026: lowest 0.0% in 2016, highest 0.4% in 2019. First to last +0.0 points, lowest to highest 0.4 points. The first-to-last change is smaller than the spread: the clear years go up and down between the first and the last. Confidence 0.15. Source: dashboard/tsagaan_suvarga/data/data.json years[].envelope.braided_share. Sentinel-2 detection, 10 m pixels, not field checked; faint years left out; one picture a year, so the spread holds the picture's noise as well as real change; ruts beyond 25 m of the OSM line counted too, that class at confidence 0.04.
- Braid width, 90th percentile of cross-sections, first rut to last: 10 m in 2016, 0 m in 2026. Within 25 m of the OSM line alone: 10 m and 0 m. Confidence 0.15. Source: dashboard/tsagaan_suvarga/data/data.json years[].envelope.width_p90_m. Sentinel-2 detection, 10 m pixels, not field checked; one rut reads 10 m, none 0 m; faint years left out.
- Braid width, 90th percentile, over 11 clear years, 2016 to 2026: narrowest 0 m in 2020, widest 10 m in 2016. First to last -10 m, narrowest to widest 10 m. Confidence 0.15. Source: dashboard/tsagaan_suvarga/data/data.json years[].envelope.width_p90_m. Sentinel-2 detection, 10 m pixels, not field checked; one rut reads 10 m, none 0 m; faint years left out; one picture a year, so the spread holds the picture's noise as well as real change; ruts beyond 25 m of the OSM line counted too, that class at confidence 0.04.
- Parallel ruts per cross-section in the braid envelope, median and 90th percentile: 0.0 and 1.0 in 2016, 0.0 and 0.0 in 2026. Within 25 m of the OSM line alone: 0.0 and 1.0 in 2016, 0.0 and 0.0 in 2026. Confidence 0.15. Source: dashboard/tsagaan_suvarga/data/data.json years[].envelope.ruts_median, ruts_p90. Sentinel-2 detection, 10 m pixels, not field checked; ruts closer than about 20 m count as one; a cross-section with no rut counts 0; faint years left out.
- Ruts gone in the braid envelope: 7.6 km seen in 2 or more clear years from 2016 to 2023 and in neither 2025 nor 2026, the last 2 clear years. Confidence 0.15. Source: dashboard/tsagaan_suvarga/data/data.json history_envelope.recovered_rut_km. Sentinel-2 detection, 10 m pixels, not field checked; gone means no rut detected within 20 m in either last year: grass back, or too faint to see; faint years left out; ruts beyond 25 m of the OSM line counted too, that class at confidence 0.04.
- New ruts in the braid envelope by first year seen, seen again the next year: 2.2 km in 2017, 0.2 km in 2018, 0.3 km in 2019, 0.1 km in 2020, 0.8 km in 2021, 0.3 km in 2022, 0.8 km in 2023, 0.0 km in 2024, 0.0 km in 2025. Only years with a clear picture the year before and after; 2026 has no next picture yet. Confidence 0.15. Source: dashboard/tsagaan_suvarga/data/data.json history_envelope.new_rut_km_by_year. Sentinel-2 detection, 10 m pixels, not field checked; a rut within 20 m of one seen in any earlier year is not new; faint years and their neighbours left out; ruts beyond 25 m of the OSM line counted too, that class at confidence 0.04.
- Detected ruts within 25 m of the OSM line in 2023: 9.4 km of skeleton, merged blind-label precision 1.00 on 16 points. Off the road: 17.5 km at confidence 0.04, not dropped. Confidence 0.30. Source: dashboard/tsagaan_suvarga/data/data.json offroad. Sentinel-2 detection, 10 m pixels, not field checked; 16 labeled points, a lower confidence class beyond 25 m.
- 0 of 22 one-km stretches are braiding hotspots. Confidence 0.15. Source: dashboard/tsagaan_suvarga/data/data.json hotspots. Sentinel-2 detection, 10 m pixels, not field checked; hotspot means at least 10% of cross-sections with 3 or more ruts.
- Pasture turned to rut ground: 6.82 ha new, 3.35 ha regained, net 3.47 ha of 2239.16 ha measured (2016-2026). New by class: 0.93 ha within 25 m of the OSM line, 5.89 ha beyond it at confidence 0.04. Confidence 0.15. Source: dashboard/tsagaan_suvarga/data/data.json pasture. Sentinel-2 detection, 10 m pixels, not field checked; greenness check on new rut ground: too sparse.
- Greenness too sparse to check on pasture turned to rut ground: median NDVI 0.110 on ground never near a rut in 2016, 2017 and 2018, under 0.2. The pasture hectares are new rut ground, not measured grass. Confidence 0.15. Source: dashboard/tsagaan_suvarga/data/data.json pasture.ndvi. Sentinel-2 detection, 10 m pixels, not field checked; median NDVI on the same pictures, mean over each period's clear years; minus the change on ground never near a rut, which rules out a corridor-wide dry or wet year, not a detection error; NDVI is greenness seen from space, not grass measured on the ground; faint years left out.
- Rut ground in the 2239.16 ha measured over 11 clear years, 2016 to 2026: 31.45 ha (1.4%) in 2016, 29.15 ha (1.3%) in 2026; lowest 19.75 ha in 2020, highest 73.88 ha in 2024. First to last -2.30 ha, lowest to highest 54.13 ha. The first-to-last change is smaller than the spread: the clear years go up and down between the first and the last. Confidence 0.15. Source: dashboard/tsagaan_suvarga/data/data.json pasture.rut_ha. Sentinel-2 detection, 10 m pixels, not field checked; rut ground is the year's detection mask inside the same measured zone every year; a year's hectares are ground under ruts that summer, not pasture lost that year: the net ha compares periods; faint years left out; one picture a year, so the spread holds the picture's noise as well as real change; ruts beyond 25 m of the OSM line counted too, that class at confidence 0.04.
- Sentinel-1 radar on the detected ruts: darker, median -0.23 dB. By class: within 25 m of the OSM line darker, median -0.53 dB; beyond it, at confidence 0.04, brighter, median 0.26 dB. Confidence unknown. Source: dashboard/tsagaan_suvarga/data/data.json radar. A check on detection only; it changes no number.
- Recommended track: 22.429 km, 0 river crossings warned. Confidence unknown. Source: dashboard/tsagaan_suvarga/data/route.json scored. OSM ways and OSM crossing tags, not field checked.
- The OSM route as is takes other ways: 22.862 km against 22.429 km recommended, 0 river crossings warned against 0. No km carries a trace score yet: the recommended track is OSM with fords and crossings with no bridge in OSM slowed, every unpaved track at the same low score. Confidence unknown. Source: dashboard/tsagaan_suvarga/data/route.json base. OSM ways and OSM crossing tags, not field checked; cost minutes are a routing cost, not an ETA, and are left out.

- On the recommended track: 0 wetland stretches, 0 sand stretches, 0 passes, 0 water points within 2000 m. Confidence unknown. Source: dashboard/tsagaan_suvarga/data/route.json scored. OSM tags, not field checked; a wetland, sand area, pass or water point OSM does not draw is not here; a well may be dry, broken or locked; DEM heights are a 2010 to 2015 surface model beside OSM's, never mixed.
- Within 2 km of the recommended track, OSM has 0 fuel stations and 0 ger camps. 0 listed. Confidence unknown. Source: dashboard/tsagaan_suvarga/data/route.json pois.counts, pois.shown. OSM amenity=fuel, and tourism=camp_site or guest_house with a ger name, not field checked; a place OSM does not draw is not here; business places are published only when matched to an official registration, the rest are counted with no name and no place.
- 86% of rut ground in 2026 lies off a 25 m band along the recommended track; 12% of the track runs on detected ruts. Within 25 m of the OSM line: 8% of 4.4 ha off the band; beyond it: 24.75 of 24.75 ha at confidence 0.04. Confidence 0.04. Source: dashboard/tsagaan_suvarga/data/route.json designate. A recommendation to check with the soum, herders and on the ground before any sign, not a decision. Rut hectares are 10 m satellite pixels and include false positives (see the detection confidence).
- Rut ground off the 25 m band along the recommended track over 11 clear years: 17.4 ha in 2016, 25.1 ha in 2026; lowest 11.79 ha in 2020, highest 56.05 ha in 2024. First to last +7.7 ha, lowest to highest 44.26 ha. The first-to-last change is smaller than the spread: the clear years go up and down between the first and the last. Confidence 0.04. Source: dashboard/tsagaan_suvarga/data/route.json designate.years[].off_band_ha. A recommendation to check with the soum, herders and on the ground before any sign, not a decision. Rut hectares are 10 m satellite pixels and include false positives (see the detection confidence); the band follows the recommended track of the route day in every year, so the years show where ruts lay against today's line, not which line drivers took then: a baseline for a sign or grading, not a before and after; faint years left out; one picture a year, so the spread holds the picture's noise as well as real change; ruts beyond 25 m of the OSM line counted too, that class at confidence 0.04.
- Rain at the corridor by month, mm/day, mean of Jan to Sep 2016 to 2026 (11 years), Oct to Dec 2016 to 2025 (10 years) at one grid cell of 0.5 x 0.625 degrees: wettest Jul 1.26, Aug 1.1, Sep 0.58; driest Dec 0.04. Confidence 0.30. Source: dashboard/tsagaan_suvarga/data/route.json weather.normals, weather.normal_years. Reanalysis at one grid cell for the whole corridor, not a gauge; rain, not the state of the track: wet ground and high fords are likelier in a wet month, not certain, and a dry month can still flood after one storm; a month's mean over its years, so one wet summer moves it; confidence is the weather source's, never above the corridor cap; the page's weather caveat gives the reader's month; Precipitation: NASA Langley Research Center POWER Project, MERRA-2.
- Verified track km: 0. Confidence unknown. Source: data/steppe/corridors/tsagaan_suvarga/traces/score.json verified_km. No consented GPS traces yet.

Attribution: Contains modified Copernicus Sentinel data 2016-2026. Sentinel-2 L2A for 2016 hosted by Microsoft Planetary Computer. Sentinel-1 GRD for 2016, 2017, 2018, 2019, 2020, 2021, 2022, 2024, 2025, 2026 hosted by Microsoft Planetary Computer. Track centerline and rivers: (c) OpenStreetMap contributors, ODbL. Copernicus DEM GLO-30. Produced using Copernicus WorldDEM-30 (c) DLR e.V. 2010-2014 and (c) Airbus Defence and Space GmbH 2014-2018, provided under COPERNICUS by the European Union and ESA; all rights reserved.

### Tsenkher soum to Tsenkher hot springs, Arkhangai

Confidence cap 0.30.

- Clear pictures in 9 of 11 summers, 2016 to 2026; every detection number below uses only those. Faint, left out: 2017 (z 3.04) and 2019 (z 3.24), under z 4.14. Last clear year 2026. Confidence unknown. Source: dashboard/tsenkher/data/data.json years[].visibility, visibility.threshold_z, page.held_years, page.missing_years. Visibility: median line response z on the steady ruts (envelope skeleton detected in >= 60% of years, rims of compact holes removed) in each composite; faint pictures when under 90% of the median year; a faint year's rut km fall with the picture, not only the ground; one composite a summer, 20 June to 10 September.
- Measured stretch: 24.79 km of the OSM line, Tsenkher soum to Tsenkher hot springs, Arkhangai, with a 500 m zone each side. Every rut number below counts this stretch only, not the whole road. Confidence unknown. Source: dashboard/tsenkher/data/data.json length_km, halfwidth_m, label. Length of the OSM line as mapped, in UTM metres, not driven or field measured; the zone follows the line where OSM draws it; the braid envelope can reach past the zone where ruts do.
- Left out of the 500 m zone around the OSM line before any rut is counted: 16%, OSM rivers and residential areas with a 50 m buffer and OSM sand and dunes as drawn. No rut number below covers that ground (21.32 km² left to measure). Confidence unknown. Source: dashboard/tsenkher/data/data.json excluded_share, page.exclude_buffer_m, zones.osm.area_km2. OSM polygons as drawn, not field checked: a river or village OSM does not draw counts as ground, one drawn too wide is left out; gravel banks, village streets and dune ripples look like ruts, so leaving them out keeps false ruts out and real ruts there with them.
- Rut km the detection rules dropped as likely false in the 500 m zone, 2016 and 2026, the first and last clear year, each rule on what the one before kept: slope mask 2.9 and 2.2, contrast floor 11.8 and 24.4, branch floor 2.1 and 0.9, soil check 0.5 and 1.5. Ruts kept: 53.9 and 44.8 km. Confidence 0.30. Source: dashboard/tsenkher/data/data.json years[].slope_dropped_km, contrast_dropped_km, branch_dropped_km, soil_dropped_km, years[].rut_km. Sentinel-2 detection, 10 m pixels, not field checked; rules applied in turn, so the drops are not summed; they drop hillside spurs, low contrast lines, short branches and bare soil that look like ruts, and real ruts there with them.
- Greenness of the 500 m zone, median NDVI, over 9 clear years, 2016 to 2026: 0.623 in 2016, 0.523 in 2026; lowest 0.523 in 2026 (44.8 rut km in the zone), highest 0.634 in 2021 (39.1 rut km). Faint years, left out: 0.463 in 2017 and 0.464 in 2019. Confidence 0.30. Source: dashboard/tsenkher/data/data.json years[].ndvi_background, years[].rut_km. Sentinel-2 detection, 10 m pixels, not field checked; median NDVI of the zone in each summer's picture, greenness seen from space, not grass measured on the ground; lower reads a drier summer, where ruts stand out less from the ground around them, so a dry year's rut km can fall with the picture as well as the ground; faint years left out; one picture a year.
- Clear looks per pixel in the 500 m zone, median, over 9 clear years, 2016 to 2026: 12 in 2016, 24 in 2026; fewest 12 in 2016 (14 scenes), most 30 in 2024 (30 scenes). No clear year under the 0.30 confidence cap. Faint years, left out: 15 in 2017 and 25 in 2019. Confidence unknown. Source: dashboard/tsenkher/data/data.json years[].nobs_median, years[].scenes, years[].confidence, page.confidence_cap. Sentinel-2 summer scenes, one composite a summer, 20 June to 10 September; a look is a scene that saw the pixel clear of cloud and shadow; fewer looks give a noisier picture, so the year's detection confidence is lower, never above the cap; looks are counted from cloud masks, not the ground measured; faint years left out; scenes from 3 archive collections across the years, so a count can move with the archive.
- Summer pictures from 3 archive collections, each a host of the same Copernicus Sentinel-2 L2A product: copernicus-s2-l2a/planetary:sentinel-2-l2a in 2016; copernicus-s2-l2a/earthsearch:sentinel-2-l2a in 2017 and 2022; copernicus-s2-l2a/earthsearch:sentinel-2-c1-l2a in 2018 to 2021 and 2023 to 2026. The first and last clear year, 2016 and 2026, come from different collections. Confidence unknown. Source: dashboard/tsenkher/data/data.json years[].source. Archive names as the year table stores them, one composite a summer; the hosts serve the same product, processed at different times and baselines, so a change between years from different collections can move with the processing as well as the ground; collection names, not the pictures checked.

- Rut detection: red signal (redder, brighter lines of soil on grass); a rut starts where the line response is 5 robust sigmas above the zone median and grows along it down to 2. The detection defaults. Basis: Orkhon defaults (red signal, grassland), kept after a seed sweep (labels/tsenkher/sweep.json) and a step 12 floor sweep (labels/tsenkher/floor.json) on this corridor's blind labels, both passes: no pair or floor beats them on odd and even ids (label.setting_pick); low 1.5 adds up to 29.0 km of 2023 mask and 32.1 km of 2026, and 2026 precision falls from 0.81 and 0.76 to at most 0.58 and 0.65; floor 0.5 adds 2 rut and 4 not points in 2023, 1 rut and 5 not in 2026 (claude-visual-s4); floor 0.9 removes 3 rut points in 2023; blind labels 2023 and 2026 on the class-cost grid scored (labels/tsenkher/score.json). Confidence unknown. Source: dashboard/tsenkher/data/data.json signal, hysteresis, page.hysteresis_note. A setting chosen per corridor, not measured; the sigmas are each year's own picture noise, so the same k finds fainter ruts in a clean picture than a noisy one; a lower k finds more faint ruts and more false ones; settings carried from another road, not checked against labels here, can miss or overcount ruts on this one.
- The braid envelope, one fixed area for all years drawn from the ruts, not the OSM line: 3.94 km², within 1400 m of the OSM line. 0% of it lies outside the 500 m zone around the OSM line (21.32 km²); it covers 19% of that zone. Confidence 0.30. Source: dashboard/tsenkher/data/data.json zones.envelope.area_km2, outside_osm_share, osm_zone_covered_share. Sentinel-2 detection, 10 m pixels, not field checked; envelope: rut pixels within 37 deg of track direction, seen in >= 3 years, chained to the OSM line through gaps <= 30 m, closed 100 m, within 1400 m; drawn from all 11 years, faint ones too; built from the same detections it measures, so it shows where the braids are, not an independent count; OSM rivers, residential areas, sand and dunes excluded.
- Rut km in the braid envelope: 29.0 in 2016, 27.0 in 2026. Confidence 0.30. Source: dashboard/tsenkher/data/data.json years[].envelope.rut_km. Sentinel-2 detection, 10 m pixels, not field checked; faint years left out.
- Rut km in the braid envelope over 9 clear years, 2016 to 2026: lowest 27.0 in 2026, highest 32.9 in 2024. First to last -2.0 km, lowest to highest 5.9 km. The first-to-last change is smaller than the spread: the clear years go up and down between the first and the last. Confidence 0.30. Source: dashboard/tsenkher/data/data.json years[].envelope.rut_km. Sentinel-2 detection, 10 m pixels, not field checked; faint years left out; one picture a year, so the spread holds the picture's noise as well as real change.
- 1.6% of cross-sections carry 3 or more ruts in 2026. Confidence 0.30. Source: dashboard/tsenkher/data/data.json years[].envelope.braided_share. Sentinel-2 detection, 10 m pixels, not field checked.
- Cross-sections with 3 or more ruts over 9 clear years, 2016 to 2026: lowest 0.0% in 2022, highest 2.8% in 2016. First to last -1.2 points, lowest to highest 2.8 points. The first-to-last change is smaller than the spread: the clear years go up and down between the first and the last. Confidence 0.30. Source: dashboard/tsenkher/data/data.json years[].envelope.braided_share. Sentinel-2 detection, 10 m pixels, not field checked; faint years left out; one picture a year, so the spread holds the picture's noise as well as real change.
- Braid width, 90th percentile of cross-sections, first rut to last: 150 m in 2016, 90 m in 2026. Confidence 0.30. Source: dashboard/tsenkher/data/data.json years[].envelope.width_p90_m. Sentinel-2 detection, 10 m pixels, not field checked; one rut reads 10 m, none 0 m; faint years left out.
- Braid width, 90th percentile, over 9 clear years, 2016 to 2026: narrowest 10 m in 2018, widest 150 m in 2016. First to last -60 m, narrowest to widest 140 m. The first-to-last change is smaller than the spread: the clear years go up and down between the first and the last. Confidence 0.30. Source: dashboard/tsenkher/data/data.json years[].envelope.width_p90_m. Sentinel-2 detection, 10 m pixels, not field checked; one rut reads 10 m, none 0 m; faint years left out; one picture a year, so the spread holds the picture's noise as well as real change.
- Parallel ruts per cross-section in the braid envelope, median and 90th percentile: 0.0 and 2.0 in 2016, 0.0 and 2.0 in 2026. Confidence 0.30. Source: dashboard/tsenkher/data/data.json years[].envelope.ruts_median, ruts_p90. Sentinel-2 detection, 10 m pixels, not field checked; ruts closer than about 20 m count as one; a cross-section with no rut counts 0; faint years left out.
- Ruts gone in the braid envelope: 17.6 km seen in 2 or more clear years from 2016 to 2023 and in neither 2025 nor 2026, the last 2 clear years. Confidence 0.30. Source: dashboard/tsenkher/data/data.json history_envelope.recovered_rut_km. Sentinel-2 detection, 10 m pixels, not field checked; gone means no rut detected within 20 m in either last year: grass back, or too faint to see; faint years left out.
- Of the 17.6 km of ruts gone in the braid envelope, 9.5 km lie where grass was green every year (57% of the envelope): there a dry summer cannot make a rut look gone. Confidence 0.30. Source: dashboard/tsenkher/data/data.json green_control.history.envelope.recovered_rut_km. Sentinel-2 detection, 10 m pixels, not field checked; green ground: pixels whose 210 m median NDVI is >= 0.40 in every year 2016-2026; there the counts still rise and fall with greenness, the floor removes dry patches, it does not correct contrast.
- New ruts in the braid envelope by first year seen, seen again the next year: 1.4 km in 2021, 5.1 km in 2022, 1.6 km in 2023, 2.1 km in 2024, 0.7 km in 2025. Only years with a clear picture the year before and after; 2026 has no next picture yet. Confidence 0.30. Source: dashboard/tsenkher/data/data.json history_envelope.new_rut_km_by_year. Sentinel-2 detection, 10 m pixels, not field checked; a rut within 20 m of one seen in any earlier year is not new; faint years and their neighbours left out.
- 1 of 25 one-km stretches is a braiding hotspot. Worst: km 10 to 11, 12% braided, shrinking. Confidence 0.30. Source: dashboard/tsenkher/data/data.json hotspots. Sentinel-2 detection, 10 m pixels, not field checked; hotspot means at least 10% of cross-sections with 3 or more ruts.
- Pasture turned to rut ground: 24.90 ha new, 30.29 ha regained, net -5.39 ha of 2131.95 ha measured (2016-2026). Confidence 0.30. Source: dashboard/tsenkher/data/data.json pasture. Sentinel-2 detection, 10 m pixels, not field checked; greenness check on new rut ground: agrees.
- Greenness on pasture turned to rut ground, median NDVI, 2016, 2018 and 2020 against 2024, 2025 and 2026: new rut ground 0.577 to 0.435, ground never near a rut (control) 0.636 to 0.599; -0.105 beyond the control: agrees, it lost more green than the control. Rut ground regained 0.481 to 0.485, +0.041 beyond the control: agrees, it greened more than the control. Confidence 0.30. Source: dashboard/tsenkher/data/data.json pasture.ndvi. Sentinel-2 detection, 10 m pixels, not field checked; median NDVI on the same pictures, mean over each period's clear years; minus the change on ground never near a rut, which rules out a corridor-wide dry or wet year, not a detection error; NDVI is greenness seen from space, not grass measured on the ground; faint years left out.
- Rut ground in the 2131.95 ha measured over 9 clear years, 2016 to 2026: 145.37 ha (6.8%) in 2016, 108.68 ha (5.1%) in 2026; lowest 90.25 ha in 2025, highest 145.37 ha in 2016. First to last -36.69 ha, lowest to highest 55.12 ha. The first-to-last change is smaller than the spread: the clear years go up and down between the first and the last. Confidence 0.30. Source: dashboard/tsenkher/data/data.json pasture.rut_ha. Sentinel-2 detection, 10 m pixels, not field checked; rut ground is the year's detection mask inside the same measured zone every year; a year's hectares are ground under ruts that summer, not pasture lost that year: the net ha compares periods; faint years left out; one picture a year, so the spread holds the picture's noise as well as real change.
- Sentinel-1 radar on the detected ruts: darker, median -0.39 dB. Confidence unknown. Source: dashboard/tsenkher/data/data.json radar. A check on detection only; it changes no number.
- Recommended track: 23.577 km, 1 river crossing warned. Confidence unknown. Source: dashboard/tsenkher/data/route.json scored. OSM ways and OSM crossing tags, not field checked.

- The OSM route as is takes other ways: 24.875 km against 23.577 km recommended, 7 river crossings warned against 1. No km carries a trace score yet: the recommended track is OSM with fords and crossings with no bridge in OSM slowed, every unpaved track at the same low score. Confidence unknown. Source: dashboard/tsenkher/data/route.json base. OSM ways and OSM crossing tags, not field checked; cost minutes are a routing cost, not an ETA, and are left out.
- Warned river crossing on the recommended track: km 4.912, river Цэцэрлэг гол, ford in OSM, high water Jul, Aug. Confidence 0.30. Source: dashboard/tsenkher/data/route.json crossings.scored, crossings.flow. OSM ways, OSM waterway and crossing tags, not field checked; high water: a month whose 1991 to 2020 mean flow is at least 1.5 times the mean of the 12 monthly means; modelled monthly flow at a model reach, not a gauge; streams are below the model's scale; confidence is the flow model's, the lowest of these crossings, never above the corridor cap; high water now is judged on the page for the reader's month; River flow: GEOGLOWS ECMWF Streamflow Service v2, CC BY 4.0.
- On the recommended track: 0 wetland stretches, 0 sand stretches, 0 passes, 4 water points within 2000 m, 1 marked drinkable in OSM. Confidence unknown. Source: dashboard/tsenkher/data/route.json scored. OSM tags, not field checked; a wetland, sand area, pass or water point OSM does not draw is not here; a well may be dry, broken or locked; DEM heights are a 2010 to 2015 surface model beside OSM's, never mixed.
- Within 2 km of the recommended track, OSM has 2 fuel stations and 16 ger camps. 0 listed. 18 not listed: not matched to an official registration. Confidence unknown. Source: dashboard/tsenkher/data/route.json pois.counts, pois.shown. OSM amenity=fuel, and tourism=camp_site or guest_house with a ger name, not field checked; a place OSM does not draw is not here; business places are published only when matched to an official registration, the rest are counted with no name and no place.
- 83% of rut ground in 2026 lies off a 25 m band along the recommended track; 37% of the track runs on detected ruts. Confidence 0.30. Source: dashboard/tsenkher/data/route.json designate. A recommendation to check with the soum, herders and on the ground before any sign, not a decision. Rut hectares are 10 m satellite pixels and include false positives (see the detection confidence).
- Rut ground off the 25 m band along the recommended track over 9 clear years: 130.09 ha in 2016, 90.35 ha in 2026; lowest 73.14 ha in 2025, highest 130.09 ha in 2016. First to last -39.74 ha, lowest to highest 56.95 ha. The first-to-last change is smaller than the spread: the clear years go up and down between the first and the last. Confidence 0.30. Source: dashboard/tsenkher/data/route.json designate.years[].off_band_ha. A recommendation to check with the soum, herders and on the ground before any sign, not a decision. Rut hectares are 10 m satellite pixels and include false positives (see the detection confidence); the band follows the recommended track of the route day in every year, so the years show where ruts lay against today's line, not which line drivers took then: a baseline for a sign or grading, not a before and after; faint years left out; one picture a year, so the spread holds the picture's noise as well as real change.
- Rain at the corridor by month, mm/day, mean of Jan to Sep 2016 to 2026 (11 years), Oct to Dec 2016 to 2025 (10 years) at one grid cell of 0.5 x 0.625 degrees: wettest Jul 3.49, Aug 2.73, Jun 2.07; driest Jan 0.1. Confidence 0.30. Source: dashboard/tsenkher/data/route.json weather.normals, weather.normal_years. Reanalysis at one grid cell for the whole corridor, not a gauge; rain, not the state of the track: wet ground and high fords are likelier in a wet month, not certain, and a dry month can still flood after one storm; a month's mean over its years, so one wet summer moves it; confidence is the weather source's, never above the corridor cap; the page's weather caveat gives the reader's month; Precipitation: NASA Langley Research Center POWER Project, MERRA-2.
- Verified track km: 0. Confidence unknown. Source: data/steppe/corridors/tsenkher/traces/score.json verified_km. No consented GPS traces yet.

Attribution: Contains modified Copernicus Sentinel data 2016-2026. Sentinel-2 L2A for 2016 hosted by Microsoft Planetary Computer. Sentinel-1 GRD for 2016, 2017, 2018, 2019, 2020, 2021, 2022, 2024, 2025, 2026 hosted by Microsoft Planetary Computer. Track centerline and rivers: (c) OpenStreetMap contributors, ODbL. Copernicus DEM GLO-30. Produced using Copernicus WorldDEM-30 (c) DLR e.V. 2010-2014 and (c) Airbus Defence and Space GmbH 2014-2018, provided under COPERNICUS by the European Union and ESA; all rights reserved.