Appendix H — Wadi Geomorphology

This appendix summarises geomorphological evidence supporting a natural fluvial connection between the Giza Plateau and the Nile floodplain. It outlines the topographic setting, data sources, and morphological analyses of the two primary wadis draining the eastern plateau—Wadi el-Jarf and Wadi Digla—to evaluate whether these corridors could have channelled seasonal flows or facilitated transport to the KVT basin during the mid-Holocene (1–3)**.**

H1. Study Area and Data Sources

Geomorphological analyses in this study were based on previously published datasets and open-access elevation models, focusing on the paleohydrological context of the eastern Giza Plateau and the two principal wadis descending toward the ancient Nile floodplain: Wadi el-Jarf and Wadi Digla (1–3). Fig. H illustrates the drainage network reconstructed from SRTM data, showing natural corridors linking the plateau to the Nile floodplain.

Digital Elevation Models (SRTM, 30 m resolution) were processed and harmonized to derive slope, curvature, and valley-axis profiles; vertical and lateral uncertainty handling follows the procedures reported in Appendix A (4,5).

A series of transects were reconstructed along the valley axes to assess slope gradients, channel morphology, and depositional sequences, enabling comparison between natural erosional features and potential anthropogenic modifications (Fig. H) (1,3). This composite dataset—compiled and reinterpreted for this study—provides a refined basis for reconstructing mid-Holocene drainage dynamics that may have influenced harbor activity and construction logistics at the KVT (1,2,6).

Figure H. Geomorphological Context of the Wadi Corridor Adjacent to the Menkaure Valley Temple

Note: Panel A shows the eastern Giza Plateau based on the AERA orthophoto mosaic, highlighting the wadi descending from the plateau toward the Nile floodplain and intersecting major archaeological zones including Khentkawes Town (KKT), Heit el-Ghurab (HeG), and the Kromer Dump (KRO). Panel B presents a 3-D reconstruction of the same corridor, illustrating the topographic relationship between the MVT, Khentkawes Town, and the inferred drainage pathway along the wadi channel. Together, these views demonstrate how the natural wadi corridor aligns with the recessed façade of the KVT, supporting its potential hydraulic function during mid-Holocene Nile highstands. Adapted from Giza Plateau Mapping Project – 2018 Field Report and Digital Model (3).

H2. Wadi Cross-Sections

Profiles indicate that both wadis possessed wide, shallow channels during the mid-Holocene, facilitating water transport during Nile inundations (1–2, 6).

- Wadi A (North Corridor): average slope 1.7%, channel width ~45 m at 4400 BCE (4–5).
- Wadi B (South Corridor): average slope 2.1%, channel width ~38 m at 4400 BCE (4–5)

Comparative stratigraphic analysis shows incision and reduced channel activity after 3000 BCE, consistent with diminished hydrological connectivity (1–2, 6).

Table H1. Morphometric parameters of wadi cross-sections derived from DEM profiles.

Wadi Corridor	Width (m)	Avg. Slope (%)	Active Period (cal. BCE)	Notes
Wadi A (North)	≈ 45 m	1.7	5000–4200	Direct Nile access
Wadi B (South)	~38	2.1	4800–4300	Seasonal overflow
Both	<20	>3.0	<3000	Reduced flow, dry gullies

H3. Sedimentological Evidence

Published sedimentological surveys of lower wadi channels have reported fluvial gravels and fine silts overlain by aeolian sands (2,6). Radiocarbon-dated plant remains from these buried silts, as compiled by Nicoll, yielded ages clustering between 4600 and 4300 BCE, corroborating active hydrologic transport during this interval (2,6).

- Sample WD-1 (Wadi A, depth 1.8 m): 4460 ± 90 cal. BCE (5).
- Sample WD-2 (Wadi B, depth 2.2 m): 4320 ± 75 cal. BCE (5).

H4. Interpretation

- DEM slope profiles and sedimentary evidence confirm that wadi corridors served as functional channels linking the plateau to the Nile floodplain until ca. 4400 BCE (2,6).
- After ~3000 BCE, aeolian sand infill and channel narrowing indicate progressive aridification, severing reliable connections (2,6).
- These data demonstrate that the wadis provided natural conduits for transporting stone and watercraft to the recessed basins of the KVT and MVT, reinforcing their interpretation as functional harbors rather than purely mortuary facilities (1, 3, 6). Together, these geomorphic observations corroborate the hydraulic framework outlined in Appendix J, linking fluvial connectivity to the engineering design of the valley temples.

H5. Data Processing and Verification

SRTM tiles (30 m resolution) were mosaicked and analyzed in QGIS 3.x under EPSG:4326 (WGS84). Derived metrics (slope, curvature, local relief) were exported for cross-section comparison and validated against AERA mapping (3). All parameters and uncertainty treatments are archived in Supplementary Appendix A (5)**.**

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