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Typo-chronology, photogrammetry and distribution of wells in the AIUla oasis

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INTRODUCTION

Despite the arid climate of AlUla, the earliest sedentary settlement in the wadi dates back to the 1st millennium BC and it has been continuously inhabited up to the present day. Rare and short-duration rainfall forced the inhabitants of the wadi to develop several methods to exploit underground water resources. While the well-known qanat network has been partially studied (Nasif, 1988), there remains a significant lacuna in the understanding of the wells. In this respect, the AlUla Cultural Oasis Project (UCOP) – led by Archaïos, funded and coordinated by the French Agency for AlUla Development (AFALULA), and conducted in partnership with the Royal Commission for AlUla (RCU) –highlighted the importance of the wells. The main objective of the preliminary study was the establishment of a typology and a relative chronology of these wells, based on their lifting devices.



A well in the middle of gardens in AlUla. R. Savignac, 1909

METHODOLOGY

- Comprehensive compilation of literature about the hydraulic structures within the oasis with a special focus on the wells.
- Wells detected by remote sensing using archive aerial/satellite imagery.
- Systematic field survey.
- Topography and photogrammetry of a relevant example (fall 2020).
- Comparisons with other wells from sites such as the Old Town of AlUla, Dadan and Mada'in Saleh but also with regional systems in order to date them.

BIBLIOGRAPHY

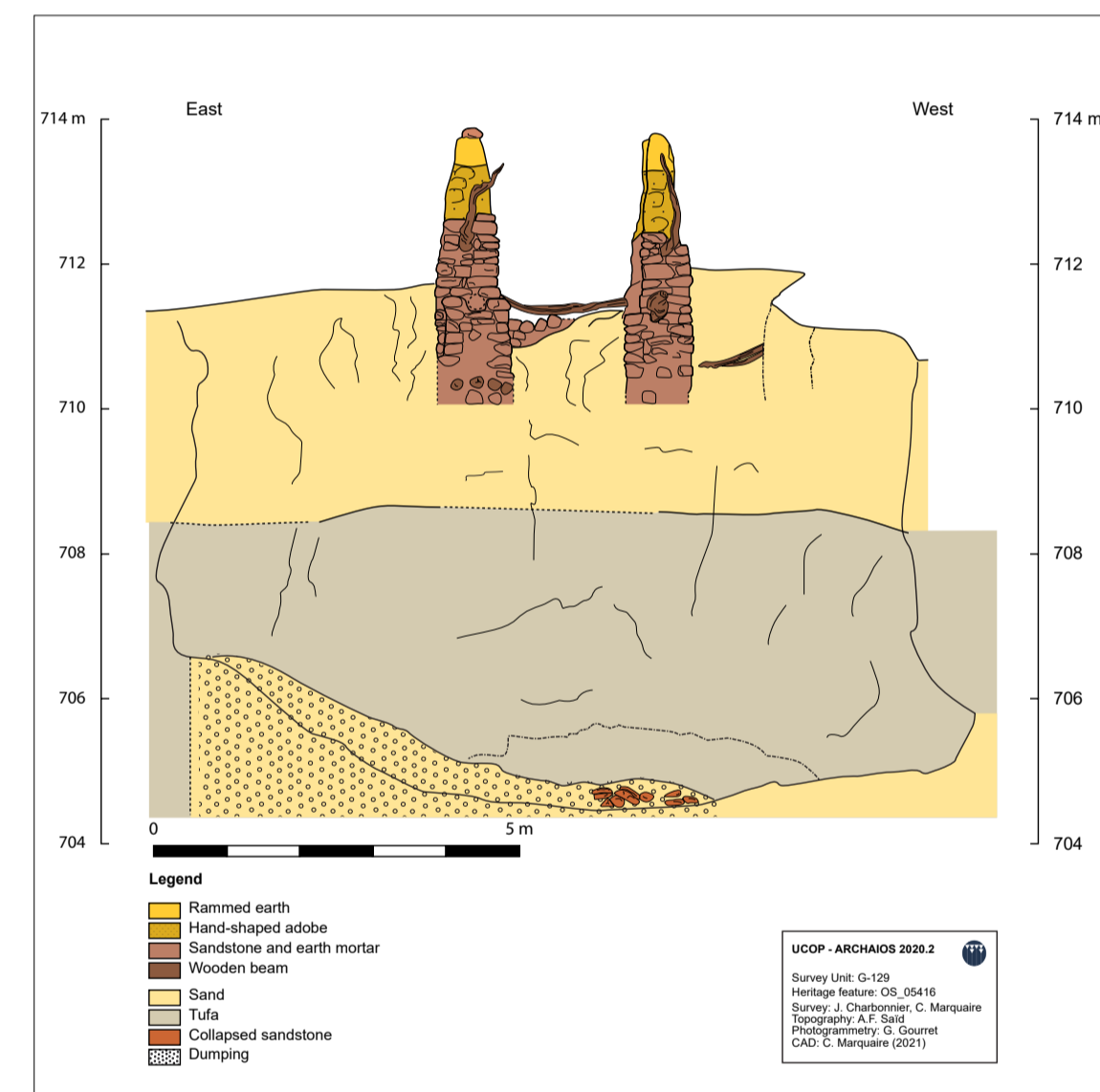
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TYPO-CHRONOLOGY OF THE WELLS

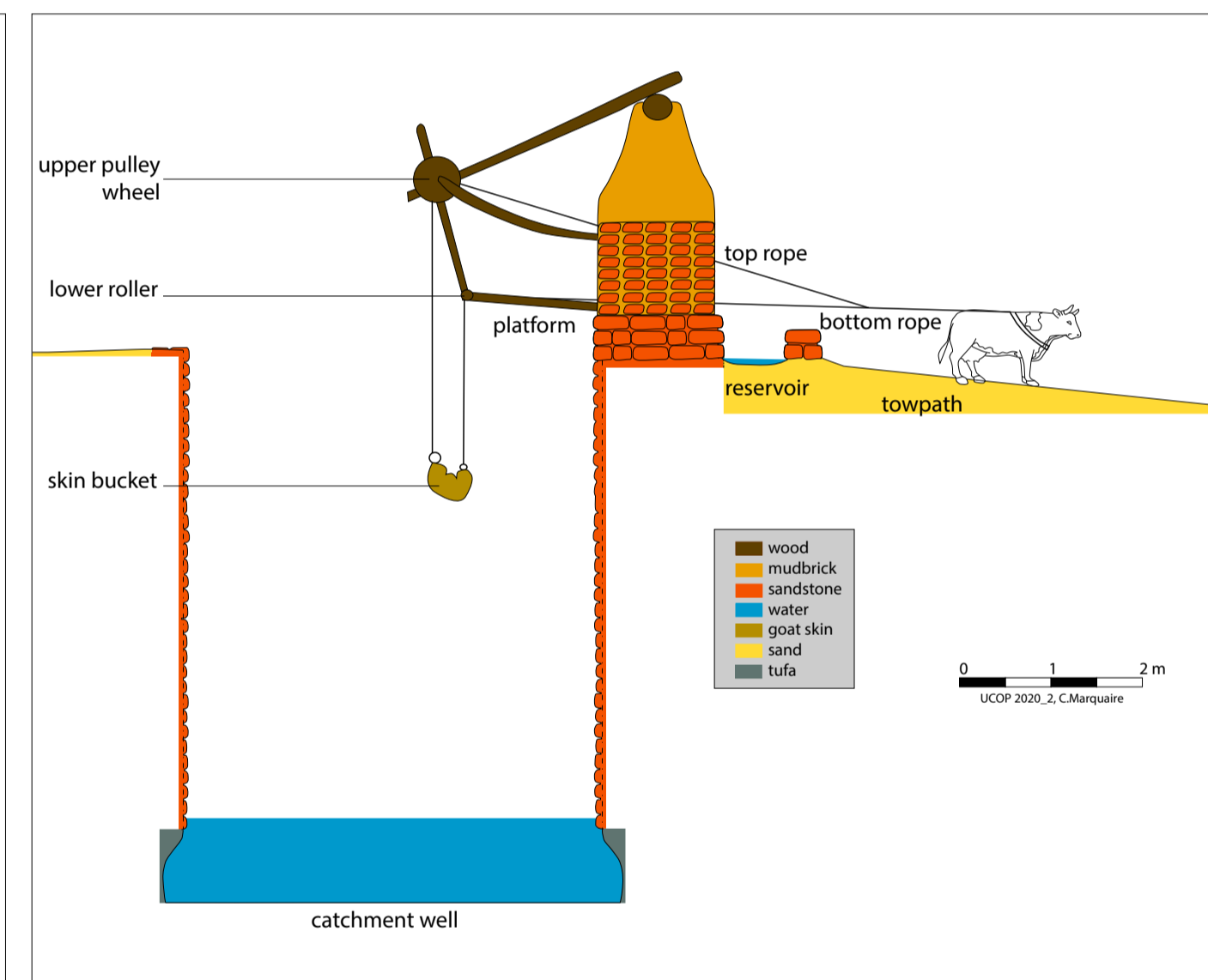
→ 3 major types of wells have been determined within the palmgrove, based on a corpus of 18 structures recorded.

1. Traditional wells

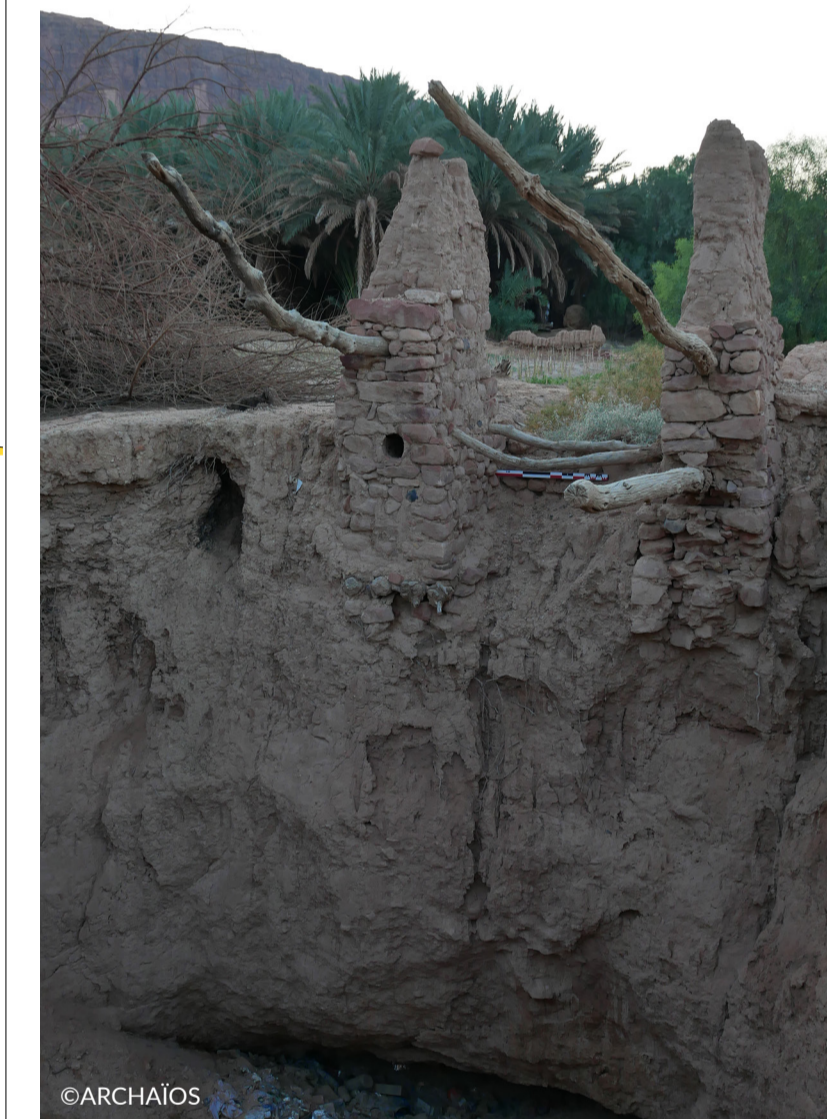
- Agricultural purposes.
- Special lifting device locally called sawani. Bell-shaped pit.
- Mostly 3 to 5 m in diameter and 7 m in depth.
- Dug into the soil or fully lined with dry sandstone masonry.
- Platform advancing above the well maintained by two pillars made of sandstone, earth mortar, mudbricks and rammed earth.
- Pulley system activated by animal traction; oxen or donkeys walking on a towpath.
- Water drained with a goatskin and poured into a basin from which a canal system distributes it to the gardens.
- Wells documented at the turn of the 20th century reflect a long tradition of construction in North Arabia: e.g. Mada'in Saleh (Courbon, 2008), Tayma (Hausleiter and al., 2018), Dumat al-Jandal (Charloux and Loreto, 2010), Boraydah (Doughty, 1888), Thaj (Marquaire, 2017), al-Hinnah (Marquaire, 2017).



Northern side of the well OS_5416, facing South



Schematic section of a traditional well

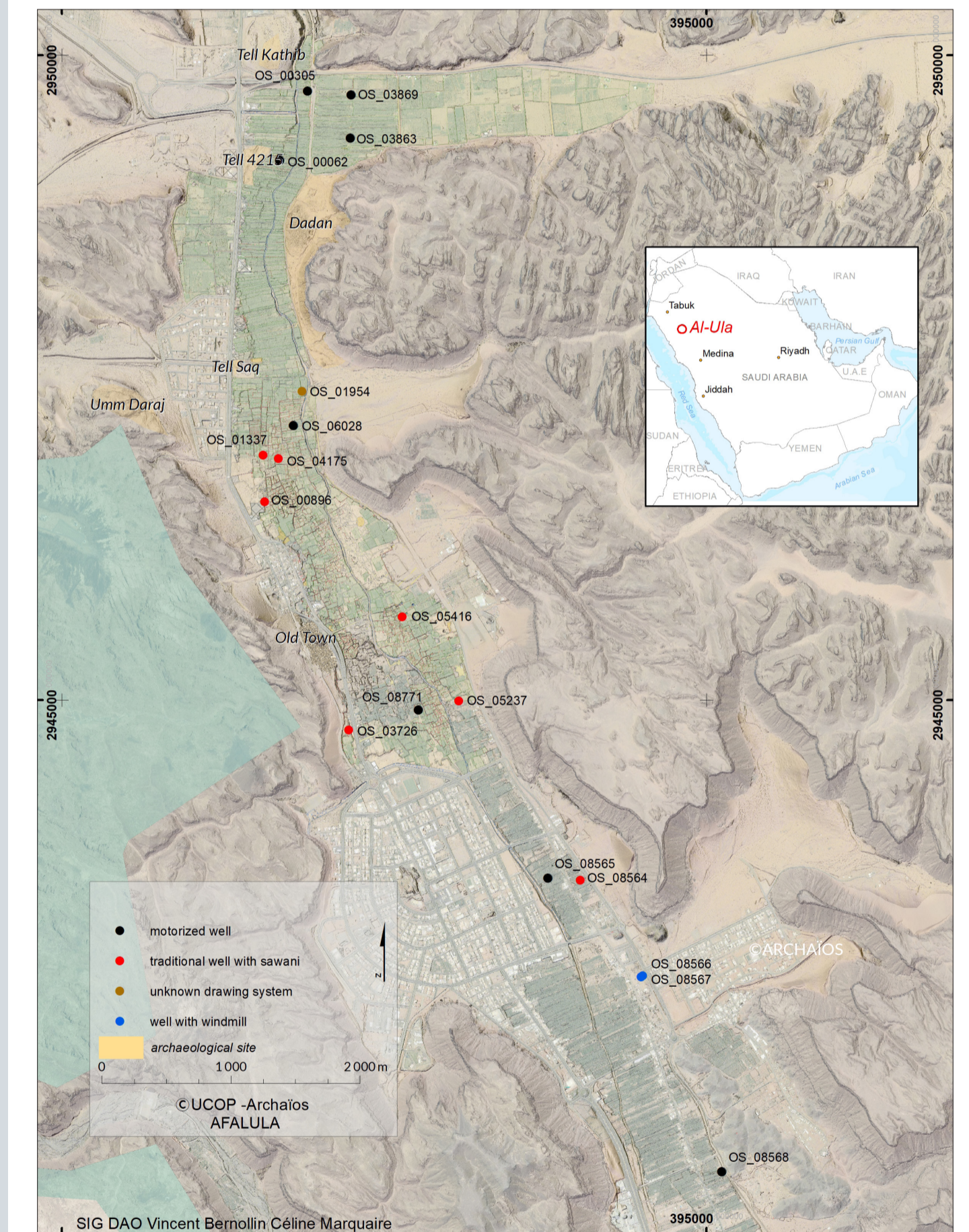


The well OS_05416, looking South

DISTRIBUTION OF THE WELLS

Wells reflect patterns of land use:

- Traditional wells are located mainly in the center of the oasis, where cultivation dates back to the Islamic and Ottoman periods in AlUla.
- Wells in the train station: development of this district dates to the first decade of the 20th century.
- Diesel-powered wells show the extension of the oasis toward the north and the south of the valley during the second quarter of the 20th century.
- All the wells are on the edge of the oasis.
- Today: deep drillings appear in all the cultivated areas of the oasis.



CONCLUSION

The construction of the wells in AlUla spans centuries; they were mainly employed for agricultural purposes, although the qanat systems prevailed as the low number of wells and their distribution in the margins of the oasis indicate. The modern deep drillings can be found all around the oasis, especially to the North, where agriculture is still practiced. Indeed, deep drillings replaced the qanats, which are now abandoned. Our study shows that the introduction of modern materials and techniques had a significant impact on the construction of the wells, as we can see through the several types of devices developed through the ages.

2. Wells activated by windmills

- Public transportation: water drained to the train station cistern.
- Lifting with windmills activating the pumps.
- Between 1,5 and 2 m in diameter and 9 to 13 m in depth.
- Fully lined with regular small sandstone blocks and cement mortar; metallic stairs used for maintenance.
- Construction of the Hejaz railway: from 1900 to 1908
- Railway abandoned and dismantled in 1924.



The well of the train station, looking East; remains of its windmill.

3. Wells activated by diesel motors

- Agricultural purposes.
- Diesel-powered motors, made by Black and Co (imported from UK), produced from 1929 to 1937.
- Pumps placed around 7 m above the water level and linked to the motor by a belt.
- Water drained into a basin then canals lead to the gardens
- Motorization of the wells common in the 20th century over the Northern Arabia: same system with machine rooms in Thaj (Marquaire, 2017) and Mada'in Saleh (Courbon, 2008).



The well OS_08568 from the lower machine room, looking north. We can see the reused rails in the pit to support the pumps but also as lintel for the openings.