Bat Archaeological Project
Preliminary Report of the 2019-2020 Season

by

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Executive Summary

The Bat Archaeological Project conducted its 2020 season of excavations and survey from 4 December 2019 - 27 January 2020. Our research concentrated on three specific areas: 1) archaeological survey between the Bat towers and surrounding the proposed visitor's center site; 2) excavations of Umm an-Nar period houses at the Settlement Slope and at Rakhat al-Madrh (رخة المدره / Bat South); and 3) artifact and landscape analyses.

The area surveyed specifically to alert the MHC of any cultural resources within a proposed location for the Visitors Center yielded few results, as an active farm and wellhead were situated within the proposed footprint. The MHC immediately took these findings under advisement and their plans have proceeded.

Intensive archaeological survey was conducted on the Settlement Slope, around the Bronze Age tower "al-Qa'a" and at Rakhat al-Madrh before beginning excavations. Together, the survey resulted in the documentation of almost 200 previously unrecorded sites. Excavations at the Settlement Slope uncovered an Umm an-Nar period house rich in ceramic artifacts that date the structure's occupation to the ca. 2200 BCE. Several samples of carbon were collected and will be tested to date the house.

Another structure was excavated at Rakhat al-Madrh, located approximately 8 km southeast of Bat. There are at least four houses all placed around an ancient water catchment area. One structure at the site was excavated, revealing an Umm an-Nar period house built with mudbrick walls atop a stone foundation. Ceramics and shell beads were found within the house which is comprised of long, narrow rooms and a central courtyard. The house excavations at both the Settlement Slope and Rakhat al-Madrh are helping us understand the diversity of places and ecologies in which people lived in Bronze Age Oman.

Several artifact and landscape analyses were also conducted at Bat this year. We are developing a new ceramic chronology for the Umm an-Nar period. A study of the lithics excavated and collected at Bat since 2007 was also conducted by Dr. Petranka Nedelcheva, a stone tool specialist, to better understand the development of lithic technology in northern Oman. This winter's rains also allowed for a survey of plants growing around Bat's archaeology to help us better envision what the site might have looked like 5,000 years ago. Finally, a survey of the status of many of the northern towers was conducted. We deeply appreciate the Ministry of Heritage and Culture's continued support of our research.

Acknowledgments

We would like to thank His Excellency Undersecretary for Heritage Affairs Mr. Salim bin Mohammed Al-Mahruqi, Director General of Archaeology and Museums Mr. Sultan bin Saif Al-Bakri, Director of World Heritage Sites Mr. Sultan al Maqbali, Director of Excavations and Collections Mr. Khamis al-Asmi, Mr. Mohammed al-Waili, Mr. Ibrahim al-Maqbali, Ms. Samia al-Asmi, and all the staff members of the Department of Excavations and Archaeological Studies, the Ministry of Heritage and Culture, Sultanate of Oman, for their wonderful support to our mission.

We are also grateful to local staff members working in the field and offices, particularly to Ministry of Heritage and Culture Representatives at Bat and Mr. Suleiman al-Jabri in particular.

Our project was financially supported by the Omani Ministry of Heritage and Culture, a grant from the Penn Museum Directors Fund to Dr. Jennifer Swerida, a research grant from the New York University Abu Dhabi Institute's Humanities Research Fellowship, and a generous donor to the Center for the Study of Human Origins at NYU. The botanical survey was completed with assistance from Dr. Vanessa Handley of the University of California Botanical Garden at Berkeley. Special thanks are also due to Ms. Reilly Jensen and Dr. Christopher Thornton for tireless efforts.

1. Introduction

Jennifer L. Swerida, Eli N. Dollarhide, & Charlotte M. Cable

1.1 Bat Archaeological Project (BAP)

The Bat Archaeological Project (BAP) began in 2007 under the direction of the late Professor Gregory L. Possehl. The first six seasons (2007-2012) focused in part on survey and excavation of the towers in and around Bat, focusing particularly on Kasr Al-Khafaji (Tower 1146), Matariya (Tower 1147), and Tower 1156 (Cable 2018; Mortimer & Thornton 2018; Thornton et al. 2016). The project joined forces for several seasons with the Japanese Team headed by Dr. Yasuhisa Kondo (Research Institute for Humanity and Nature, Japan) in what was known as the American-Japanese Bat Archaeological Project (AJBAP). Several field and study seasons followed with a new focus on third millennium BCE settlement and agriculture and resulted in the completion of three new PhD dissertations on the research at Bat.

Now in its 14th season, the Bat Archaeological Project (Penn Museum) continues its focus on the development of complex societies in the Greater Bat Area. This season continues the shift in scale begun in 2019 that encompasses not only the well-studied towers, tombs, and Settlement Slope, but also paying greater attention to the areas that lie between them in order to understand Bronze Age subsistence practices, sociopolitical organization, and regional patterns of production and exchange.

To this end, the project conducted surveys and excavations in the Bat heartland, in the southern quadrant of the UNESCO World Heritage Site at Bat, as well as in the area of the recently discovered satellite settlement of Rakhat al-Madrh in the Wadi Sharsah. In addition, BAP has assisted the MHC by providing technical expertise in several areas:

- Identification of areas for further study in the face of modern development;
- Providing feedback on the ongoing Visitor Center plans;
- Identifying areas for protection;
- Develop tourism and outreach.

1.2 Research programs of the 2019-2020 season

The 2019-2020 season of the Bat Archaeological Project commenced on 1 December 2019 and ended on 31 January 2020. Research focused on two areas: first, at the south end of the UNESCO zone, a 23 ha area bounded by five third millennium towers and the Settlement Slope; and the second, 7 km to the east at the satellite settlement of Rakhat al-Madrh (Figure 1). In addition the Ministry of Heritage and Culture requested preliminary survey of a third area, just southeast of the Wahrah-Al-Ayn road, that is the proposed location of the Bat Visitor Center. The eight-week season was dedicated to eight goals:

(1) to quantify artifact density variation and periodization;
(2) to reassess the locations and dates of and relationships between archaeological features in the study areas;

(3) to compare third-millennium settlement architecture and contexts between locations within the Bat heartland and between locations inside and outside of the Bat oasis;
(4) to document the modern plantlife in the area;
(5) to overview the lithic and ceramic assemblages collected since 2007;
(6) to begin ethnographic study of the ʻaflaj and other water management systems;
(7) update our understanding of towers in northern Oman;
(8) to use these new data to inform site management.

1.2.1 Survey

The Bat site surveys were coordinated by Dr. Charlotte Cable and Dr. Eli Dollarhide. Intensive archaeological survey was conducted in:

- The area of Matariya, the Settlement Slope, and al-Qa'a wadi between 11 December 2019 and 12 January 2020;
- The area of Rakhat al-Madrh between 16 December and 19 December 2019;
- The area of the proposed Visitor Center on 22 December 2019.

1.2.2 Excavations

Archaeological excavations were coordinated by Dr. Jennifer Swerida and Dr. Eli Dollarhide. Based on results of the intensive surveys carried out in 2017 and 2019, two areas of excavation were opened:

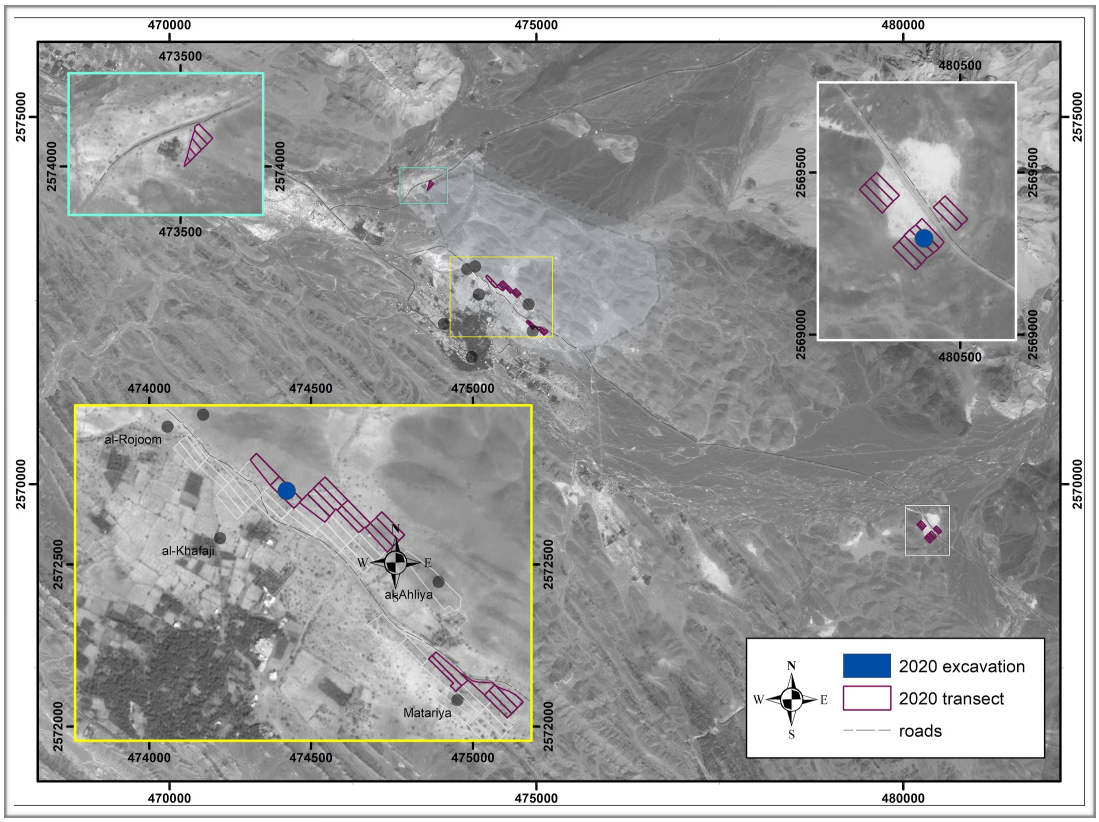

Figure 1. BAP's 2019-2020 survey area and excavations. Insets: teal (Visitor Center); yellow (UNESCO), showing the location of excavations headed by Dr. Swerida; white (Rakhat al-Madrh), showing the location of excavations headed by Dr. Dollarhide.

- On the northeast area of the Settlement Slope: Trenches 561937, 561937b, and 561862a, aimed to identify dating and Umm an-Nar occupational practices;
- At Rakhat al-Madrh, located in the Wadi Sharsah (7.5km southeast of modern Bat), to date the site's primary occupation, better understand its relationship with Bat, and investigate the Bronze Age water management practices in this area.

1.2.3 **Other Activities**

Chapters 5 and 6 describe the materials identified this season (Chapter 5) and three specialist projects: survey of the northern Bronze Age towers (6.1); modern botanical identification at Bat (6.2), and a preliminary study of 'aflaj management practices (6.3). In addition to providing results of the Visitor Center survey, Chapter 7 introduces a new project focusing on community archaeology and student engagement and also reports some of the outreach activities conducted at Bat. Chapter 8 provides an overview of the Season's results and proposes research for the following seasons.

1.2.4 **BAP team members**

BAP's research programs this season involved the following members:

Co-directors
Dr. Jennifer L. Swerida, Penn Museum, USA
Dr. Eli N. Dollarhide, New York University Abu Dhabi, UAE
Dr. Charlotte M. Cable, University of New England, Australia

Consulting director emeritus
Dr. Christopher P. Thornton, Penn Museum, USA

Survey & excavation team
Ms. Maria Kia Ofelia Da Silva, University of Pennsylvania, USA
Ms. Sophie Walsh, University of Pennsylvania, USA
Mr. Berj Wannessian, American University of Beirut, Lebanon
Mr. Mina Megalla, Independent Researcher, Egypt
Ms. Josephine Schmollinger, University of Pennsylvania, USA
Mrs. Cindy Srnka, University of Pennsylvania, USA
Mr. Evan Curtis Charles Hall, University of Pennsylvania, USA
Ms. Marya Soubra, American University of Beirut, Lebanon
Mr. Nathan Azar, American University of Beirut, Lebanon

Specialists
Ms. Reilly Jensen, SWCA, USA – Archaeological illustrator and photographer
Dr. Petranka Nedelch, New Bulgarian University, Bulgaria – Lithicist
Ms. Akudo Ejelonu, University of Pennsylvania, USA – Graduate student/ethnographer
Mr. Gideon Dollarhide, University of California-Berkeley, USA – Botanist
Dr. Gemma Tulley, University of Cambridge, UK – Community archaeologist

2. Archaeological Survey

Charlotte M. Cable

2.1 Introduction

This is the second season of intensive archaeological survey at Bat. In the BAP 2018-19 season thirty-nine transects (ca. 10.25 ha) were surveyed and 218 features documented (Cable, Swerida, and Dollarhide 2019). In this 2020 season, surveys both built on the previous year's work and expanded it to include new areas (Figure 2). Research continued around Matariya and the southeastern end of the Settlement Slope, but also expanded to include an in-depth study of Rakhat al-Madrh (Bat South). In addition, discussions with the Ministry of Heritage & Culture led to inclusion of survey areas in the northwestern end of the UNESCO site to identify archaeological remains in a proposed location for the Visitor Center (VC; see the teal inset in Figure 2). Results of the VC survey are discussed in Section 7.1 below.

2.2 Methods

In order to integrate previous and new survey results in the Bat area a 25 x 100 meter grid oriented -45.56 degrees off of true north was laid down over the survey area. Previous excavation grids as well as the 2019 season's survey grids were independent from each other. Each grid was established for a purpose specific to the research at hand and orientations and datums differed for each. The grid system established for the 2020 season effectively unifies the entire area. It therefore has the added benefits of being extendable in any direction and incorporating other independent stand-alone grids, should the need arise.

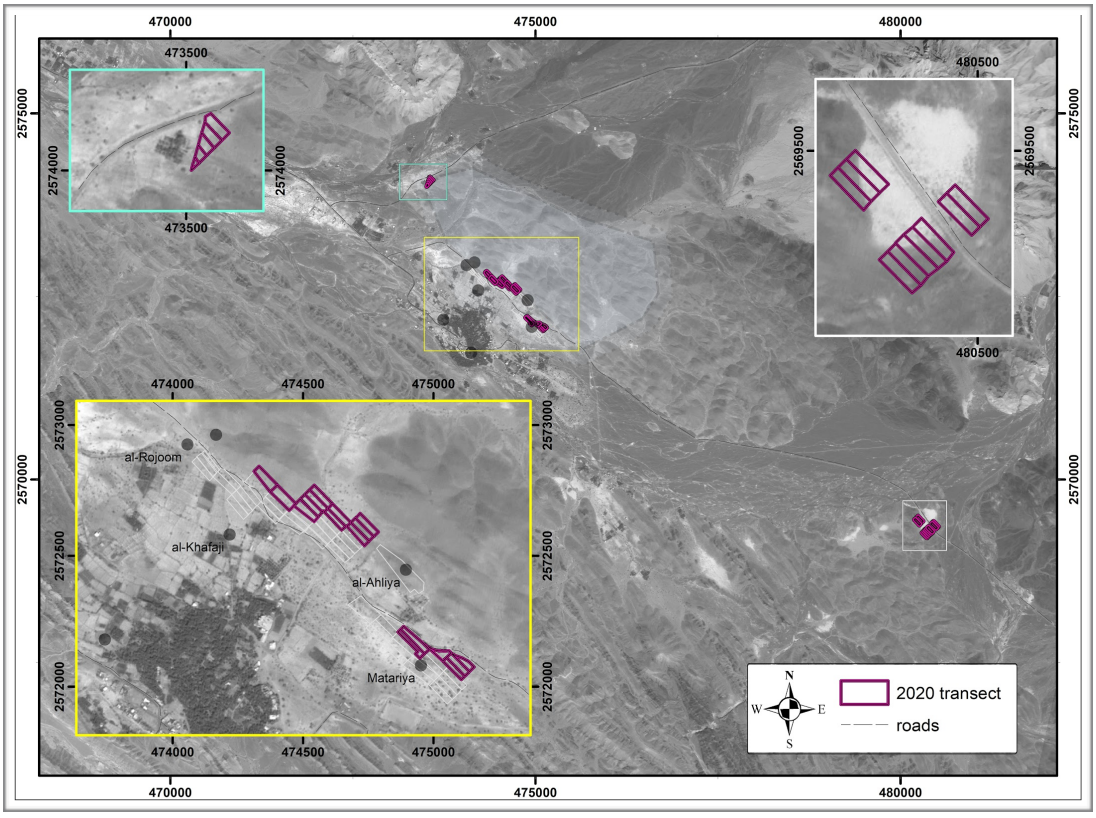

Figure 2. BAP's 2019-2020 transects and survey areas: teal (Visitor Center; VC); yellow (UNESCO); white (Rakhat al-Madrh; RaM).

Following the previous season, transects and features were assigned individual "lot" numbers with the project season prefix (20) plus a unique number—for example, 200532. Transects, features, and diagnostic artifacts were mapped by means of a stand-alone GPS receiver (Garmin eTrex x20), while basic metadata were assigned to points using a handheld data collector (Trimble Juno 3B). Coordinates, when mentioned, refer to the UTM projection (40Q) using the WGS 1984 (WKID 32640).

This grid system was then used to define pedestrian survey transects 25 m wide and 100 m long. Assuming no ground cover and a one-meter sweep radius, lines walked at ca. 5 meter intervals oriented along the long axis provide a minimum coverage of at least 40%. On the first walk-through diagnostic finds and features were flagged while non-diagnostic finds were left in situ and recorded as counts. The coordinates for diagnostic finds were then taken and the associated find(s) collected in order to identify spatial finds trends within each transect. Features within each transect were then documented using a standard form developed by the project in 2007, so that they can easily be integrated with the previous years' survey and excavation data. The transect itself was documented using that same form, with finds data, geomorphological, and landscape characteristics documented alongside archaeological data. These paper forms were later digitized. The spatial and non-spatial data sets are in the process of being integrated in a GIS.

A MavicPro drone collected overhead imagery of key survey and excavation locations. Special attention was paid to: the Settlement Slope; al-Ahliya; al-Rojoom; Matariya and the enclosure (1167); and Rakhat al-Madrh. Although there is little to no obscuring ground cover, overhead imagery allowed us to document areas such as al-Ahliya tower, which is both difficult to access in rugged terrain and even more difficult to see as a whole in spite of its many parts visible on the ground. Drone imagery also proved useful in identifying patterns related to soil moisture content, and thus identify a large structure without the need to excavate it in its entirety.

2.3 Results

Thirty-two transects were undertaken within the study area (Figure 3; Appendix 9.1), amounting to ca. 7.25 ha and 167 features documented.

2.3.1 Transects

Aggregate finds were associated with transects from background scatters and features located within those transects. Compared to previous seasons the finds overall were fewer, however those that were identified this season are of considerable usefulness and their distributions varied considerably. While lithics were somewhat ubiquitous, ceramic counts varied considerably across space, with the majority concentrated on the Settlement Slope, as expected (Figure 4).

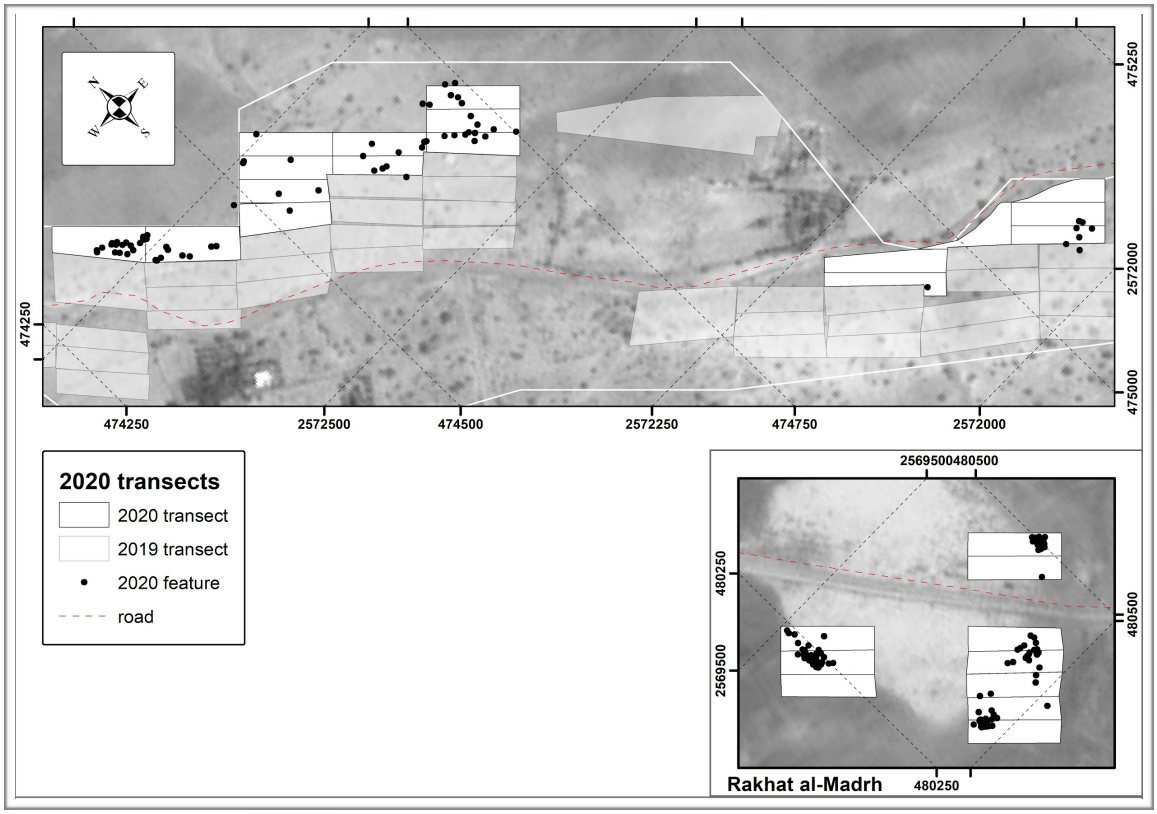

Figure 3. BAP's 2019-2020 transects in the UNESCO and Rakhat al-Madrh (RaM) areas showing feature distributions.

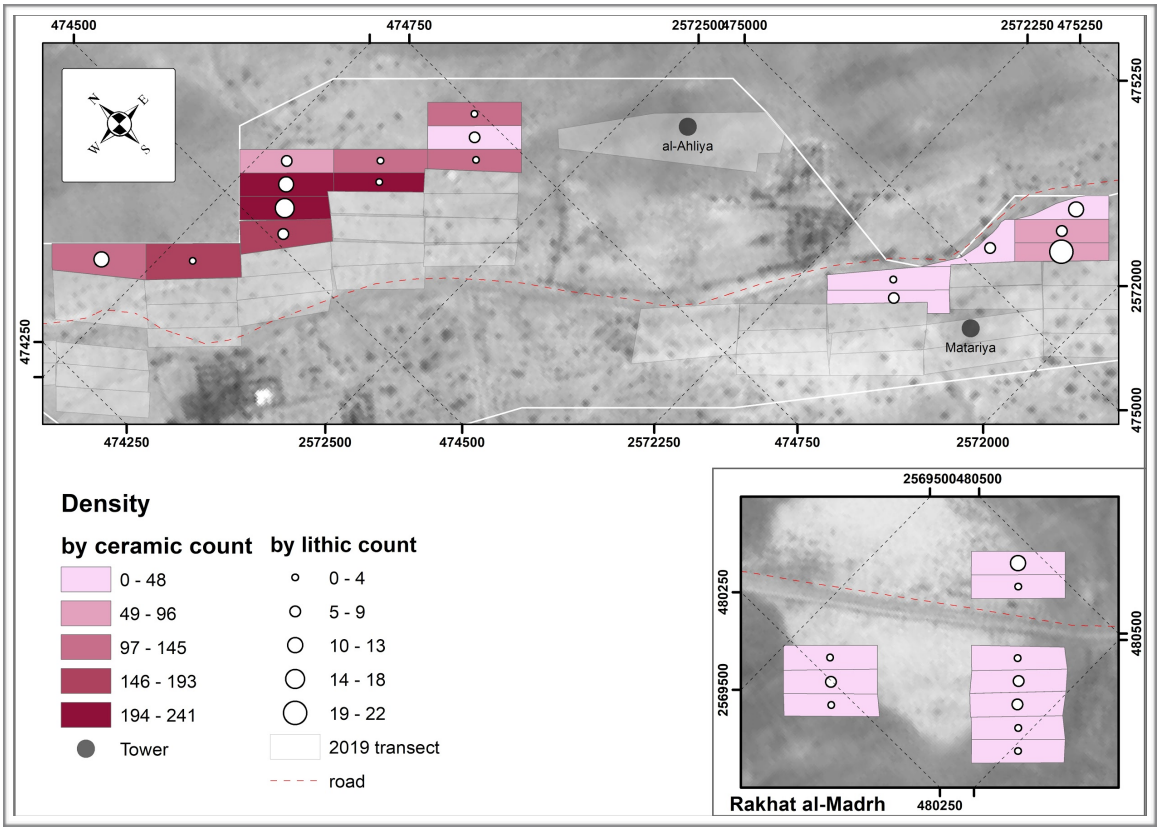

Figure 4. Lithic and ceramic densities by transect. Categories are displayed by equal intervals.

Drilling down into the diagnostic ceramics and their associated periods, it is clear that certain areas were used with lesser or greater frequency (Figure 5). In particular, Rakhat al-Madrh is primarily represented by Bronze Age ceramics; the Matariya area has a stronger Islamic period signature; and the Settlement Slope ceramics consisted of a mix of Bronze Age and Islamic period materials. Meanwhile, the Iron Age period is unevenly present in each major area of the site but only in relatively small numbers. As Figure 6 makes clear, nearly all of the Bronze Age ceramics were dated to the Umm an-Nar period, while Wadi Sûq ceramics were only present as a single sherd found in the al-Qa'a area between the Settlement Slope and al-Ahliya tower.

The paucity of Wadi Sûq ceramics is followed by a similarly low number of Iron Age materials, with no Late Pre-Islamic ceramics identified at all (Figure 7). As is clear when comparing the overall Iron Age-Late Pre-Islamic materials (in lavender shades) to the sub-period frequencies (in shades of red), the majority of ceramics could only be tied generally to the Iron Age-Late Pre-Islamic. No Iron Age ceramics were identified at Rakhat al-Madrh and only a few were found in the Matariya area. One large, late IA storage jar sherd with snake appliqué was unique this season. However, other sherds of this type were identified during excavations of the Matariya tower (Cable 2016, fig. 4.8; Thornton & Ghazal 2016, fig. 9.12 (Lot 100802)), and may therefore tie the surface find to stratified deposits. The greatest number of Iron Age ceramics were found at the Settlement Slope and to the southeast toward al-Ahliya, but their combined counts still well below 30 sherds.

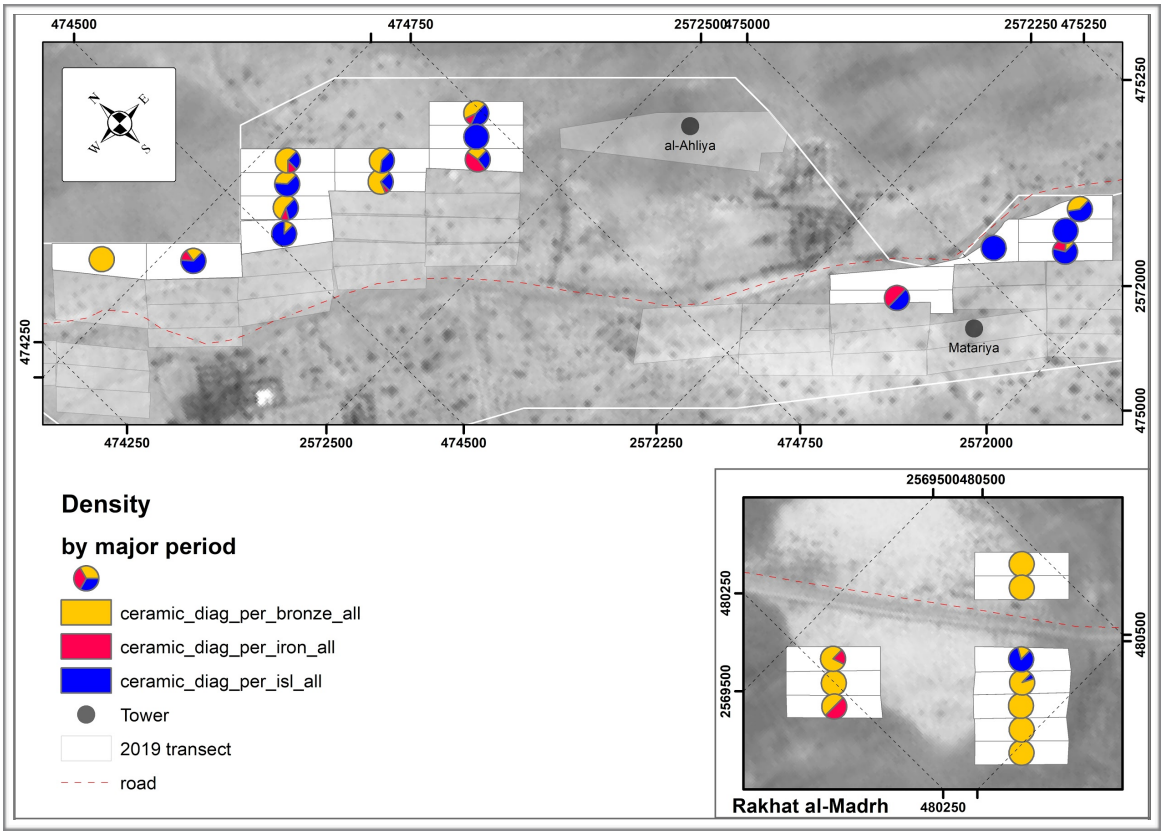

Figure 5. Distribution of diagnostic ceramics relative to major period.

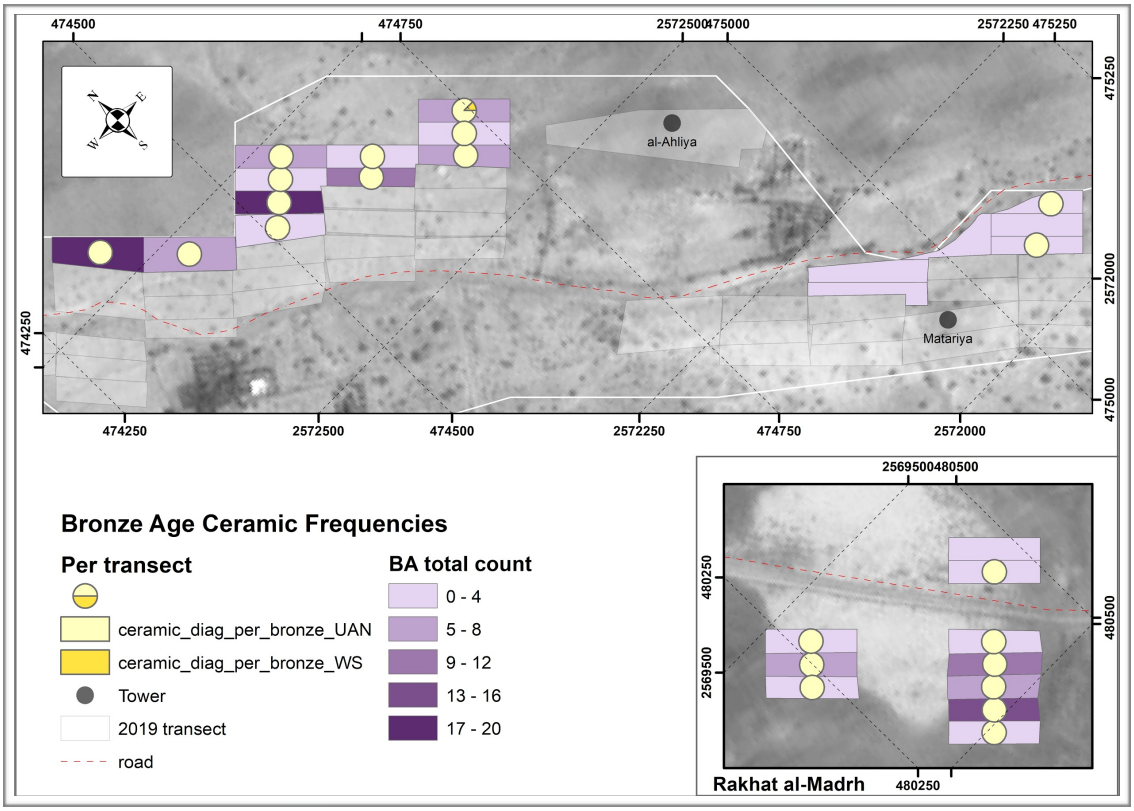

Figure 6. Frequency of Bronze Age ceramics per transect, broken down into sub-phases (Umm an-Nar and Wadi Sûq).

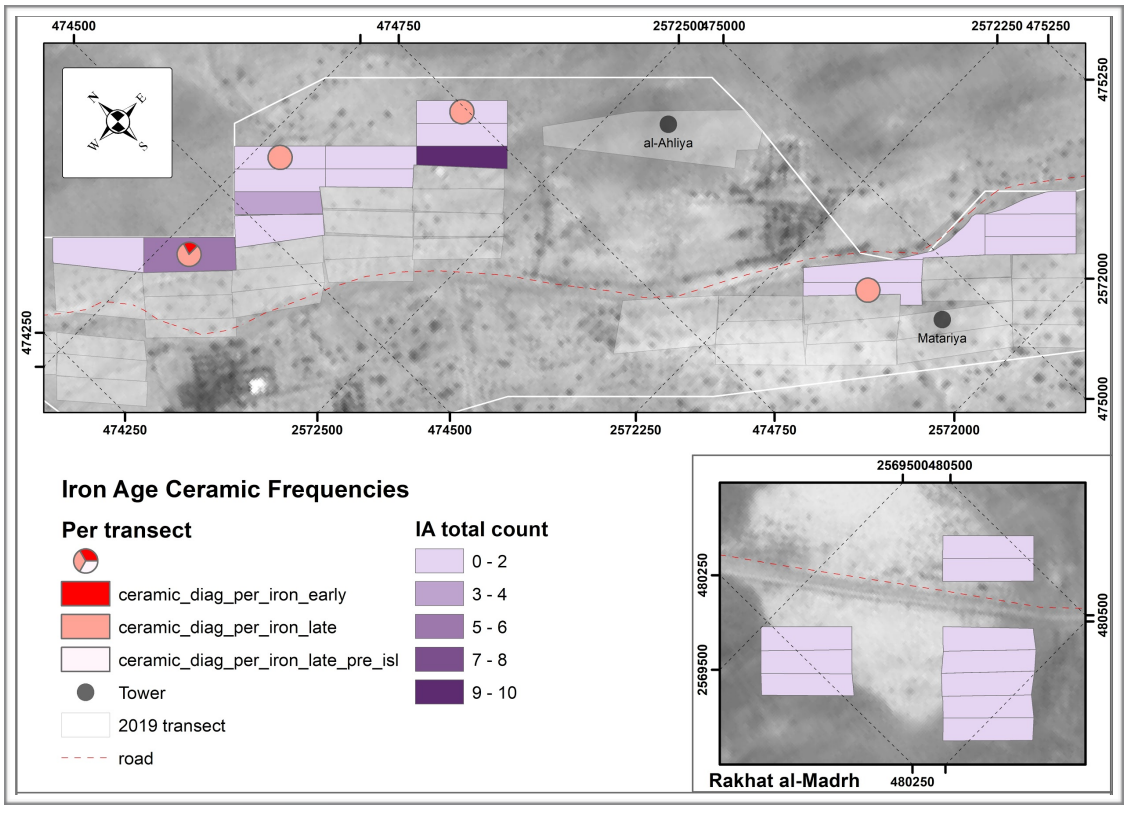

Figure 7. Frequency of Iron Age and Late Pre-Islamic ceramics per transect, broken down into sub-phases (Early Iron Age, Late Iron Age, and Late Pre-Islamic).

The Islamic period ceramics are somewhat ubiquitous across the site, as is evident in the overall Islamic period counts, with the strongest signatures located in the southern Settlement Slope transects (Figure 8). Although most of the ceramics were either Late Islamic or identifiable only to generally to the Islamic period the southern Settlement Slope transects contained ceramics dating to all three sub-phases. This indicates that while other areas may have been abandoned, the Settlement Slope was used more consistently.

2.3.2 **Features**

This season we documented 167 features, of which only 74 (44%) were identifiable to one or more time periods (Figure 9). Of the features that were identifiable to one or more periods 57 were datable to the Bronze Age — accounting for a significant percent (77%) of the identifiable features (Table 1; Figure 9; Appendix 9.2). This is consistent with the data from the previous season.

Table 1: Features by Period

Period	Number of Features
Bronze Age	57
Iron Age	14
Islamic Period	7
Modern	2
Unknown	87
Total	**167**

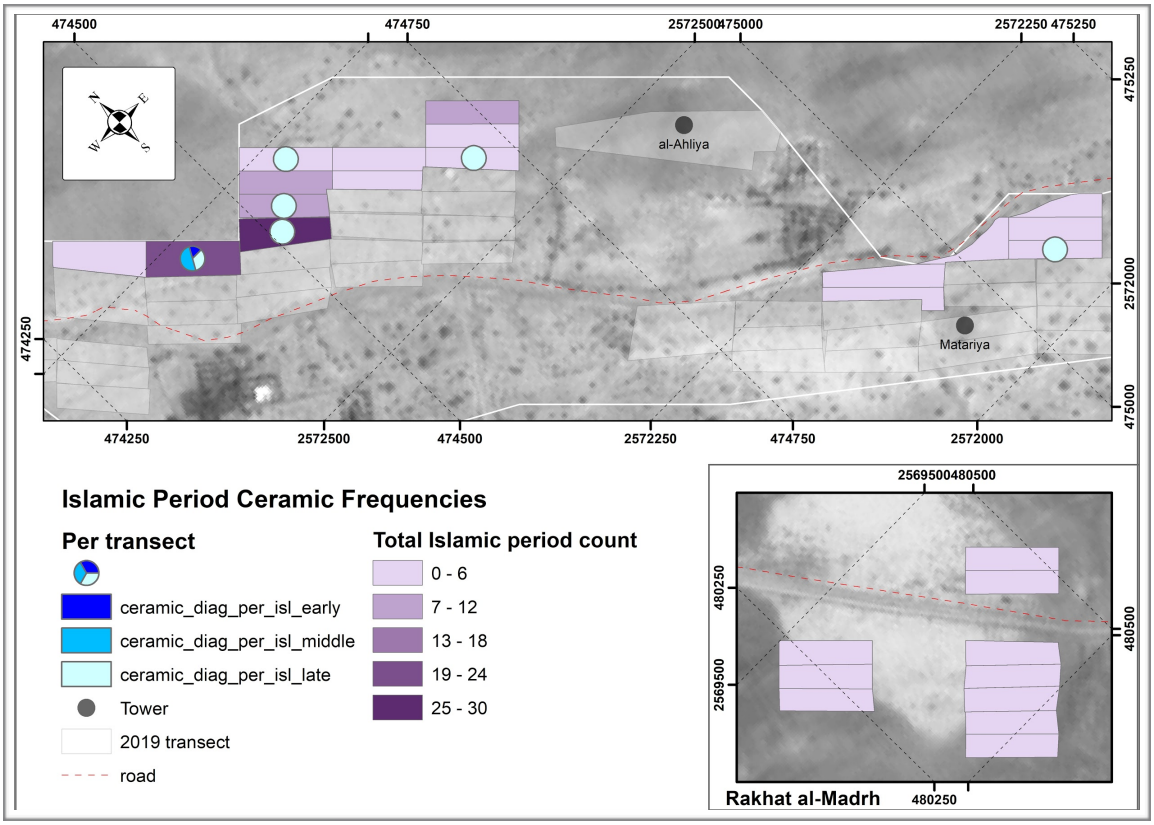

Figure 8. Frequency of Iron Age and Late Pre-Islamic ceramics per transect, broken down into sub-phases (Early Iron Age, Late Iron Age, and Late Pre-Islamic).

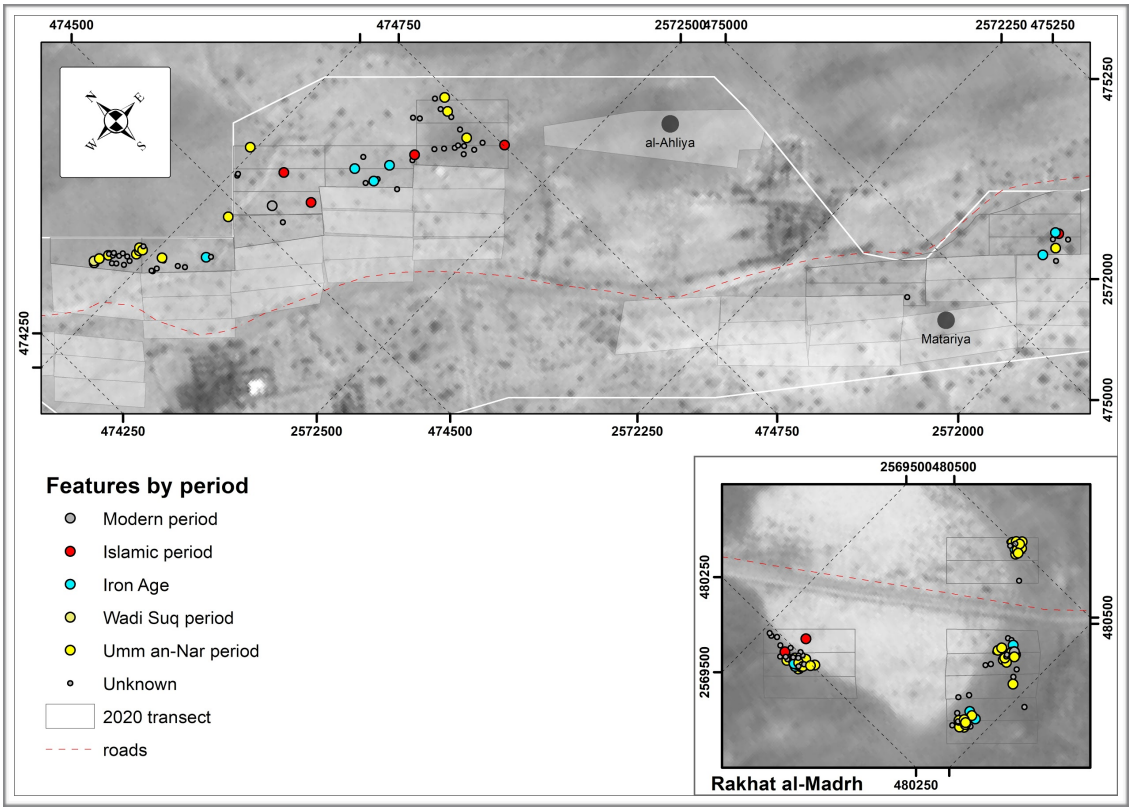

Figure 9. Features documented in the 2019-2020 season and their dates, if identified.

Bronze Age features tend to be located just above or at the edge of the current alluvial fill levels — visible in the maps as the light grey areas. As is evident from the distribution of Iron Age and Islamic period ceramics, features dated to the later periods may also be located alongside (or rather, on top of) the Bronze Age deposits on the lower hillsides. However, features located on the alluvial fill deposits— that is, on the alluvial plains — are much more likely to date to later periods (indicated in Figure 9 as teal, red, and grey). The exception to this pattern at first glance is near Matariya (itself a Bronze Age feature). This suggests that to the east of Matariya, the current alluvial plain is relatively shallow.

Building on results from previous seasons, further non-invasive studies were undertaken in the surveyed areas. Low-elevation drone photography was used to document changes to the natural landscape over the course of the the field season. Archaeological site detection is a continually developing method of inquiry, but it has long been known that differences in the landscape that are invisible (or at least uninterpretable) from the ground may yet contain evidence of ancient land use (e.g., Beck et al. 2007; Cowley et al. 2010). The 2019 BAP excavations at feature 1167 identified a section of mudbrick wall a mere 20 cm below the modern surface and just below the level of the Umm an-Nar stone foundation identified as 1167a (Cable et al. 2019; Cable et al. 2020; Frifelt 1989). Based on those results a series of low-elevation aerial photographs were taken of the feature at sunrise and sunset over a course of four days and following the rains of December 4-5, 2019. The images clearly show rectilinear features beneath the Umm an-Nar wall (Figure 10).

Figure 10. Feature 1167 from above. Note the changes in soil hue bound by the Umm an-Nar stone walls.

Drone photography was also used to document visible archaeological features such as al-Ahliya tower. Images of the tower, which was documented by total station in 2014 (Cable and Thornton 2014), can now be georectified as baseline documentation in preparation for further research at al-Ahliya.

Finally, our MHC Representative, Ms Asma bint Rashid al-Jassasi, identified a hearth feature (lot numbers 200076 - 200078) in an erosion cut during our pedestrian survey of the Settlement Slope. The documentation and sampling of this feature is described in Section 3.

3. Settlement Slope Excavations

Jennifer L. Swerida

3.1 Introduction

Excavations on the Settlement Slope began on 30 December 2019 and concluded on 16 January 2020. Three contiguous trenches were excavated at the eastern end of the Settlement Slope hillside in an area where stone architecture had been identified during the BAP 2019 survey—Structure SS12. Excavations were carried out with the goals of:

- Identifying the date of the architecture;
- Evaluating the state of preservation for archaeological contexts on the Settlement Slope hillside;
- Clarifying 3rd millennium settlement practices;
- Comparing settlement contexts from the eastern end of the Settlement Slope hill with those previously excavated at the western end of the hill.

Excavations revealed the southwestern portion of a stone, rectilinear structure and some preserved contexts within and south of the building.

3.2 Methodology

Trenches were assigned unique "trench" numbers with a prefix (56-) taken from the published 5 x 5 m grid previously established across the entirety of the Settlement Slope followed by a unique number—for example, Trench 561937. As the grid is aligned with the sloping terrain, each grid square was bisected east-west to create 2.5 x 5 m trenches stepping up the hillside. The southern trench in each grid square was given the suffix "a" and the northern trench was given the suffix "b"—for example, Trench 561937a is immediately south of Trench 561937b. The locations of each trench and the excavated contexts within them were recorded on paper forms and in digital records.

During excavation, all Settlement Slope contexts or "lots" (dirt context, feature, artifact, or sample) were given a unique number consisting of the project season prefix (20-) plus a unique number beginning with 201001. Lot numbers were continuous across the three excavated trenches. Finds data, dimensions, and other characteristics of individual lots were described on a paper-based form. Each lot was also photographed and the images logged. Later, during post-processing, the disparate data sets were partially integrated for spatial visualization.

The building designation—Structure SS12—is consistent with a numbering sequence already established in published research of the Settlement Slope (Swerida 2017; Swerida & Thornton 2019a).

3.3 Results

The location of the Settlement Slope excavations were determined based on the results of the BAP 2019 survey. The chosen location (Figure 11) is situated on an area of the hillside where the terrain is more level than its surroundings and rectilinear stone walling was visible on the

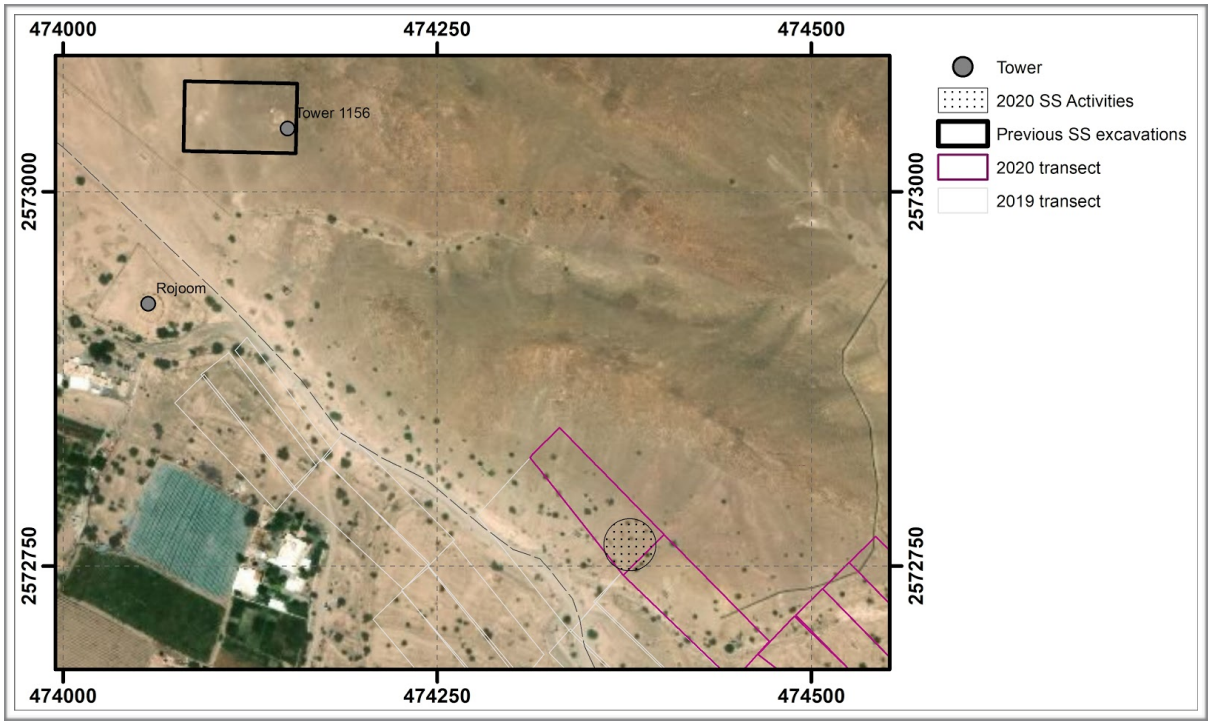

Figure 11. Map of the Settlement Slope indicating the location of the 2020 season excavations and other activities.

unexcavated ground surface. The construction style and layout of this walling appeared comparable to Umm an-Nar period architecture previously excavated on the western end of the Settlement Slope hill (Swerida & Thornton 2019a) and it was hypothesized that the building—Structure SS12—was contemporaneous with that occupation (i.e. Middle Umm an-Nar). Three contiguous trenches—Trenches 561937a, 561937b, and 561863a—were excavated over the western half of Structure SS12, where contexts appeared to have not been disturbed by erosion. Larger erosion channels were visible to the east and west of this location.

Upon excavation it became clear that the contexts in the trenches were disturbed by erosion in places, although less severely than to the east and west of the excavated areas. All three trenches shared a similar stratigraphic structure that consisted of: (1) an uppermost layer of coarse gravel and silt; (2) alternating layers of dense gravel in silt and fine sandy silt that are probably the result of runoff wash from erosion; and (3) a fine, dense, brown clay that is the matrix associated with the use of the building. Final use layers of Structure SS12 were reached in excavations of Trenches 561937a and 561937b, but not in 561863a.

3.3.1 Trench 561937a

The southernmost of the excavated trenches, Trench 561937a, is situated immediately downhill from the other trenches (Figure 12). A large, east-west running wall (Survey Lot 200050/ Excavation Lot 201029) constructed of large (ca. 85 x 55 x 30 cm) limestone blocks was visible on the surface prior to excavation and guided the selection of trench location. The large size of the stones composing this wall in comparison to others in the building led us to hypothesize that this was one of the building's exterior walls. The trench was excavated with the aim of verifying

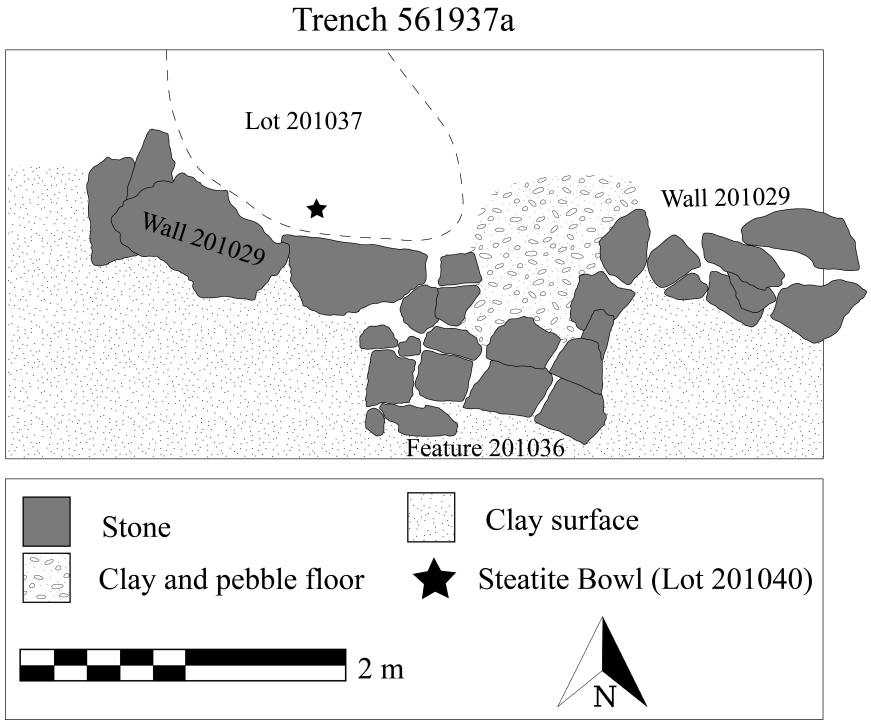

Figure 12. Plan of Trench 561937a.

this hypothesis, defining the southern exterior wall of Structure SS12, and comparing the interior and exterior contents of the building.

The entirety of Trench 561937a was covered in a ca. 10 cm layer of topsoil consisting of a fine, medium brown silt with dense, coarse gravel. Ceramic sherds stylistically datable to the Middle and Late Umm an-Nar period were common finds. Sherds datable to later (Wadi Sûq, Iron Age, and Early Islamic) periods were also recovered, although in fewer numbers.

Below the topsoil, contexts in Trench 561937a were found to be partially disturbed by erosion damage, especially in the space north of Wall 201029. This large wall is confirmed to form the southern, exterior end of Structure SS12 and may be an attempt to terrace the building into the hillside. Two exceptionally large stones in the western preserved half of the wall are shifted slightly out of place by the force of water flow down an erosion channel (Lot 201037) that was only visible upon excavation. The interior contexts of the western half of SS12 in this trench were particularly impacted by this erosion channel, while contexts in the eastern half of the building were somewhat more intact. The erosion channel was preserved as an irregularly-shaped, roughly north-south running gully filled with sand and gravel. Ceramics from various periods (Umm an-Nar, Wadi Sûq, and Iron Age) were recovered from this fill, along with a small softstone bowl (Lot 201040) (Figure 13).

Figure 13. Softstone bowl (Lot 201040) from erosion context in SS12.

To the south of Wall 201029, contexts were protected from erosion by the large wall stones. Below the ca. 10 cm layer of gravely topsoil, excavations encountered a layer of dense clay with frequent Umm an-Nar sherds and flakes of charcoal. This matrix is comparable to other exterior domestic activity surfaces excavated elsewhere on the Settlement Slope (Swerida & Thornton 2019a) and in the Khafaji settlement (Swerida & Thornton 2019b). The clay surface is approximately level with the foundations of the neighboring stone wall and can be tentatively considered contemporaneous with a use phase of Structure SS12. C14 samples collected from this surface will provide an approximate date for this phase.

A probable doorway to Structure SS12 is located in the center of the segment of Wall 201029 that is included in Trench 561937a. At this point, there is a gap of approximately 80 cm in the course of the wall. The location of this doorway, in the western half of the building's southern wall, is comparable to the entryway of Structure SS1 at the western end of the Settlement Slope. Abutting the southern face of the wall and filling the space just to the south of the gap are a series of two shallow stone steps (Lot 201036) (Figure 14). These stairs lead into the gap, or doorway, and onto a surface of packed clay and pebbles that is level with the top of the uppermost stone stair. This surface was likely the floor for the southern room of Structure SS12, however, because of the aforementioned erosion, the only section of flooring to preserve in Trench 561937a is that protected by the stones defining the doorway. The stairs leading up to the doorway are further indications that Structure SS12 was intentionally built into the sloping side of the Settlement Slope hill.

3.3.2 **Trench 561937b**

Trench 561937b is located immediately north of Trench 561937a and immediately south of Trench 561862a (Figure 15). Alignments of moderately sized stones (ca. 50 x 25 x 10 cm) visible on the modern ground surface led us to hypothesize that Structure SS12 continued into this trench and that the walls were likely to be defining interior spaces. This trench was excavated with the goal of clarifying the layout of Structure SS12 and identifying interior use contexts.

Figure 14. Stairs (Lot 201036) leading to Structure SS12 entry.

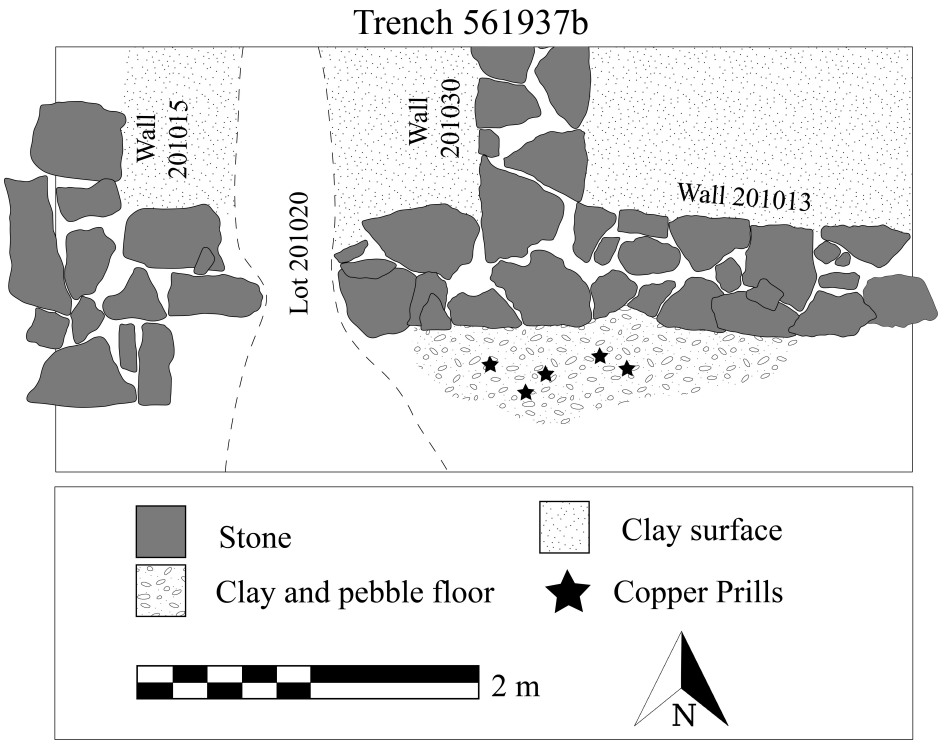

Figure 15. Plan of Trench 561937b.

Below roughly 10 cm of silt and gravel topsoil, it became clear that the space within Trench 561937b was defined by three stone walls—Walls 201013, 201015, and 201030—and that the western half of the trench was heavily disturbed by a gravel-filled erosion channel (Lot 201020, the same channel noted in Trench 561937a). The wall originally visible on the modern ground surface, Wall 201015, is situated at the western edge of the trench and is truncated at its northern and southern ends. The original extent of this wall remains unclear, however it is probable that it formed a corner with Wall 201029 to the south as well as continuing further to the north. If true, it is likely that 201015 served as the western exterior wall of Structure SS12.

Wall 201013 bisects Trench 561937b east-west and is broken for a span of approximately 40 cm where the erosion channel cut through the space, eventually running against the interior face of Wall 201029 to the south. While it is possible that an existing interior doorway in Wall 201013 acted as a natural pathway for the erosion channel, the concentration of displaced wall stones found in the space to the south of this gap suggests that it was originally a continuous wall. The erosion channel consisted of a deep, linear cut through the clay matrix within Structure SS12. This cut was filled with coarse sand and gravel and contained a sparse mixture of ceramic sherds stylistically datable to the Umm an-Nar, Wadi Sûq, and Iron Age periods. These materials attest to the longevity of the Settlement Slope as an occupational center.

The northern half of Trench 561937b is divided into two interior rooms by Wall 201030. The construction style of this wall, and of Wall 201013 to which it is bonded, is typical of Middle Umm an-Nar period settlement architecture at Bat: well-formed wall foundations constructed of 2-3 courses of roughly worked, dovetailed limestone blocks set horizontally into a mud mortar (see Swerida & Thornton 2019b). The primary matrix in both northern rooms in Trench 561937b was a dense, brown clay with occasional flakes of charcoal. Probable floor surfaces of packed clay were identified in both rooms, however neither surface was associated with further features or artifacts. The possible floor in the northeastern room was removed in order to determine if multiple use phases could be identified. Although no further floor surfaces were identified, it was determined that Walls 201013 and 201030 were constructed on a sterile layer of dense, coarse gravel that naturally occurs on the Settlement Slope.

The southern half of Trench 561937b was part of an interior room formed by Wall 201013 in the north, Wall 201015 in the west, and Wall 201029 (Trench 561937a) in the south. A narrow strip of clay and gravel floor (Lot 201024) was preserved along the southern face of Wall 201013, on which rested several Umm an-Nar sherds and five small copper prills. It is notable that this floor surface is located at an elevation between 10 and 15 cm higher than the floor surface found within the doorway in Trench 561937a. While it is possible that these surfaces represent two different use phases of Structure SS12, both surfaces are identical in composition and position relative to the adjacent stone wall foundations. A more convincing interpretation that takes into account the sloping trajectory of the stone wall foundations throughout the building is that the floor surface of Structure SS12 also sloped gently in accordance with the Settlement Slope hillside. Such an interpretation would account for the difference in elevation between preserved patches of a single floor surface.

3.3.3 **Trench 561862a**

Trench 561862a is located immediately north of Trench 561937b (Figure 16). No trace of stone walling was visible prior to excavation, however the mounded ground surface in this location led us to hypothesize that intact contexts associated with Structure SS12 were preserved below. The trench was excavated with the goal of determining if Structure SS12 continued to the north and assessing the quality of preservation of this and similar mounded areas on the Settlement Slope.

Below a thick, mounded layer of topsoil (ca. 15-20 cm), excavations in this trench encountered alternating layers of silt with coarse gravel and fine sand with gravel, which likely reflect runoff layers from general erosion. The large erosion channel responsible for damaging contexts in Trenches 561937a and 561937b to the south was found to begin in the southern half of Trench 561862a (Lot 201053), where it remained shallow and had little impact on the contexts below. A second, narrower and more shallow erosion channel (Lot 201045) cut through the eastern portion of this trench and likely disturbed some of the contexts of the northeastern room in Trench 561937b. However the southesterly trajectory of this channel suggests that most of the downhill erosion damage was directed east of the two excavated trenches to the south. The higher intensity of erosion in the eastern half of Trench 561862a, compared to the western half of the trench, is also indicated by the additional layers of runoff wash visible in profile (Figure 17).

Contexts within this trench were divided into eastern and western interior spaces by Wall 201030, which runs continuously from the northern face of Wall 201013 in Trench 561937b to the northern baulk of Trench 561862a. It is clear that Wall 201030—and by extension the other walls of Structure SS12—originally supported a mudbrick superstructure. One mudbrick is visible in section in the north profile resting atop the stone wall foundations. The superstructure of this wall appears to have collapsed to the east, as clumps of mudbrick and bricky wash were found in the fill throughout this space.

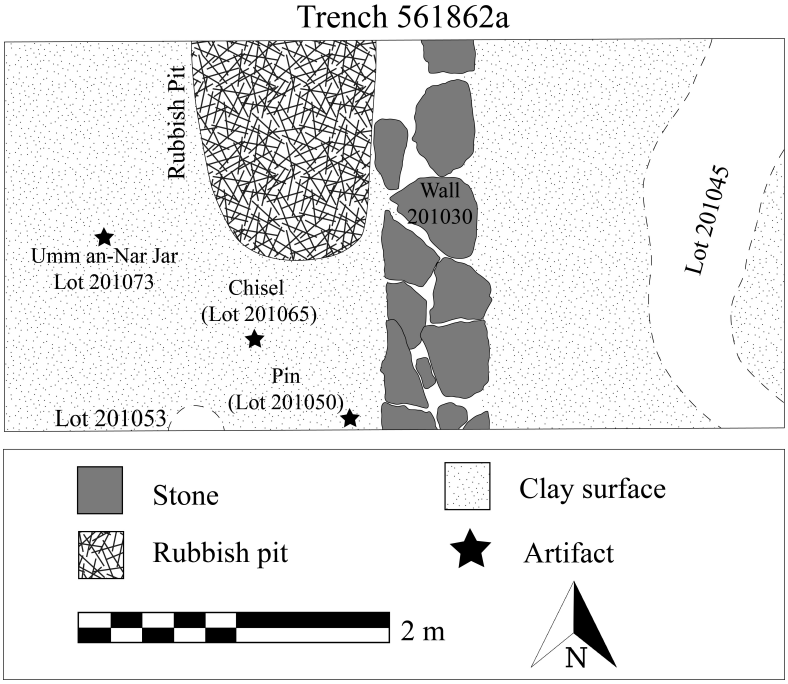

Figure 16. Plan of Trench 561862a.

Below the runoff wash layers, both rooms in this trench were filled with a dense, brown clay that contained frequent Umm an-Nar sherds and charcoal flakes. No clear floor surface was identified in either room, however it is possible that informal floor surfaces are contained within the clay fill. Indications that a possible informal floor surface was encountered in the western room include the shattered remains of a Late Umm an-Nar jar (Lot 201073; Figure 18) resting on a flat level and two copper tools (a pin - Lot 201050, a chisel - Lot 201065) found at approximately the same elevation. Excavations halted approximately 5 cm below the top of the uppermost stone course of the Wall 201030 foundations. This level is 15-30 cm above the levels at which the clay and gravel surfaces identified in Trenches 561937a and 561937b, indicating that a formal floor surface may yet to be uncovered.

A particularly rich source of material culture in Trench 561862a was a large rubbish pit situated along the western face of Wall 201030 and extending into the north baulk (Lots 201061 and 201070). The mounded upper layer of this pit was found to contain a dense ashy silt, coarse gravel, frequent clumps of charcoal, and a significant concentration of Umm an-Nar sherds. The ceramics recovered from this pit are stylistically comparable to those from Late Umm an-Nar (ca. 2200-2000 BC) contexts known from elsewhere on the Settlement Slope (Swerida & Thornton 2019a). C14 samples collected from the charcoal deposits within the pit will provide a scientific date for the feature and its contents.

The Late Umm an-Nar stylistic consistency of ceramics from this pit is similar to the finds from the clay room fill layers in Trench 561862a, but contrasts with the stylistically Middle Umm an-Nar sherds found on the internal floor surfaces in Trenches 561862a and 561862b and sherds from the exterior areas south of Structure SS12 in Trench 561862a. This pattern suggests that the building experienced at least two use phases: (1) a Middle Umm an-Nar (ca. 2500-2200 BC) phase associated with the clay and gravel floor surfaces and (2) a Late Umm an-Nar (ca. 2200-2000 BC) phase associated with more ephemeral clay floors and the large rubbish pit.

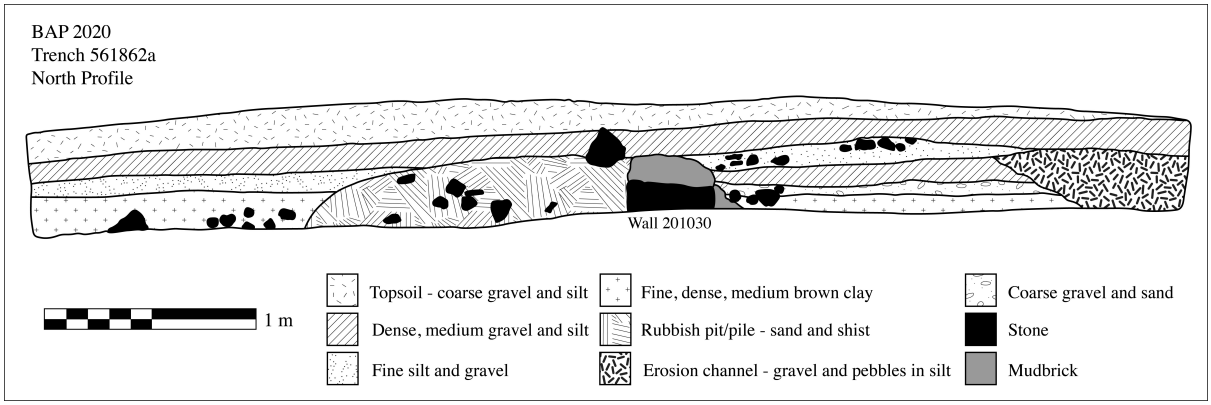

Figure 17. North profile of Trench 561862a.

Figure 18. Late Umm an-Nar jar fragments (Lot 201073).

3.3.4 Adjacent Survey

Additional, targeted studies were also carried out in the area surrounding Trenches 561937a, 561937b, and 561862a. These include:

- Surface clearing of stone walling associated with Structure SS12 immediately east of the excavated trenches;
- Documentation and sampling of a hearth feature visible in an erosion cut approximately 30 m south of the excavated trenches;
- Documentation of two probable Umm an-Nar tombs located on a ridge approximately 50 m northeast of the excavated trenches

Further stone walling was visible at ground surface level in the space immediately east of the excavated trenches. However, the signs of erosion that had exposed this architecture led us to hypothesize that contexts in this area would be poorly preserved. Thus, rather than excavating this space, the BAP team cleared the surface debris around stones that were already visible with the goal of clarifying the architectural layout of Structure SS12 (Figure 19). The results of this surface clearing enable us to propose approximate building dimensions. Structure SS12 is estimated to have been approximately 11 m long (east-west) and at least 8.5 m wide (north-south). These measurements are comparable to, and in some cases slightly larger than, Umm an-Nar domestic buildings excavated at the western end of the Settlement Slope hill (Swerida & Thornton 2019a) and Khafaji (Swerida & Thornton 2019b).

It is clear that Structure SS12 did not exist in isolation in this area of the Settlement Slope. The same large erosion channel that damaged the eastern half of Structure SS12 also revealed the remains of a hearth located approximately 30 m south of the building. This hearth is visible in profile (Lot 200076; Figure 20) and is not associated with visible architecture. C14 (Lot 200077) and floatation (Lot 200078) samples collected from the hearth will provide further information on the date of this activity and what purposes it may have served.

Additionally, the remains of at least two Umm an-Nar tombs were identified on an elevated ridge of limestone bedrock roughly 50 m east of Structure SS12 (Figure 21). These tombs were carefully documented during excavation of the neighboring building due to their close proximity. It is possible that the occupants of Structure SS12 and others on the eastern end of the Settlement Slope were interred in these tombs. Both mortuary structures are poorly preserved and are only visible through their fragmentary stone foundations. Fragments of pecked white limestone blocks suggest that the tombs originally featured a white stone facing. A single carnelian bead was found on the surface on one tomb (Figure 22). More substantial surface clearance is necessary to further examine the tomb features on this ridge.

Figure 19. Drone photograph of Structure SS12 surface clearing.

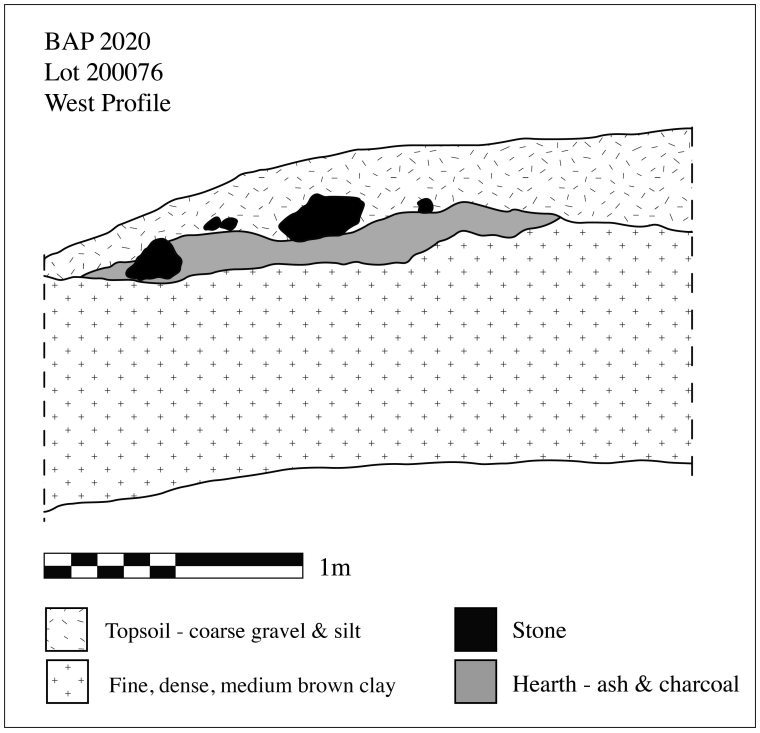

Figure 20. Profile of hearth feature 200076.

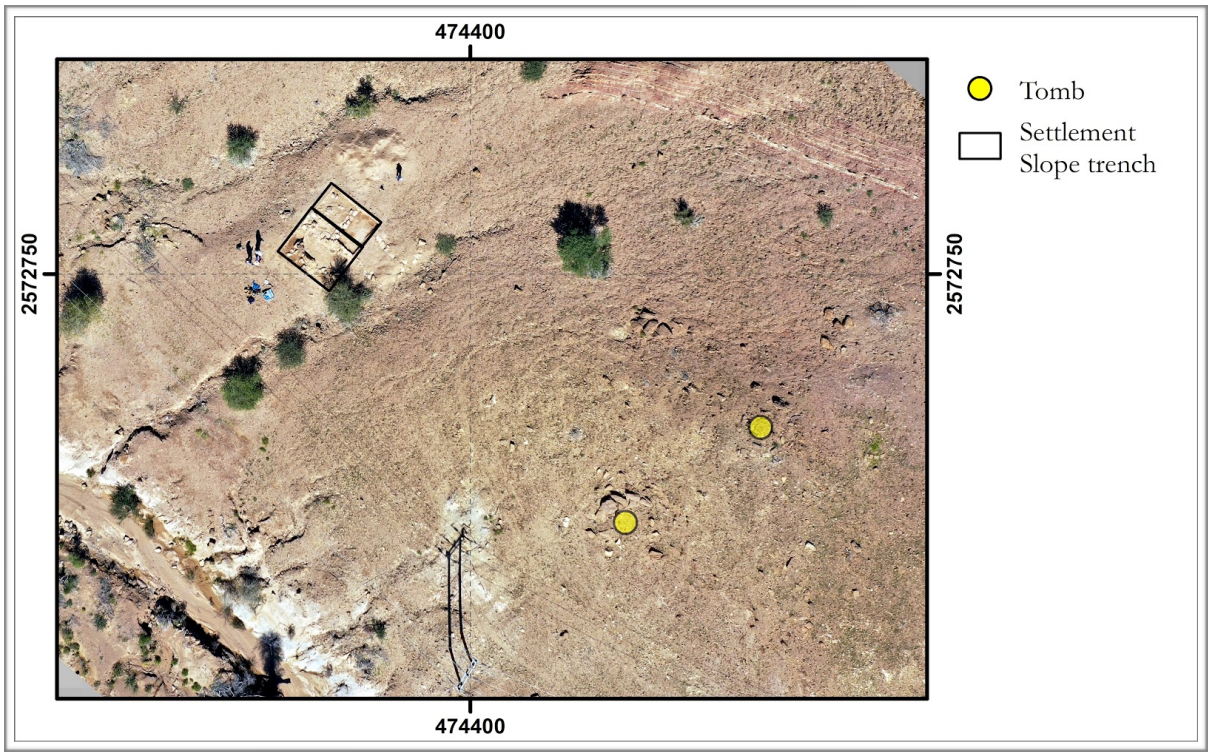

Figure 21. Aerial image showing the location of the tombs in relation to Settlement Slope excavations of SS12.

Figure 22. Carnelian bead found near Tomb 201202.

3.3.5 Summary

Based on the results of the BAP 2020 Settlement Slope excavations and adjacent survey activities, Structure SS12 (Figure 23) appears to be an Umm an-Nar settlement building with at least two use phases. Architecturally, the building is consistent with trends identified in excavations at the western end of the Settlement Slope hill, as well as elsewhere on the Bat landscape. However, further research is necessary to confirm the function served by Structure SS12.

The early (Middle Umm an-Nar) phase of Structure SS12 is represented by the initial construction and floor surfaces. The building's architectural style of dovetailed stone wall foundations with a mudbrick superstructure is comparable to well-dated Middle Umm an-Nar buildings elsewhere on the Settlement Slope (Swerida & Thornton 2019a) and at Khafaji (Swerida & Thornton 2019b). No secondary architectural additions or renovations can yet be identified in the excavated remains. The date estimate derived from the building's architectural style is reinforced by Middle Umm an-Nar style ceramic sherds found in association with the interior clay and gravel floor surfaces and the exterior clay surfaces to the south of Wall 201029 (see Swerida, Dollarhide, & Jensen *forthcoming*). Forthcoming scientific dates from C14 analysis will confirm the accuracy of these stylistic dates.

The later (Late Umm an-Nar) phase is represented by the large rubbish pit (Lots 201061 and 201070) and interior clay surfaces excavated in Trench 561862a. The fact that these features were only identified in the uppermost trench, where contexts were less impacted by erosion damage than those further downhill, indicate that the later use of Structure SS12 was more ephemeral than the earlier. The Late Umm an-Nar date estimate for this later phase is based on the stylistic forms and decorations of ceramic sherds recovered from the large pit and clay surfaces. Carbon samples recovered from the pit will provide scientific dates for this use phase.

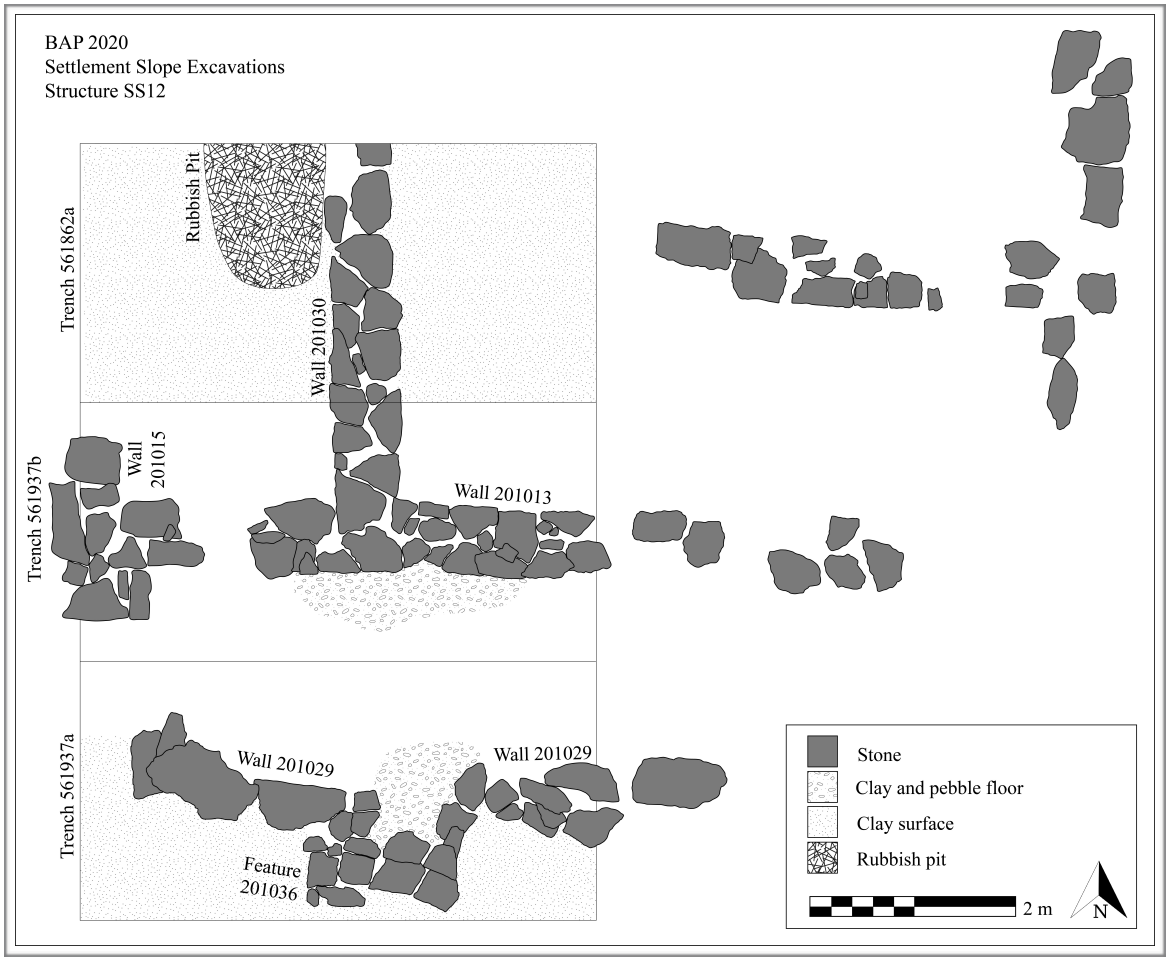

Figure 23. Overall plan of Structure SS12.

Given the structural similarities between Structure SS12 and Umm an-Nar domestic buildings previously excavated at the western end of the Settlement Slope and at Khafaji, there is a high likelihood that this building served as a domestic house. The architectural plan of Structure SS12 is similar to the semi-subdivided plans defined in structures at the western Settlement Slope, such as Structures SS1 and SS2. This comparison is especially clear when the partially exposed walling in the space east of the excavated trenches is included in the building plan. The interior layout features at least three long, east-west rooms in the eastern half of the building, each approximately 2 m wide, and appears to follow the semi-integrated floorplan commonly found in Umm an-Nar settlement architecture. The north-south orientation of the northwestern room breaks with this pattern, however the fragmentary state of Wall 201015 makes interpretation of this space as interior somewhat tentative. Further excavation is necessary to fully define the layout of Structure SS12.

Despite the similarities between Structure SS12 and other known Umm an-Nar domestic structures at Bat, it is not yet possible to decisively identify this building as a house due to the limited extent of excavations and the absence of indicators of domestic activity (i.e., cooking hearths, household storage, craft production, etc.). Future seasons of excavation and survey on the Settlement Slope will further clarify the function of Structure SS12 and the occupational patterns of the Umm an-Nar period at the site.

4. Rakhat al-Madrh (Bat South) Excavations

Eli N. Dollarhide

4.1 Introduction

BAP's 2020 season marked the beginning of excavations at Rakhat al-Madrh (Figure 24). This area is located approximately 7.5 km southeast of the modern Bat village in the Wadi Sharsah. The archaeological remains at the site were first identified during a BAP archaeological survey conducted between Bat and 'Amlah during winter 2017 (Dollarhide 2019; Dollarhide, Garrett, and Rissman 2018). Upon initial discovery, four structures were identified as well as several associated scatters of Umm an-Nar ceramics and several lithic flakes. The architecture, visible on the ground's surface, bared obvious similarity to the compartmented rooms and large enclosed spaces of excavated Umm an-Nar domestic contexts on the settlement slope. Initial documentation included GPS mapping, artifact collection, and aerial photography with a drone (supplied by Mr. Mansour al-Badi).

In this initial phase of research, the site was called 'Bat South' given its strategic location in the middle of a modern access route between Bat and 'Amlah, an Umm an-Nar settlement recorded by Beatrice de Cardi (et al. 1976) and revisited in 2017 by the BAP survey team (Dollarhide 2019: 52). In consultation with the Ministry of Heritage and Culture, we learned the area which the site occupies is locally known as Rakhat al-Madrh (رخة المدره), the name by which this archaeological site is referred to in this present document and in future publications.

The initial discovery of Rakhat al-Madrh revealed its location and environment differed substantially from other Bronze Age settlements known in the Bat Region. The four structures are situated around the edges of a sub-recent alluvial fan (Janjou et al. 1986)—an area of ancient above-ground water catchment. This makes Rakhat al-Madrh unique, as nearly all the currently known Umm an-Nar domestic areas are located near below ground water sources. Record-levels of rainfall experienced in the Bat area during the first weeks of December 2019 further evidenced that the depression at Rakhat al-Madrh continues to hold water in extreme precipitation events in the modern era. In fact, the water from a storm on December 8, 2019 kept the center of the Rakhat al-Madrh submerged under at least 50 cm of water for 16 days (Figure 25).

Bearing this information in mind, excavations at Rakhat al-Madrh were conducted with four primary goals:

1) Obtain C-14 samples and additional diagnostic artifacts in an effort to confirm the Umm an-Nar period date of the site's occupation as evidenced in earlier ceramic surface collections;
2) Better understand the function of the site and its connection to Bronze Age water management and subsistence practices in the interior of the Oman Peninsula;
3) Connect the site with Bat's different Umm an-Nar occupation zones and other nearby settlements to better understand regional connections across sites in the Bronze Age;
4) Align these newly discovered remains with BAP's long-term goal of interpreting the wider Bat landscape.

Figure 24. Aerial photograph of Rakhat al-Madrh with structures highlighted.

Figure 25. A view of the flooded Rakhat al-Madrh depression on December 10, 2019, looking southeast. The surface remains of structure RaM 4 are located in the foreground and the modern track to 'Amlah runs through the middle of the image.

In order to achieve these objectives, excavations were conducted at Rakhat al-Madrh between December 30, 2019--January 15, 2020.

4.2 Excavation Strategy

Before beginning the excavation, a systematic, intensive pedestrian survey was conducted across the Rakhat al-Madrh area, resulting in the discovery of over 100 additional archaeological features (the full results of this survey work is presented in section 9.2 of this report). As part of this process, the visible surface architecture and preservation of each structure was assessed. Each of the four structures were also given a numerical designation (RaM 1-4) and walls and other elements were assigned lot numbers.

The structure RaM 1 was selected as the first location for excavations this season as its surface architecture appeared to be in the best state of preservation and bore the closest resemblance to domestic structures known elsewhere on the Bat landscape: a walled enclosure or central courtyard surrounded by small and narrower compartmented spaces (Figure 26).

A cardinal grid of 5 x 5 meter squares (running North-South/East-West) was laid out across the area to facilitate recording and selecting trenches for excavations in advance of commencing excavations.

Figure 26. Areal photograph of RaM 1 before beginning excavations.

A row of these squares, bisecting the northwestern corner of the external wall of RaM 1 was selected for this preliminary excavation season. The 5 x 5 m squares were halved in width to facilitate opening a wider exposure of the architecture and capturing both interior and exterior spaces within the confines of our short field season. Thus, three 2.5 x 5 m trenches were excavated, labeled A-C, moving from west to east, resulting in a total exposure of 2.5 x 15 meters (Figure 27).

Following BAP convention, each context (feature, dirt section, or individual sample) was given a unique lot number. The 2020 Rakhat al-Madrh excavations lots began with 201501 and extended through 201536. The lot numbers assigned to the archaeological features visible on the surface during the 2020 initial survey. Each lot was photographed before and after excavation, sketched, and planned as appropriate and details about its contents and context were recorded on a paper form and entered into a digital database.

Additional flooding events experienced in Bat on January 11 made the access route through the Wadi Sharsah to Rakhat al-Madrh briefly impassable and left the dense, clay-ish dirt in the trenches water logged, bringing the season's excavations to an early close. Following a clean-up of the trenches on January 15, the trench profiles and plans were completed. The excavated areas were backfilled anticipating future excavation seasons at RaM 1.

4.3 Results

4.3.1 Trench A

Excavations in Trench A began by removing a layer of topsoil composed of loose silt and wadi alluvium across the entire surface of the trench, varying between 7-10 cm deep across the entire surface. Immediately beneath this surface a level of dense clay clumps and small flecks of stone and carbon was revealed adjacent to Wall 200509, identified as a melted mudbrick matrix (Figure 28). This mudbrick melt extended for 1.6m west of Wall 200509 and continued downwards for 43 cm. Inside RaM 1, below the topsoil, the mudbrick melt matrix continued for 19 cm. Three brick outlines, with mortar in between, were definable within this area (Lots 201504 and 201510).

Further operations in Trench A included soundings to define the number of courses in Wall 200509 and Wall 200513, and a deep sounding along the western edge of the trench. Since this was the first excavation conducted in the Rakhat al-Madrh area, the deep sounding operation was conducted in order to better understand the diversity of soil types present and aid future geomorphological investigations. The deep sounding (Lots 201506 and 201508), ended at a depth of 1.43 meters, where bedrock was reached. Underneath the mudbrick melt in this area was a horizon of loose silt 12 cm deep, followed by compact clay that appeared to crystalize as the bed rock level was reached.

Figure 27. Plan of RaM 1 excavations.

Figure 28: Mudbrick matrix inside of RaM 1.

Both Walls 200509 and 200513 were constructed primarily of large limestone blocks, the largest of which was over 75 x 35 cm and, as all of the RaM 1 walls revealed in this season's excavations, were faced on both sides. Three courses of stone were preserved in both walls, which appear to have been constructed contemporaneously, given the presence of the largest limestone block used in their construction and shaped to fit the curving stone corner of the structure.

Finds were generally sparse in the lots within Trench A. One C14 sample was removed from within the mudbrick melt evident in Lot 201502. No ceramics were recovered.

4.3.2 **Trench B**

Trench B was composed of interior spaces within RaM 1's long, narrow, compartmented rooms, defined by Walls 200509, 200510, and 200511. The levels of mudbrick melt continued across these spaces, with a particularly thick (15cm) pocket located between 200510 and 200511. Though no individual surfaces were discernible below the mudbrick melt, several dry, flakey patches of sediment resting above the dense clay horizons (recognized to be the dominant soil type in the area) indicate that the room at one point before the collapse of mud brick walls contained water or damp surfaces. An additional individual mudbrick was discernible between Walls 200510 and 200511, abutting 200513. Underneath this brick was the same, loose silt deposit evidenced under the melt in Trench A. A C14 sample (Lot 201522) of charcoal temper was taken from within the brick.

Wall 200510 proved to be one of the best preserved within RaM 1, with two courses of stone and remnants of mortar still evident. A C14 sample was taken from directly underneath Wall 200510 (Lot 201528), which will assist in dating the construction of the structure.

A few fragments of Umm an-Nar domestic ware ceramics were recovered from throughout Trench B. Two nearly identical punctured shells (Figure 29) were also recovered from within the space created between Wall 200511 and 200512 (found in Lots 201512 and 201525). This evidence of coastal connections hints at the integration of even the smallest of Oman's settlements to regional exchange networks.

3.3.3 Trench C

Trench C contained two primary features: the complicated collapse of Wall 200512 and the interior of the large enclosed space of RaM 1 formed by Walls 200513 and 200515. This trench was opened with surface clearing operations (Lots 201509, 201513, 201515, and 201520). The dense, clay clumps continued in the western most portion of the trench, starting at a depth of 52 cm below the surface. This horizon likely indicates the collapse of mudbrick from Wall 200512.

Two phases of construction of Wall 200512 became apparent through the clearing of several collapsed stones and the excavation of Trench C. Underneath the in situ stones of Wall 201512 visible on the surface, a circular deposit filled with melted mudbrick matrix was revealed (Lot 201524 and 201526). A sherd of Umm an-Nar domestic ware was recovered from this deposit.While it is unclear if this pit was intentionally constructed or the natural filling of the space resulting from a displaced architectural stone, immediately below it another course of stones at a different angle were revealed in Lot 201530. Unlike the large limestone blocks composing the visible surface of Wall 200512, this lower and angled course was composed of smaller, schist blocks, the largest of which was 35 cm long and 14 cm high. This lower alignment was ultimately assigned as Wall 201531. A C14 sample (Lot 201532) was collected from between the stones composing this wall. Already, however, the Umm an-Nar sherd recovered from the mudbrick deposit above the wall offers a *terminus ante quem* for the construction of Wall 201531.

Figure 29. Punctured shell from RaM 1 (Lot 201525).

4.4 Conclusion

The initial excavations of three trenches at Rakhat al-Madrh offer several insights to the site's ancient occupation. The excavated remains of the structure RaM 1 are consistent with Umm an-Nar domestic architecture known elsewhere from Bat and its environs (Swerida and Thornton 2019; Schmidt and Döpper 2014). The stone foundations visible on the surface and further revealed through this season's excavations served as a foundation for mudbrick walls. Over time, these walls melted and collapsed both within and outside the structure. The complicated collapse of the stone foundation of Wall 200512 and 201531 underneath indicate that the structure was modified over the course of its use. As Wall 200512 forms the interior wall of the large enclosure, it seems likely that the differing angle of Wall 201531 indicates the enclosure was added-on after the structures initial construction, or that the enclosure initially took a different shape or dimension. Further excavations in the rest of the RaM 1 will help us understand the structure's function and changes made to it over time.

The general lack of ceramics and small finds indicate the structure was likely cleared out after abandonment. The uniformity of the limited ceramics recovered from the excavations and surface collections, however, suggest a primary Umm an-Nar period occupation of the area. The pending results of C14 dating will further refine understandings of Rakhat al-Madrh's chronology and relationships with other areas of Bat and 'Amlah.

5. Preliminary Finds Report

5.1 Ceramics - by Eli Dollarhide

The ceramics analysis conducted as part of the Bat 2020 field season utilized a macro-stylistic approach and non-destructive techniques. Sherds were analyzed and sorted according to vessel form, ware/fabric type, surface treatment, and decoration. This information was then utilized to assess the time period in which each sherd was produced, in consultation with previous excavations at Bat and other published archaeological ceramic assemblages from the region.

All sherds were photographed in the context of their find-spot or associated excavation lot and particularly interesting examples were illustrated.

Sherds from the following chronological periods were analyzed during the 2020 BAP field season (Table 2 – adapted from Thornton and Ghazal 2016; Potts 1992; Magee 1996; Whitcomb 1975; and Kennet 2004):

Table 2. Bronze Age chronology used in this report.

Period	Date Range
Umm an-Nar:	2800-2000 BCE
Wadi Sûq:	2000-1300 BCE
Iron Age I:	1300-1100 BCE
Iron Age II:	1100-600 BCE
Iron Age III:	600-300 BCE
Late Pre-Islamic (Sasanian/Parthian):	300 BC-635 CE
Early Islamic:	635 AD-1055 CE
Middle Islamic:	1055 AD-1500 CE
Late/Early Modern Islamic:	1500-1750 CE
Modern/Ethnographic:	post 1750CE

5.1.1 Preliminary analysis

In total, 746 ceramic sherds were examined during the 2020 season. These ceramics are part of three research operations conducted at Bat this season: excavations at Rakhat al-Madrh and the Settlement Slope and survey operations conducted across the Bat region. Each of these collections are reviewed individually in the sections below.

5.1.2 Excavations at the Settlement Slope

The analysis of ceramics recovered from the excavations at the Settlement Slope this season revealed a remarkably chronologically-uniform corpus of forms and fabrics types (Table 3). In brief, the assemblage is dominated by late Umm an-Nar period domestic wares with an

increasing frequency of middle Umm an-Nar wares in deeper contexts (e.g., 201071 and 201072). Globular jars with everted rims appear to be the primary form represented, followed by shallow bowls with rim diameters under 15 cm. The pastes of these vessels are characteristically fine, with vessel wall thickness ranging between 5-13 mm. The assemblage appears largely composed of typical Umm an-Nar "sandy red wares" (Méry 2000) of Hili phases IIe and IIf, which are paralleled in the Bat corpus by 'domestic wares' (see further ware description in Thornton and Ghazal 2016; Dollarhide 2019).

The quantity of bowls present in the Settlement Slope excavations, representing ~25% of the total diagnostic assemblage (e.g., sherds 201010-002 (Figure 30.4), 201010-003 (Figure 30.1), and 201016-001 (Figure 30.5)), is particularly remarkable and unparalleled in other Umm an-Nar period contexts at Bat. The pending results of radiocarbon dating of the structure will help assess whether this is a functional and/or chronological indicator. Several sherds in Lots 201045, 201028, 201016, 201039, and 201010 were produced in fabrics with a particularly sandy matrix and between 5-10% more visible inclusions. These fabrics bore obvious similarities to typical Wadi Sûq period wares, but instead featured diagnostic Umm an-Nar period painted designs (e.g., sherds 201016-004 and 201039-001 (Figure 30.3)). It seems likely they may represent a phase in the transition between these two ceramic production styles.

Table 3. Ceramic counts from 2020 Settlement Slope excavations.

Settlement Slope Lot Number	Total Diagnostic Sherd Count	Total Sherd Count
201001	1	10
201002	2	6
201003	1	2
201004	4	18
201006	0	3
201010	8	29
201011	2	4
201014	2	6
201016	5	9
201017	1	6
201019	1	5
201020	3	5
201023	7	19
201024	0	1
201026	9	20

Settlement Slope Lot Number	Total Diagnostic Sherd Count	Total Sherd Count
201028	3	8
201031	4	16
201032	0	5
201033	0	2
201037	4	29
201039	0	3
201041	1	3
201042	1	7
201043	4	13
201045	3	3
201046	17	34
201048	1	7
201049	0	12
201053	1	2
201056	1	13
201057	0	7
201058	0	2
201061	7	19
201067	2	13
201069	2	6
201070	4	18
201071	0	16
201072	8	33
201073	5	14
201076	1	6

Typical across BAP's investigations of the Settlement Slope, there is a considerable range of chronological periods evidenced in surface contexts. In this year's lots, they included modern technical ceramics, Bahla/Khunj wares (Kennet 2004), slag-tempered and coarse-gritted Iron

Age fabrics, a thin-walled Late Bronze Age vessel, and several Wadi Sûq sherds (e.g., sherd 201026-001 (Figure 30.2)).

Among the most notable fragments from the excavations were twelve sherds of Indus-style black-slipped storage jar(s) in a red, micaceous paste, including a well-preserved rim fragment. The sherds are likely from a single large jar. This style is now well-documented in the Bat area and across the Oman Peninsula in Umm an-Nar domestic contexts. The presence of a black-slipped storage jar located adjacent to the excavated house further evidence the feature's primary domestic function.

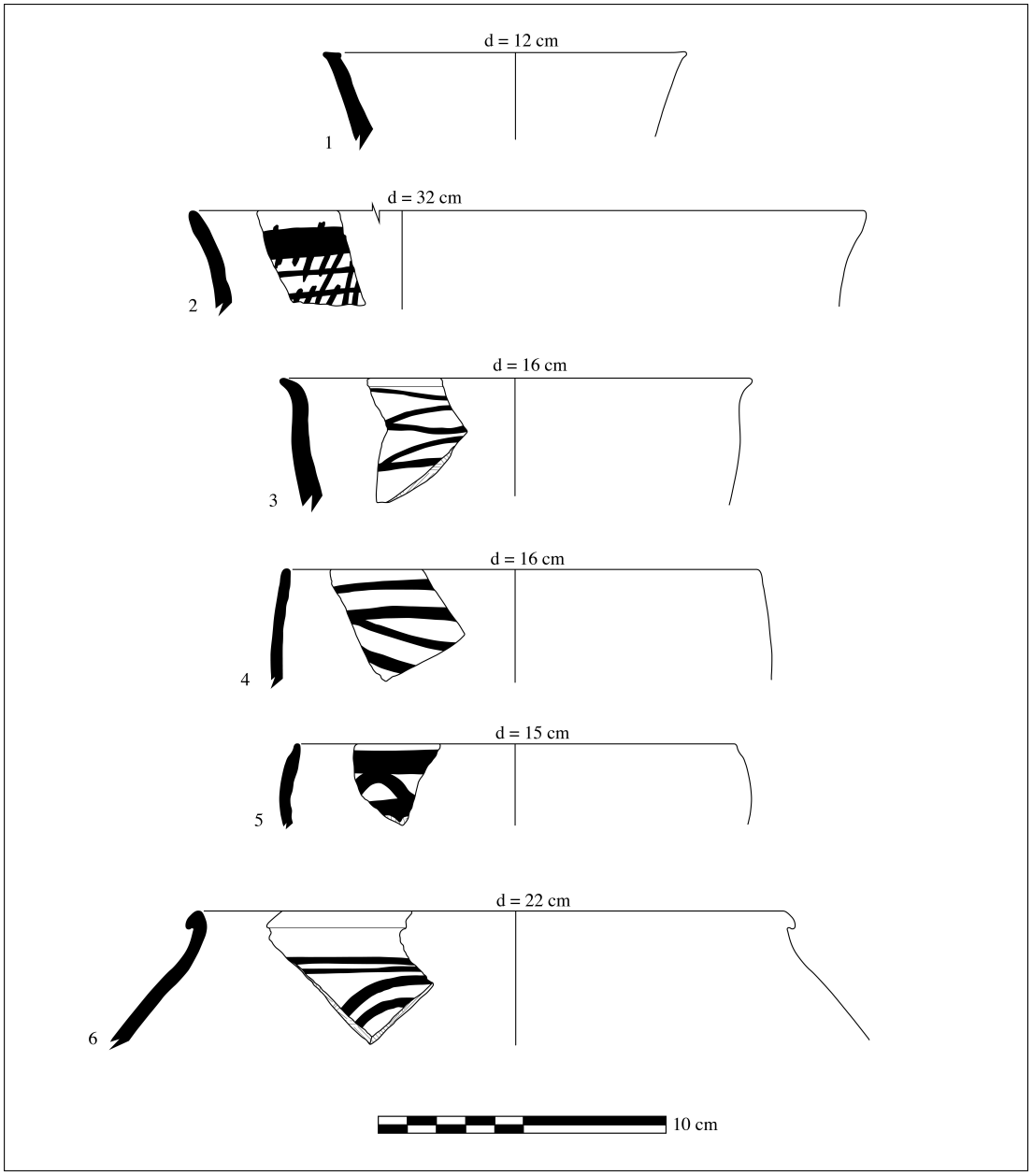

Figure 30. Notable ceramic sherds from 2020 Settlement Slope excavations: (1) Wadi Sûq bowl 201010-003, (2) Wadi Sûq bowl 201026-001, (3) Late Umm an-Nar bowl 201039, (4) Late Umm an-Nar bowl 201010-002, (5) Umm an-Nar bowl 201016-001, and (6) Middle Umm an-Nar jar 201046-001.

5.1.3 Excavations at Rakhat al-Madrh (Bat South)

Ceramic finds from this season's excavations at Rakhat al-Madrh (Bat South) were considerably rarer (Table 4). A total of seven sherds were uncovered. All were produced in typical Umm an-Nar domestic ware fabrics (Figure 31). Three maintained varying degrees of red slip on their exterior surfaces and one sherd displayed evidence of black paint, likely a fragment of the undulating line motif well-known in the middle and late Umm an-Nar phases. Also present was a small fragment of a vessel base.

Table 4. Ceramic counts from 2020 Rakhat al-Madrh excavations.

Settlement Slope Lot Number	Total Diagnostic Sherd Count	Total Sherd Count
201511	1	1
201512	1	1
201517	0	1
201519	0	1
201521	0	1
201526	0	1
201529	1	1

The general lack of ceramics at the excavations of Rakhat al-Madrh may signify that the excavated structure was 'cleaned-out' after abandonment. The uniformity of the collection in terms of ware type further indicates that the structure was likely not occupied before 2400 BC.

Figure 31. Example of an excavated Umm an-Nar domestic ware body sherd from Rakhat al-Madrh.

5.1.4 **Ceramic Surface Collections from Survey Operations**

Ceramics were also collected during this season's survey operations. All diagnostic sherds were collected within the context of each transect walked. When sherds could be assigned to individual features within transects, they were collected separately and assigned lot numbers corresponding to their feature find location. The collected diagnostics were counted and analyzed with a particular interest in utilizing them as chronological markers for dating features and tracking the different use patterns across the Bat landscape over time. Non-diagnostic sherds were counted as observed while transects were surveyed but not collected.

In total, 328 diagnostic sherds were collected and analyzed from survey transect and individual features identified within the surveyed area. An additional 1,591 non-diagnostic sherds were counted but not collected (see Appendix 9.3; Tables 11 and 12).

Several preliminary trends and sherds of note were discernible within this dataset. The area surrounding the tower at al Qa'a continued to prove prolific in Umm an-Nar, late Islamic, and modern period ceramics. Both Umm an-Nar domestic and thin, black-on-red, funerary wares were collected in this unexcavated area. A single sherd, produced in a buff-gray, slag-tempered fabric was the only evidence of Iron Age presence in the al Qa'a area, while fragments from a single black-painted classic Wadi Sûq jar (Lot 200095; similar to Carter 1997: fig. 22.10) provide evidence for the area's prehistoric occupation after the end of the third millennium.

Additional intensive survey conducted around Rakhat al-Madrh in advance of excavations also resulted in the collection of 49 Umm an-Nar period ceramic fragments (Figure 32), in primarily domestic ware fabrics, including one with a repair hole drilled through it (Lot 200569; Figure 33). A sherd from a thin-walled funerary ware vessel was also collected at the site. Six glazed and other Islamic ware fragments collected at the site also represent some more recent use of the area.

Sherd density from transects around the tower Matariya continued to be characteristically low in surface collections this season. Of particular note in this area was the collection of a sherd from Lot 200068 from a large Iron Age II/III storage jar (Figure 34). This vessel was produced in a well known fabric type (medium-coarse gritted orange ware) that is common at Iron Age sites across region (e.g., Rumeilah (Boucharlat and Lombard 1985); Rafaq (Phillips 1998); Raki II (Dollarhide 2019); Salut (Condoluci 2018); among many others). Iron Age pottery is rare at Bat and this find provides some of the clearest ceramic evidence currently known linking the site to the broader Southeastern Arabian Iron II/III period.

Figure 32. Umm an-Nar period ceramics collected during survey of Rakhat al-Madrh.

Figure 33. Poorly preserved Umm an-Nar sherd from survey surface collections at Rakhat al-Mardh from a repaired vessel.

Figure 34. Fragment of a large, gritted Iron Age storage jar found during survey near the tower Matariya (Lot 200068). Some fragments of a red/tan slip remain.

Surface collections conducted along the Settlement Slope were particularly rich in Bronze Age ceramics (Table 5). The Settlement Slope survey assemblage included fragments from at least 7 different Middle and Late Umm an-Nar period black-painted jars with everted rims and a wide variety of small bowls, the latter of which also proved prevalent in this season's excavations in the area. A single Wadi Sûq sherd was also found and collected. The few diagnostic sherds on the Settlement Slope were identified by their coarse fabrics and characteristic red-stone inclusions and were largely unremarkable, with the highest density located in Lot 200025. Iron Age sherds were recovered from Lots 201010, 201011, 201043, 201061, and 201070. The slag-tempered fragment in Lot 201010 was the only example of this type collected this season. The Islamic wares present in the Settlement Slope were primarily Bahla/Khunj glazed vessels (Kennet 2004: 42). Generally, the forms, fabrics, and decoration of these Settlement Slope sherds are all well represented by previous BAP project excavations.

Table 5. Diagnostic ceramic counts from the Settlement Slope surface collection.

Bat Lot Number	Bronze Age	Iron Age - PIR	Islamic	Modern	Total Diagnostics
190233	8	2	8	0	18
200001	20	4	12	0	36
200004	4	0	7	0	11
200007	8	1	2	0	11
200008	3	0	0	0	3
200011	3	0	2	0	5
200013	1	0	2	0	3
200015	2	0	0	0	2
200017	11	1	4	0	16
200020	2	0	0	0	3
200022	4	0	30	0	34
200025	8	5	23	0	36
200029	2	0	0	0	2
200033	1	0	0	0	1
200035	18	0	0	0	18
200056	1	2	6	0	9
200061	0	0	3	0	3
200062	0	0	0	3	3
200065	0	0	4	0	4

Bat Lot Number	Bronze Age	Iron Age - PIR	Islamic	Modern	Total Diagnostics
200066	0	1	1	1	3
200068	0	0	0	0	0
200069	2	0	3	0	5
200070	0	0	0	0	0
200071	0	0	0	0	0
200072	0	0	0	0	0
200074	0	0	0	0	0
200075	0	0	0	0	0
200080	2	0	0	0	2
200085	0	0	2	0	2
200090	6	10	6	0	22
200095	2	10	0	0	12
200099	0	0	0	5	5
200501	1	0	5	0	6
200504	12	0	1	0	13
200523	5	0	0	0	5
200526	14	0	0	0	14
200546	2	0	0	0	2
200548	2	0	0	0	2
200550	1	0	0	0	1
200559	1	0	0	0	1
200568	1	1	0	0	2
200569	8	0	0	0	8
200598	4	1	0	0	5
Totals	**159**	**38**	**121**	**9**	**328**

5.2 Stone Tools - by Petranka Nedelcheva and Mina Megalla; Edited by Jennifer Swerida

The following is a preliminary report on the analysis of the BAP lithic collection from the archaeological sites of Bat, Oman. Project surveys have led to the discovery of a number of sites with the presence of lithic artifacts. The chipped stone artifacts presented in this report come

from two main areas: Matariya (Tower 1147) and from the 2017 Bat-'Amlah survey area. A total of 721 lithics were examined in the 2020 field season. These lithics were collected during archaeological survey and excavation on the greater Bat landscape between 2009 and 2020. Additionally, thirty-eight retouched tools and cores were drawn.

The lithic artifacts were divided into several categories distributed as follows:

Table 6. Lithic types.

Lithic Type	Percent
Cores	1.2
Blade Products	3.2
Retouched Tools	10.3
Debris	50.6
Flakes	34.7
Total	**100**

The table above displays a considerable predominance of flakes (34.7%) and flake debris (50.6%), including small flakes and flake fragments, in comparison with the other categories. The size and the forms of the flakes suggest a direct percussion mode of detachment. The artifacts were mainly composed of a local radiolarite or chert raw material and very often bear traces of cortex. It is worth noting that the high amount of natural unprepared butts might be due to the geological structures of the raw material, which was formed with layers and small concretions.

The lithic collection also has a notable scarcity of cores: one unidirectional core, two cores with changed orientation; four cores for flakes and two core fragments. It can be posited that this pattern is evidence that the knapping process took place somewhere out of the survey and excavation areas, very likely taking place near the raw material sources.

Presumably the lack of cores (one unidirectional core, two cores with changed orientation; four cores for flakes and two core fragments) can be considered as evidence that the knapping process took place somewhere out the survey and excavated areas very likely near by the raw material sources.

Blades make up a slim 3.2%, or 23 items, of the lithic assemblage analyzed for this report. These objects are predominantly cortical blades with irregular shapes and natural butts. One especially large example of a cortical blade (103 x 23 x 9 mm) was discovered in the area of Matariya. At this stage of research, we can assume that this artifact is related with later prehistoric periods such as the Chalcolithic or Bronze Age (Figure 35.1).

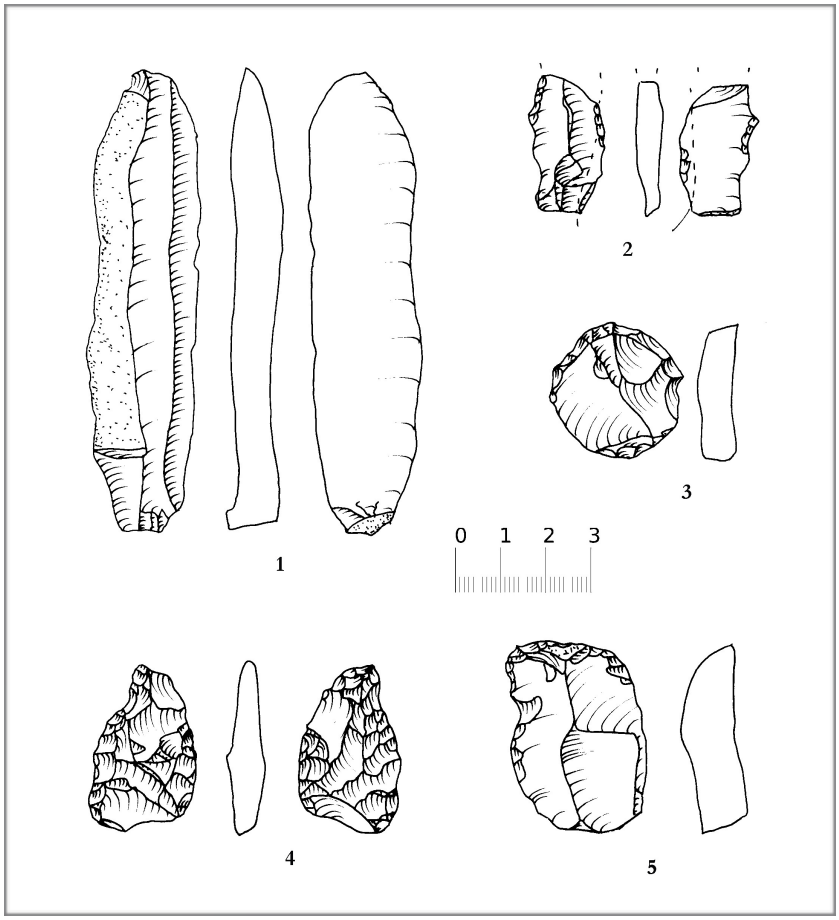

Figure 35: Notable lithics from BAP collection: Cortical blade (Matariya, Lot 100007); 2- Retouched blade with sickle shine (Matariya, Lot 102802); 3- semicircular end scraper Settlement Slope, Lot 200035); 4- Bifacial foliated piece (Bat-'Amlah Survey, Lot 09002); 5- End scraper (Bat-'Amlah Survey, Lot 11001).

Retouched tools composed just over 10% of the total analyzed collection. The greatest concentration of retouched tools was found in the Bat-'Amlah Survey area, where up to forty six artifacts were collected. The majority of these tools are made out of flakes, such as retouched flakes and end scrapers on flakes, which is a result of the predominantly flake orientated industry. The presence of several unusual forms should be highlighted, including: two micro end scrapers, few perforators and drills, and three foliates. Another interesting observation concerning the lithic material from the Bat-'Amlah Survey area is linked with the discovery of two bifacial foliated pieces. According to lithic scholars of the region (Białowarczuk and Szymczak 2018; Charpentier 2008; Uerpmann et al. 2013), their presence in the area is indicative of a late Neolithic phase of occupation in Oman. However, we should keep in mind that tools of this type are also known from significantly earlier periods, such as the Upper Paleolithic.

A single example of a semicircular end scraper has been recorded from the Settlement Slope (Lot 200035). This type of tool is considered to be a Neolithic development disseminated in the whole south Arabian peninsula (Crassard and Petraglia 2014) (Figure 35.3).

A small number of retouched tools were found in the area around Matariya, and it is very important to note that one of the blades with sickle shine belongs to this area (Figure 35.2).

Sickle shine is a secure sign of agricultural activities in the region. The other blade with visible traces of usage as a sickle was found in the area of the Settlement Slope/al-Qa'a.

While preliminary, this lithic analysis reveals broad patterns in stone tool use and production on the Bat landscape. Given the current state of scholarly research on the lithic tradition of Oman, it is not yet possible to use stone tools as reliable chronological indicators (Białowarczuk and Szymczak 2018). The development of a more refined chronology for lithic production will further increase the interpretive potential for the Bat lithic assemblage.

5.3 Other Finds - by Jennifer Swerida

Artifacts collected on survey and uncovered in excavation are another valuable source of information regarding land use and periodization (Table 7). The modest collection of small finds recovered in the BAP 2019/20 fieldwork demonstrate the longevity of human occupation at Bat —artifact dates range from the Early Bronze Age through the modern era—and included a surprising variety of material and find type, including: several copper tools (such as in Figure 36), pierced shells (Figure 29), softstone vessel fragments (Figure 37), and one carnelian bead (Figure 22) were also found.

Table 7. Small finds.

Lot Number	Object Type	Proposed Date
200035	Softstone bowl fragment	Bronze Age
200056	Grinding stones (2)	Bronze Age
201004	Copper tool fragment	Unknown
201040	Softstone bowl fragment	Umm an-Nar
201050	Copper pin/tool	Late Umm an-Nar
201064	Copper prill	Late Umm an-Nar
201065	Copper chisel/tool	Late Umm an-Nar
201073	Large jar	Late Umm an-Nar
201205	Carnelian bead	Umm an-Nar
201512	Pierced shell	Bronze Age
201525	Pierced shell	Bronze Age

Figure 36. Copper tools: (a) Chisel - Lot 201065; (b) Pin - Lot 201050.

Figure 37. Softstone vessel fragment - Lot 200035.

5.3.1 Shell - by Jennifer Swerida

Fragments of marine shell identified on survey without clear evidence of having been worked were counted in each lot (Table 8). These shells are evidence of regional exchange between the population at Bat and the coast.

Table 8. Shell counts by lot.

Lot Number	Total
200001	3
200004	8
200007	2
200011	7
200017	12
200022	3

Lot Number	Total
200061	1
200065	1
200066	2

6. Special Projects

Charlotte M. Cable, Gideon Dollarhide, and Akudo Elanju

6.1 Tower Survey - by Charlotte M. Cable

In 2009 members of the Bat Archaeological Project conducted a survey of over 40 of the known towers of Oman (Figure 38; Cable and Thornton 2013). Since that time a number of towers have been added to the corpus and our understanding of these Bronze Age monuments has grown. A survey was conducted from 31 December 2019 to 14 January 2020 in an effort to monitor the changes to the previously known towers, to collect baseline data on the newly discovered towers, and to provide the Ministry of Heritage and Culture with an overview of the towers of northern Oman. To avoid encroaching upon ongoing research projects, only the characteristics originally studied in the 2009 survey were documented this season. In the case of new tower discoveries (such as Tower 6 at al-Aridh) the text is checked by the original researcher.

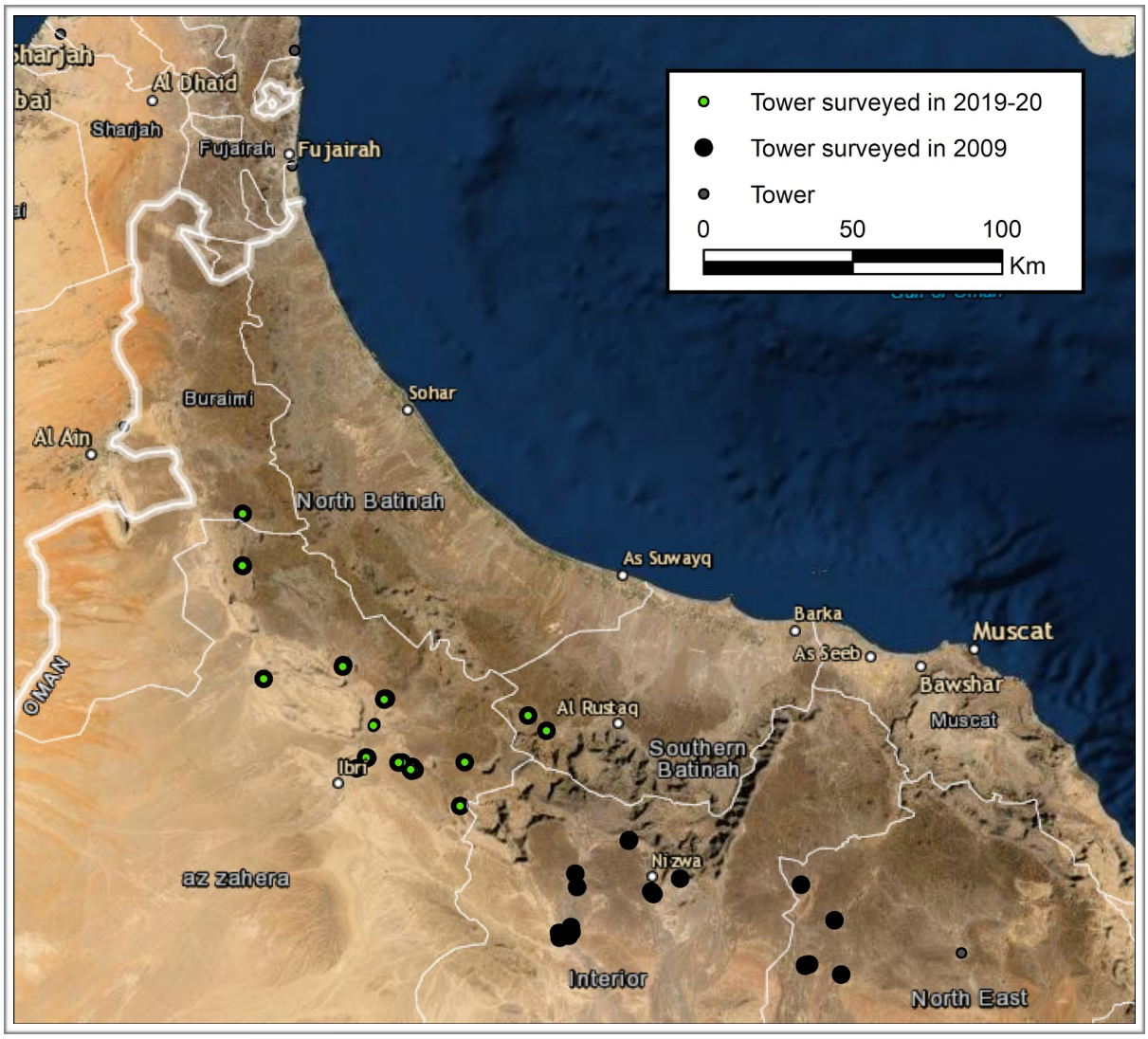

Figure 38. Map showing the tower sites visited in 2009 (black) and 2019-20 (green).

6.1.1 State of Conservation

Where possible assessments were carried out on changes to the states of conservation for each of the towers visited in 2019-20 as compared to previous studies. The majority of monuments remain in stable condition, but recent construction of a perimeter wall has cut through the outer works of ad-Dariz South 2 (Figure 39).

Figure 39. An aerial view of the corner of ad-Dariz South 2 showing outer works, consisting of rectilinear walling, bisected by a new perimeter fence.

6.2 Botanical Survey - By Gideon Dollarhide

During the 2019-2020 field season, BAP conducted a walking survey of modern flora found in various areas of the site with the assistance of Gideon Dollarhide.

6.2.1 Botanical Survey Strategy

Despite the rich variety of archaeological contexts present at Bat, few botanical remains have been recovered at the site or in its surrounding environs (see Tengberg 1998, 2016; Nathan Staudt 2017 for further discussion). Recent climactic and geomorphological investigations of the region, however, suggest that the Oman Peninsula's arid climate has been largely consistent since the fourth millennium BC (Fleitman et al. 2007). Thus, the current corpus of plants growing in and around the archaeological remains at Bat offer one potential method of reconstructing the site's little known Bronze Age botanical landscape. Additionally, the results of this research furthers our understanding of the biodiversity and natural history of the al-Dhahirah Governorate, which remains little known compared to neighboring regions in Southeastern Arabia. The botanical survey will also supply useful interpretive information for visitors to the

site, as the Ministry of Heritage and Culture prepares guides and didactic materials for the public.

In an effort to further explore the agricultural and botanical potential of Bat and better understand how the Bronze Age landscape appeared, the initial steps of a Botanical Survey were undertaken in BAP's Winter 2020 season. Four areas were explored: Matariya, Khutm, Rakhat al-Madrh, and the Settlement Slope. At each site, areas were walked and each taxa encountered was documented and photographed. Species were identified utilizing all potentially diagnostic features, including leaves, inflorescence, and habitat features. The published *Flora of Oman* volumes (Ghanzafar 2015) were consulted in addition to botanical guides to Oman, Southeastern Arabia and the Gulf region (Ghanzafar 1988; Shaw Reade, et al. 1980; Pickering and Patzelt 2008; Daoud and al-Rawli 1985; al-Rawli 1987).

At this early stage in the research, the identified taxa are being cross-referenced with ethnographic accounts and ecological research to determine specific habitat requirements and potential uses of the identified species.

6.2.2 **Preliminary Speciation: Khutm, Matariya, Settlement Slope, and Rakhat al-Madrh**

*indicates a species only identified at Rakhat al-Madrh

- Cleome rupicola
- Calotropis procera
- Physorhynchus chamaerapistrum
- Salsola drummondii
- Suaeda vermiculata
- Tephrosia nubica
- Rumex vesicarius
- Tamarix aphylla
- Fagonia indica
- Aizoon canariense
- Pentatropis nivalis
- Helichrysum glumaceum
- Iphiona aucheri
- Launaea sp. intybacea
- Reichardia tingitana
- Arnebia hispidissima
- Diplotaxis harra
- Sisymbrium erysimoides
- Sevada schimperi
- Citrullus colocynthis
- Crotalaria aegyptiaca
- Portulaca oleracea
- Ochradenus arabicus
- Schweinfurthia papilionacea
- Tetraena simplex
- Tribulus terrestris
- Aerva javanica
- Rhazya stricta
- Morettia parviflora
- Cometes surattensis
- Spergula fallax
- Malva parviflora
- Gallonia aucheri
- Lycium shawii
- Tetraena qatarense
- Chenopodium murale
- Forsskaolea tenacissima
- Seetzenaia lanata
- Maerua crassifolia
- Acacia tortilis
- Acacia ehrenbergiana
- Prosopis cineraria
- Ziziphus spina-christi
- Saccharum ravennae
- Cynomorium coccineum
- *Astragalus sp.
- *Launaea sp. (intybacea?)
- *Peganum harmala

Figure 40. A selection of identified plant species with scientific and vernacular names.

- *Cistanche phelypaea
- *Atriplex sp.
- *Notoceras bicorne
- *Scabiosa sp.
- *Plantago albicans
- *Pergularia tomentosa
- *Acacia nilotica
- *Gypsophila sp.
- *Corchorus depressus

6.3 Water Management Study - By Akudo Elanju; Edited by Jennifer Swerida

A new research project carried out under the BAP umbrella aims to understand the movement, distribution, and management of water resources and watershed sustainability in the Bat area and beyond. Preliminary research was carried out by Ms Akudo Ejelonu, a University of Pennsylvania graduate student, and will contribute to her PhD Dissertation. Fieldwork for this project was conducted between 28 December 2019 and 9 January 2020 and included a series of interviews with Omani water management personnel and falaj site visits.

6.3.1 ‘Aflaj

As an essential resource on the Arabian Peninsula throughout the anthropocene, regular access to water is as much a matter of cultural negotiation and mediation as it is a technical and environmental problem, and thus an important element for anthropological study. This project targets the ‘aflaj system of irrigation that provides ancient and modern Omani communities with access to water resources (Sutton 1984). Threatened by over-used aquifers and increasing aridity, the ‘aflaj represent a well-preserved but endangered form of land use. Nevertheless, due to their rich cultural associations and their demonstrated sustainability without negative environmental

Figure 41. (Left) Zaby Falaj in Bat; (Right) Dried irrigation system connected to a falaj in Bat.

impact, the ʻaflaj is an excellent example of best practice for human-managed water systems in arid areas. In the increasingly arid global climate, such a promising case study is now of international import.

Agricultural production in Oman is dependent on irrigation systems of which more than one third of the water is supplied by falaj. However, due to the differing attitudes of farmers toward the modernization of ʻaflaj management, technical knowledge of the ʻaflaj largely remains with older generations (Tayara 2015). In recognition of their importance, the Omani government is striving to document, conserve, and maintain the ʻaflaj systems (al-Ghafri et al. 2000). Previous studies document their physical structure, method of construction and governance, irrigation scheduling, and water rights (al-Marshudi 2007; Tayara 2015). This study aims to document traditional systems of ʻaflaj management in order to inform ongoing efforts to preserve and modernize the system (see al-Ghafri et al. 2002).

6.3.2 Research Objectives and Methods

The objectives of this research are to better understand the effects of land use activities on water resources and to develop best practices to prevent and mitigate negative impacts. The goals are to review the existing management of ʻaflaj systems, analyze traditional laws governing the management of ʻaflaj and their effectiveness, and ascertain whether these regulations can survive and adapt to modern changes.

Data was collected through interviews with water management officials and falaj site visits (see Appendix 9.5, Table 15). Interviews included:

- Four *wakils* – managing agents for falaj administration – in Bat, Ibri, ad-Dariz, and Sarrani;
- Three academic researchers at the University of Nizwa, Falaj Research Unit;
- Nine water administrators for the al-Dhahirah Region in the Ministry of Regional Municipalities and Water Resources and Ministry of Agriculture and Fisheries.

6.3.3 **Preliminary Results**

The conducted interviews revealed three commonly held perspectives on how to maintain the ‘aflaj:

1) The function of falaj shares is an understudied and potentially significant component of the ‘aflaj system;
2) The success of the ‘aflaj system also depends on communities ability to access the economic benefits of falaj-fed agriculture (e.g., international sale of dates);
3) There is a need to develop an incentive program to encourage younger generations to learn about the ‘aflaj system and to build economic independence through traditional agricultural practices.

Future efforts in this project will include the study of traditional and modern (time-based) methods for falaj water distribution through additional interviews and falaj site visits.

Figure 42. Falaj site visit with Mr. Sheikh al-Salam, al-Dariz wakil.

7. Site Management and Outreach

Charlotte M. Cable, Eli N. Dollarhide, & Jennifer Swerida

7.1 Bat Site Management

During the 2019-2020 field season, BAP worked with and on behalf of the Ministry of Heritage and Culture to contribute to the Bat Site Management efforts. Project contributions included a survey of an area proposed for the location of the site's future Visitor Center and periodic conferences with MHC officials. Other activities included determining the potential for student-focused curricula with archaeological content and giving several presentations and tours.

7.1.1 Bat Visitor's Center Survey

In an initial interview with the MHC Director of World Heritage Sites we were asked to conduct a preliminary archaeological survey of a block of land, ca. 270 x 225 m, that was a proposed location for a Visitor Center for the UNESCO Sites of Bat, al-Khutm and Al-Ayn (Figure 43). This space was chosen because it was thought to be just outside of the boundaries of the UNESCO site and is accessible via the paved Wahrah-al-Ayn road. At the time, it was known that a farm was located there, but the MHC Muscat offices found no *mulkiya* (formal deed) documenting ownership and thus, assured us that the farm was as good as public property.

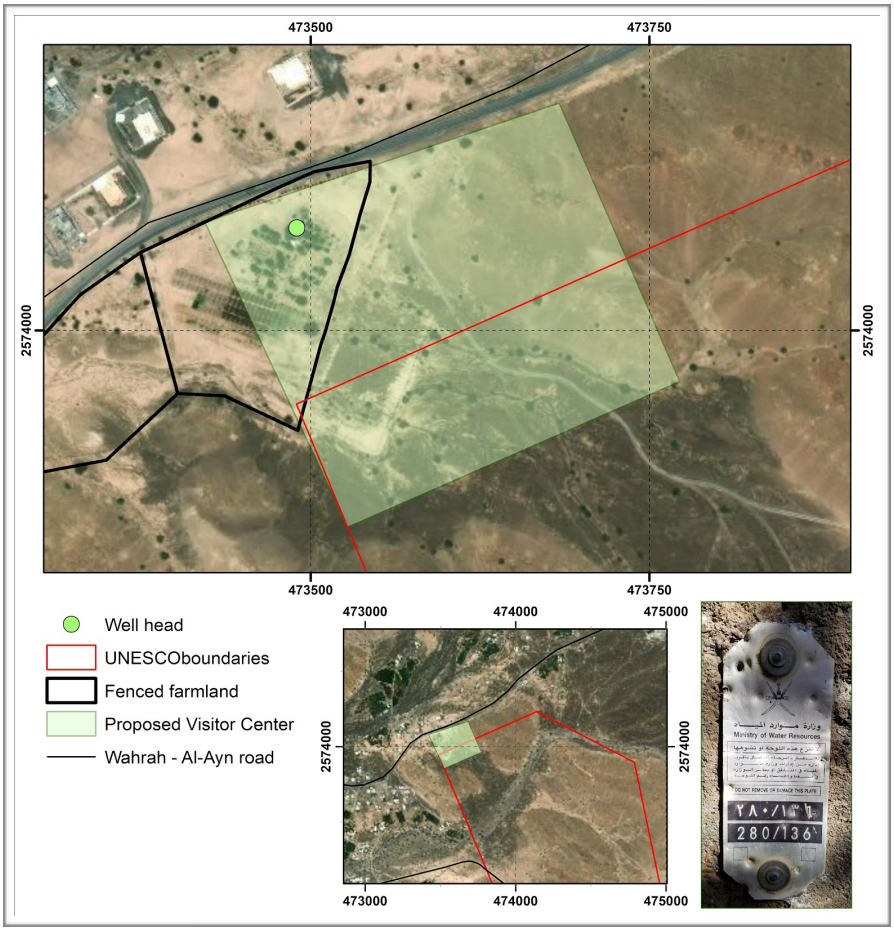

Figure 43. The Proposed Visitor Center location along the Wahrah-Al-Ayn road, showing the farm, the fenced areas, the wellhead and its registration number. Inset: overview showing location of the proposed Visitor Center and the Bat UNESCO boundary.

Initial pedestrian survey of the area took place on December 22, 2019. The area in general is a low and narrow wadi terrace situated between the upright bedrock slopes that make up the northwestern corner of the UNESCO zone. Its narrowest point (ca. 130 m) is also where the gravels of the terrace meet the soft sediments that usually indicate alluvial deposits — in this case, possibly the Wadi ash Shuwayi. Therefore it was expected that few archaeological features would be visible in this area. However, the low bedrock hills in the eastern and southern quadrants of the proposed VC footprint were likely to contain evidence of prehistoric features, as these are commonly the locations for Bronze Age tombs.

A preliminary assessment of the area provided evidence of permanent and legal ownership in the form of significant fencing and a well registration plaque located on an established well head and pumping system (Figure 43). This documentation was immediately forwarded to the World Heritage Sites Department, who were able to confirm these conjectures. Consultation with the MHC Bat office manager, Mr. Suleiman Al-Jabri, additionally confirmed that, while no *mulkiya* had been issued, land rights documents had been lodged for that location by a private citizen decades earlier, and thus the confusion was caused by legal technicalities. Later, after the completion of fieldwork, it was possible to overlay the various legal boundaries to determine alternatives to the original proposal.

Instead, pedestrian survey took place outside of the fenced areas (Figure 44). Five transects were walked and only one unidentified feature, located on the alluvial plain, was documented. The feature's presence, however, suggests that the depth of the alluvial deposits in the proposed VC footprint is relatively shallow, therefore any construction runs the risk of impacting (destroying) buried archaeological remains. An additional 7 Bronze Age tombs, situated on the hill in the northeast quadrant, also lie within the proposed VC area (see Figure 44).

When viewed in a GIS it was also possible to determine that the proposed VC area falls partially within the UNESCO boundary (see Figure 44).

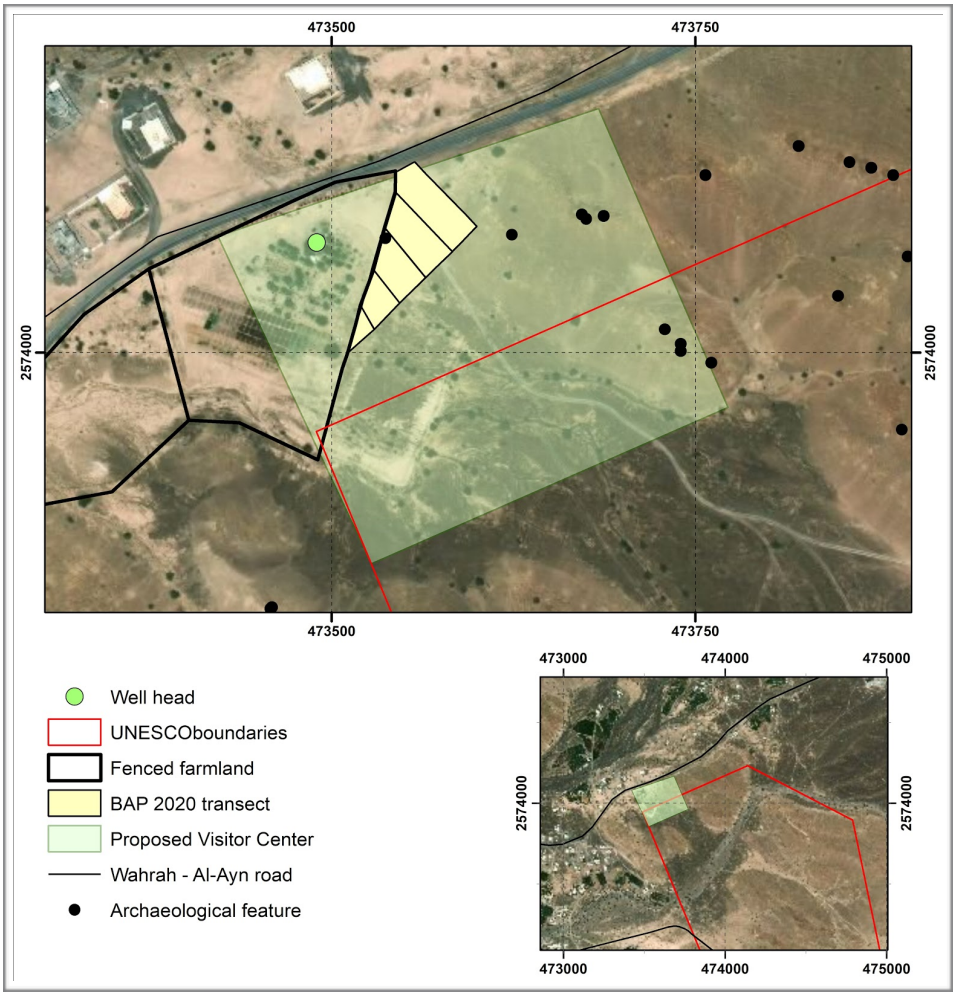

Figure 44. Location of transects and archaeological features within the Proposed Visitor Center footprint, with the Bat UNESCO boundary in red. The archaeological features in the northeastern quadrant of the VC footprint are situated on a bedrock outcrop.

Recommendations:

- As one goal in choosing a location for the VC was to avoid overlap with the boundary, it is recommended that the entire southeastern half of the proposed VC area should be abandoned.
- Destruction of the hill in the northeast quadrant of the proposed area, and/or its archaeological remains, should be avoided. The modifications to the natural landscape that are visible from within the UNESCO site should be considered only if they enhance the values of the site.
- The area between the privately owned fenced land and the UNESCO boundary is ca. One-third of the original proposed VC area. Purchase of the privately owned property and two of the fenced areas to the west of it would increase the area to 225 m along the road frontage and 125-145 m deep, to the edge of the UNESCO property.
- The next phase of study should identify the depth of deposits (i.e., the location of underlying bedrock) and to identify any potential archaeological anomalies, preferably by geophysical assessment, and conduct test excavations at the identified feature to determine its antiquity.

7.1.2 Ministry of Heritage & Culture Site Visits

Officials from the Ministry of Heritage & Culture visited Bat on two occasions during the BAP field season: (1) an unofficial visit by Mr. Mohammed al-Waili on 16 January 2020 and (2) an official visit by Mr. Sultan al-Moqbali and Mr. Mohammed al-Waili on 22 January 2020.

During the unofficial site visit of 16 January 2020, Mr. al-Waili toured the ongoing excavations on the Settlement Slope in order to observe the work. He also held brief discussions with Dr. Swerida in order to review BAP season progress of the Bat walking survey and the excavations at Rakhat al-Madrh.

During the official visit of 22 January 2020, Mr. al-Moqbali and Mr. al-Waili came to the site in order to observe the results of the BAP 2019-2020 field season and integrate BAP expertise into MHC decision-making for the site. Discussions between MHC officials and BAP directors emphasized the importance of a holistic understanding of the Bat archaeological landscape and refinement of our knowledge of the site's prehistoric material culture.

7.2 Education and Outreach

BAP is committed to promoting public education on the archaeology of Oman and of the site of Bat. In the 2019-2020 field season, BAP furthered this objective through several endeavors: (1) a guided site visit to visiting scholars from the College of William and Mary; (2) beginning preparations for the publication of a children's book on the archaeology of Bat; and (3) the first project research presentation of season results at the MHC offices at Bat.

7.2.1 College of William and Mary Group Visit

Twenty-one American university students, faculty, and staff from the College of William and Mary visited the archaeological site of Bat on January 9, 2020. They received a tour of the site, including the tower Rojoom, the Settlement Slope, and the Bat cemetery, led by Dr. Eli Dollarhide and Dr. Jennifer Swerida. As the students were staying in 'Ibri, the tour highlighted the depth of human occupation in the al-Dhahirah Governorate specifically and the importance of the remains at Bat for understanding the broader prehistory of the Gulf Region. Ancient Magan's copper trade and relationships with other sites along the Indus River Valley, in the Iranian Plateau, and along the coast of the UAE and Bahrain were also discussed. The visit concluded with a stop at the Ministry of Heritage and Culture Offices in Bat to view the latest finds from BAP's 2020 excavations and explore the MHC's important role in the preservation of Bat.

Figure 45. American students receiving a tour of the Rojoom tower.

Figure 46. American students receiving a tour of the Bat Necropolis.

7.2.2 **Bat Children's Book**

A preliminary discussion with local community members arose to assess interest in teaching resources that drew on knowledge of ancient Oman. This proposed project would invite Cambridge researcher Dr Gemma Tully to work with the schools in Bat. Dr Tully, who has completed similar projects at Mograt Island in the Sudan and at Tell al-Amarna in Egypt, works with local schools and their teachers to develop curricular resources that use local archaeological heritage to teach science, mathematics, and other foundational subjects in schools. The projects not only foster awareness of and pride in archaeological heritage, they also result in materials and resources that can be distributed widely in numerous languages. Dr Tully's newest bilingual book, Life under the Sun: A Story from Ancient Amarna (https://www.google.com/url?q=https://en.blikvelduitgevers.nl/product-page/life-under-the-sun-an-egyptian-story-and-activity-book&sa=D&ust=1592272462919000&usg=AFQjCNHn2BtkFFN4uUb_x07i2IUXJmwJtA), in publication now, while the Arabic-English Discovering Mograt Island Together was completed in 2016 (Figure 47). It is hoped that future seasons will provide opportunities to engage directly with Bat community members as we develop similar projects alongside technical experts such as Dr. Tully.

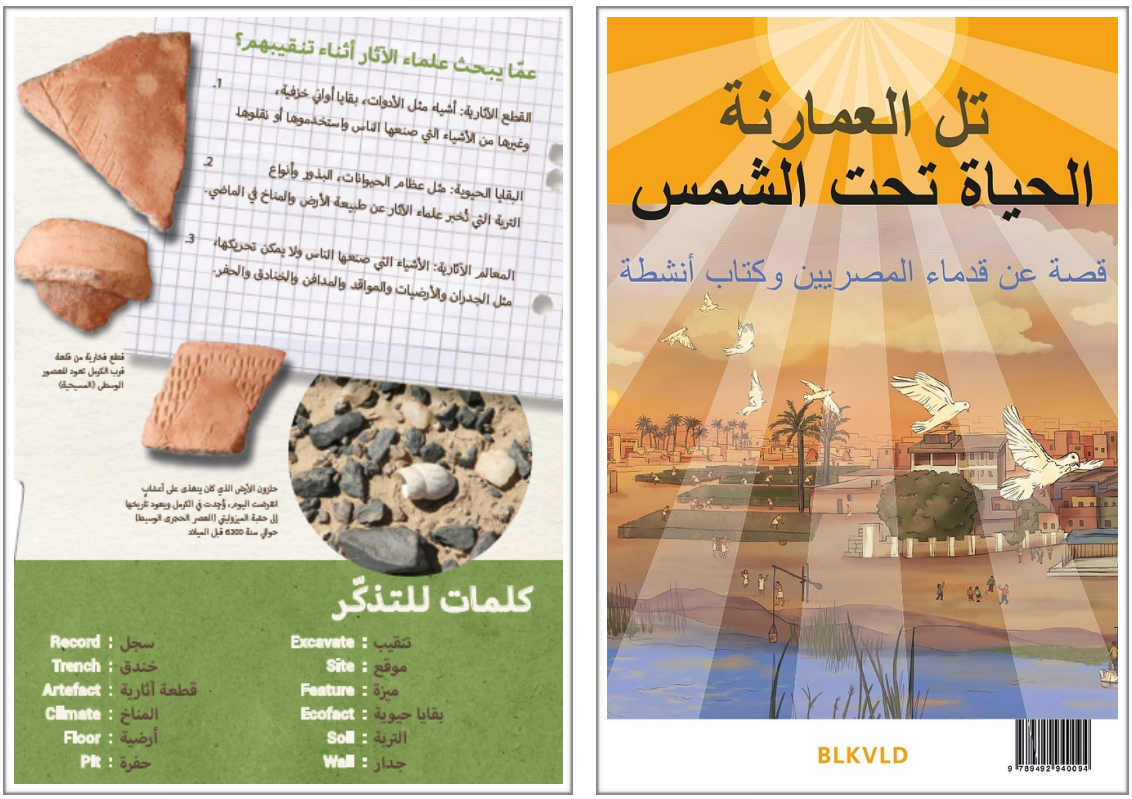

Figure 47. Sample pages from *Discovering Mograt Island Together* (left) and *Life under the Sun* (right).

7.2.3 **Research Presentation at the MHC Bat Office**

On 22 January 2020, BAP directors Dr. Jennifer Swerida and Dr. Eli Dollarhide gave the first official presentation of project research conducted at Bat to an audience of archaeological and heritage specialists in the MHC Bat Office. Attendees were composed of the MHC Bat Office staff — including, among others, Mr. Suliman al-Jabri, Ms. Asma al-Jisassi, and Mr. Badr Ali al-Maqbali — as well as visiting officials from the MHC in Muscat — including Mr. Sultan al-Moqbali and Mr. Mohammed al-Waili. The decision to hold the presentation of the BAP 2019-2020 season preliminary results in the HMC Bat Office provided an excellent opportunity for the project to share its findings with partners in the MHC who work most closely with the site of Bat year round.

By chance, it was also possible for members of the French team led by Dr. Corinne Castiel to be in attendance at this presentation. As a neighboring project working at the nearby site of al-Arid, it was particularly useful for the French team to learn of the BAP results. Such open communication between projects may enable BAP and the French team to coordinate future fieldwork and research objectives to complement one another.

Following the formal presentation of the season results, BAP hosted an informal "show and tell: discussion between project members and presentation attendees. This casual gathering provided an opportunity for all participants to discuss BAP's season results and to observe artifacts highlighted in the presentation.

8. Conclusion and Future Plans

Jennifer L. Swerida, Eli N. Dollarhide, and Charlotte M. Cable

8.1 BAP Future Research Plans

In light of the current global situation, BAP plans to conduct a study season with limited survey and excavation components during the winter of 2020-2020. This will be followed by three subsequent field seasons of more substantial survey and excavation.

8.2 2020-2021 Study Season

The BAP 2020-2021 study season will pursue five research objectives: (1) the re-evaluation of previously collected archaeological materials for publication; (2) geomorphological study of the relationship between previously excavated Umm an-Nar domestic contexts and identified hydraulic features; (3) targeted survey of areas of interest identified in the 2019-2020 drone survey; (4) limited excavations at the Settlement Slope and Matariya to clarify the results of the 2019-2020 season; and (5) the collection of clay samples from the region to continue on-going research on Bronze Age ceramic production.

8.2.1 Re-Evaluation of BAP Materials for Publication

Since our research on Bat began in 2004, BAP's understanding of the site's archaeological landscape and materials has grown substantially. During the 2020-2021 study season, we will re-evaluate documentation and materials collected in the early years of the project in light of the extraordinary growth of knowledge regarding the Bronze Age in Oman. Materials to be considered include ceramics, groundstone, and lithics from survey and excavation, especially those from the Operation A excavations and the 2007 surveys (Possehl and Thornton 2007). Operation A is of particular interest, as this feature makes a modest impact on the Bat landscape but may provide important information on Umm an-Nar and Wadi Sûq occupational patterns and ceramic sequences. The proposed re-evaluation is central to our understanding of how different parts of the landscape, and different features on it, developed and changed over time.

The re-evaluation of materials collected early in BAP's tenure at Bat will contribute to multiple new publications that will discuss Bronze Age ceramics, lithics, and settlement. The research will focus on Bat but these new interpretations will add significantly to the ways in which archaeologists interested in Bronze Age Oman will evaluate their materials and understand broader cultural trends.

8.2.2 Geomorphological Studies

In coordination with geomorphological specialist Tara Beuzen Waller, BAP will investigate the relationship between settlement and water management, comparing Matariya, Rakhat al-Madrh, and the Settlement Slope. At Matariya, a test trench and scientific sampling (soil probe) will identify ancient water levels in the tower well and in a nearby section and compare them to results from previous work between Khafaji and the Settlement Slope (Desruelles et al. 2016). At Rakhat al-Madrh, a test trench and scientific sampling will be used to determine the connection between Structure RaM 1 and the nearby water catchment area. At the Settlement Slope, a test trench and additional scientific sampling with determine the contemporaneity and functional

relationship between Structure SS12 and a nearby feature identified as a check dam (Brunswig 1989). Geomorphological studies will be carried out over a two week period, to be coordinated with limited excavations at the Settlement Slope.

8.2.3 **Survey**

Further pedestrian survey and test excavations will clarify the dates and types of features in the Matariya, al-Ahliya, and al-Qa'a areas. With Bronze Age deposits near and at the surface in these areas it will also be possible to better document environmental changes in these zones, focusing on sedimentation and erosion, in order to model land use patterns and to develop appropriate detection methods (such as geophysical prospection).

8.2.4 **Limited Excavations**

During the 2020-2021 study season, limited excavations will be carried out in strategic locations at Matariya and the Settlement Slope in order to answer unresolved questions from the 2018-2019 and 2019-2020 field seasons.

At Matariya, strategic testing of surveyed features will identify both the types of features present but also provide datable materials for chronometric and relative dating. Previous research by Frifelt (e.g., Frifelt 1989; 2001) and BAP (e.g., Cable et al. 2019; Thornton et al. 2016) suggests that the Matariya area was used in Hafit and Umm an-Nar times, then again in the Iron Age. Excavations will be conducted over the course of two weeks and will prepare the groundwork for much larger future research.

At the Settlement Slope, the northernmost trench (Trench 651862a) of the Structure SS12 excavations will be reopened and the grid square north of it (Trench 651862b) will be excavated. Objectives of this excavation include: (1) defining the northern extent of Structure SS12; (2) identifying the Late Umm an-Nar use surface(s); (3) completing excavation of the Late Umm an-Nar pit (Lots 201061 and 201070); and (4) identifying and dating the original Middle Umm an-Nar floor surface in the northern half of the building. Excavations will be conducted over the course of two weeks, concurrent with the Settlement Slope geomorphological studies.

8.2.5 **Clay Sampling**

Following the successful results of a program of ceramic petrography completed on Umm an-Nar ceramics from Bat, Rakhat al-Madrh, and 'Amlah, a series of clay sampling is planned for the BAP 2020-2021 Season. The initial results of the ceramic petrography indicated Umm an-Nar period ceramics were being produced at Bat by at least the start of the Middle Umm an Nar Period (c. 2500 BCE). This pottery appeared to also circulate to 'Amlah and likely other surrounding settlements. By the late Umm an-Nar period (c. 2200 BCE), the petrographic results indicated ceramics were also being produced at 'Amlah. Several potential clay sources have been located through local reconnaissance and consultation with geological maps. By sampling and exporting these raw clay materials for laboratory analysis, we will be able to investigate the production processes, locations, and eventual circulation of Umm an-Nar ceramics in the Bat region.

8.3 Future Seasons

Following the 2020-2021 study season described above, BAP will conduct three field seasons targeting five key areas of the site: (1) the "enclosure" near Matariya; (2) the eastern end of the Settlement Slope/al-Qa'a; (3) tombs on the al-Ahliya hilltop; (4) the field east of al-Rojoom; and (5) the settlement contexts at Rakhat al-Madrh. The long-term goals of these studies are (1) to create a local-scale model of land use and change for the Wadi Sharsah and Wadi al-Hijr in the late Holocene; (2) to understand its integration within larger Bronze Age networks while focusing on local actors and relationships; (3) to develop a model of Bronze Age socio-political and economic organization for the northern interior Oman; and (4) to increase both international academic and local Omani understandings of the archaeological heritage of Bat.

8.3.1 Matariya

The promising results from the 2019-2020 drone survey and the 2018-2019 trenches 67001 and 67002 suggest that the area below the enclosure (1167) at Matariya contains mudbrick architecture dating to the Hafit period. We hypothesize that this architecture is related to the Hafit occupation of the landscape around Matariya tower. Beginning in the winter of 2021-2022, BAP will open horizontal excavations in this area with the goal of exposing and dating the mudbrick architecture and assessing the nature of their associated contexts. Excavations will be carried out for one or two seasons.

8.3.2 Settlement Slope/al-Qa'a

Survey on the eastern end of the Settlement Slope hillside extending into the al-Qa'a wadi plain documented a dense concentration of Umm an-Nar architectural fragments and pieces of material culture. Based on this pattern, it is likely that the Umm an-Nar settlement contexts known to exist on the Settlement Slope hillside continue into the area now covered by the sediment of the al-Qa'a wadi plain. In the winter of 2021-22, BAP will begin three seasons of broad horizontal excavations at the base of the eastern Settlement Slope hillside. The objective of these excavations will be to determine if the Umm an-Nar settlement does extend into the al-Qa'a plain and to identify Umm an-Nar domestic contexts. This data will be used to explore Umm an-Nar lifesways, domestic economy, social organization, and settlement ecology.

8.3.3 al-Ahliya Tombs

Survey of the al-Ahliya hill between 2011 and 2020 have documented a remarkably dense collection of multi-period remains. This density of remains—especially the multiple Wadi Sûq and at least one Umm an-Nar tomb—makes the Umm an-Nar tower located on the hill crest difficult to document and understand. In the winter of 2020-21, the Bat Archaeological Project will collaborate with Dr. Selin Nugent (University of Oxford) to excavate the tombs located on the al-Ahliya tower. These excavations will enhance our understanding of the Wadi Sûq and Umm an-Nar mortuary traditions at Bat. Once excavated and fully documented, these tombs can be removed to reveal the Umm an-Nar tower below them. Excavation of the tombs will take one to two seasons; cleaning of the tower will take one season.

8.3.4 **Rojoom**

The results of the 2019-2020 Trench 45001 demonstrate that Umm an-Nar contexts exist below the field to the east of Kasr al-Rojoom. The sloping nature of the Umm an-Nar surface identified in this trench also shows that the third millennium landscape in this area was more irregular than the modern landscape. In the 2021-22 season, BAP will open a second trench perpendicular to and west of trench 45001 with the aim of further exploring the ancient topography and to understand better the link between the settlement and the environment. Based on the results of this trench, a further season of excavation may be carried out in the 2022-23 season.

8.3.5 **Rakhat al-Madrh**

The excavation of RaM 1 demonstrated the archaeological potential of this smaller Umm an-Nar settlement area south of Bat. Starting in the 2021-2022 season, BAP investigations at RaM will continue by excavating in the northern quadrant of the structure RaM 1, to further ascertain information about the functions of the building's spaces. Excavations will also begin in RaM 2, the other well-preserved structure identified in 2017 and mapped during this season's survey operations. Additionally, a geomorphological study of the sedimentary trap at the center of Rakhat al-Madrh will begin in Spring 2021. This research will help model how the landscape at Rakhat al-Madrh has changed over the past 4,500 years; how anthropogenic causes have affected the availability of water at the site; and whether the patterns of Bronze Age landscape management at the site indicate modification was completed for flood prevention, agriculture, or other causes.

8.3.6 **Education and Outreach**

During the next several years the Bat Archaeological Project will explore a new emphasis on outreach and education materials focusing on people at Bat. We hope to include annual open houses and development of Arabic-language presentation materials for local MHC staff, and begin a larger project to explore collaborations with primary schools in the area more broadly.

9. Appendices

9.1 Transects

Table 9. List of transects and summary of finds.

Lot Number	Associated Lots (Features Contained)	Dimensions	Finds	Description
190233	200079–200084	25 x 100 m	Pottery; lithic; unworked marine shell	Transect lies on a very low terrace on the eastern edge of the al-Qa'a plain, where alluvial silt and colluvial debris meet. On its northern boundary is a small Umm an-Nar style tomb that had been excavated, probably in 2007 or 2008. The northwestern part of the transect is disturbed by an electricity pole and power lines and its eastern and northern parts by numerous rubbish heaps (ca. 7). It is muddied in the eastern end from recent rainfall. A 10 m-tall hill occupies the southern side of the transect.
200001	200002, 200003	25 x 100 m	Pottery; lithic; unworked marine shell; metal	Transect on the al-Qa'a wadi plain. The landscape is cut by one large erosion cut and several channels. Many small sherds on the surface - displaced by water movement (recent rain).
200004	200005, 200006	25 x 100 m	Pottery; lithic; unworked marine shell; metal	Transect on the al-Qa'a wadi plain, cut by several meandering erosion cuts. Many well-worn sherds and lithics on the surface, tumbled from flooding. Two stone features are located at the western and where the transect meets the base of the settlement slope hill.
200007	200008– 200010	25 x 100 m	Pottery; lithic; unworked marine shell	Transect on the al-Qa'a wadi plain and eastern end of the Settlement Slope hill. Cut by one large erosion channel and several small ones. An Umm an-Nar tomb (200008) is situated on the low slope of the SS hill, in the NW corner of the transect. Pottery on the surface is relatively sparse and well-worn by erosion. Two walls (200009 and 10) on the wadi flat probably date to the Iron Age or later.

Lot Number	Associated Lots (Features Contained)	Dimensions	Finds	Description
200011	200012–200016	25 x 100 m	Pottery; lithic; shell	Transect on the al-Qa'a wadi plain. Mostly flat terrain with sand, silt, and gravel. Surface pottery is heavily worn from erosion. High quantities of chert on the surface, some of it clearly worked. Most/all of this material is probably accumulated wadi wash. One probably deconstructed tomb in the center of the transect is of uncertain date. The pottery is a mix of periods.
200017	200018–200021	25 x 100 m	Pottery; lithic; unworked marine shell	Transect on the al-Qa'a flood plain. Surface ceramics are for more common on the southern end of the transect, possibly due to wash from tomb features 200015 (in transect 200011) and 200020. Sherds are well-worn and mostly date to the UAN and IA. Features 200019 and 200021 are probably fragments of the same destroyed wall feature of 200012 in transect 200011, which now appears significantly larger than originally thought.
200022	200023, 200024	25 x 100 m	Pottery; lithic; unworked marine shell	Transect on the al-Qa'a flood plain. Its irregular shape accommodates the Settlement Slope grid in this transition to the Universal Bat Grid. Terrain is featureless but cut by numerous erosion channels in the west. Most pottery appears to be Islamic in date; a fair number of lithic tools were found. No features, in sharp contrast to the transect to the south. Found a possible little wall fragment in the northeast quadrant. Nothing around it.
200025	200026–200034	25 x 100 m	Pottery; lithic; metal	Transect on the eastern end of the south-facing side of the settlement slope hillside. The transect is larger than usual to accommodate the transition from the Settlement Slope grid and the Universal Bat Grid. It includes the east end of the Settlement Slope hill and some of the al-Qa'a flood plain and is cut by a large wadi channel. Numerous wall fragments and tombs are visible on the surface, most disturbed by erosion down the Settlement Slope hill. The surface pottery is a mix of UAN, IA, and Islamic. The terrain is also cut by cemetery fencing and power line poles.

Lot Number	Associated Lots (Features Contained)	Dimensions	Finds	Description
200035	200036–200055	25 x 100 m	Pottery; lithic	Transect on the southern face of the Settlement Slope. Its irregular shape is the result of the convergence of the Settlement Slope grid and the Universal Bat Grid. Not much by way of features or finds in the northwestern quadrant of the transect because of the steep grade of the slope. As the slope tapers in the south and east, there is a high density of pottery and wall fragments. Periods represented are mixed, but the UAN is most common. Most surface contexts on the slope appear to have been affected by erosion.
200056	200057–200060	19 x 100 m	Pottery; lithic	Transect is south of the Wahrah-Amlah road and is truncated because of it. It is on a flat plain that slopes slightly down to the northwest and its deposits consist of fine silty sand and clay with gravel. All of the stone is probably brought in, as there is no evidence of bedrock nearby. The features in this area contain notable amounts of subrounded large pebbles/small cobbles and likely all came from medium-velocity wadi streambeds.
200061	200062–200064	25 x 100 m	Pottery; lithic; unworked marine shell	Transect immediately to the south of the Bat–Amlah road. The ground is relatively flat, with near-perfect visibility (as elsewhere). No features were identified on the northern and western quadrants. The features that were present were mounds of stone (both wadi cobbles and angular schist) with significant soil mounding.
200065	0	50 m x 100 m (triangular)	Pottery; lithic; unworked marine shell	This triangular transect is heavily truncated by the unpaved Bat–Amlah road, which forms its western and northern boundaries. Although the size is irregular the area covered is roughly equivalent to a full 25 x 100 m transect. The road itself is deeply incised into the wadi deposits, and the northern section created by the road cut suggests ca. 30 cm of alluvial deposit above the natural gray clastic materials (i.e., slightly more than the deposits visible in 200069 to the northeast). No features were identified in this small space.

Lot Number	Associated Lots (Features Contained)	Dimensions	Finds	Description
200066	200067	(15 to 25 m) x 130 m	Pottery; lithic; unworked marine shell	This transect is situated directly north of Matariya tower. In keeping with the 2019 results from adjacent transcents, finds in 200066 were few and only a single feature was identified. Several large bushes provide the only obstructions to feature detection, and the entire transect slopes gently north and westward, away from the tower. A dirt track bisects the transect area, leading from the Bat–Amlah road to the school nearby.
200068	0	(15-25 m) x 130 m	Pottery; lithic; slag	This transect, directly to the north of 200066, sits on the wadi plain north-northwest of Matariya tower and is truncated on its northern edge by the Bat–Amlah road cut. The area was used as the stone rubble pile for tower stones removed during excavation of Matariya's exterior destruction layers and as such visibility can only be said to be ca. 50%. Several erosion channels drain northward into the road cut. Near the cut, a soil pile formed by modern earth-moving equipment (i.e., not a backdirt pile) contained a sizable sherd from a large Iron Age storage jar with snake applique as well as a fist-sized chunk of slag --- indicative of an IA presence near Matariya.
200069	0	25 x 100 m (triangular)	Pottery; lithic	Transect, bordered on the north and west sides by the Bat–Amlah road and truncated to only ca. Two-thirds of the theoretical edges of the transect. The northern section visible in the exposed road cut indicates only 20-30 cm of deposit above a grey clastic deposit. The surface is made up of fine silty alluvium that is mostly flat. Little archaeological remains were found.
200070	0	25 x 100 m	Pottery; lithic	This is the northwestern-most transect of the proposed Visitor Center (VC) site. It is partially cut on the west end by an extant farm. In the northeast quadrant is the western face of a limestone hill, descending down to a very loose silt alluvial plain which makes up the surface of the rest of the transect. A fasad point was found at the base of the hill.

Lot Number	Associated Lots (Features Contained)	Dimensions	Finds	Description
200071	0	25 x 100 m	Pottery; lithic	This transect is truncated on the western side by a farm. It was surveyed to provide information for the MHC regarding VC locations. No features. Surface sediments are quite soft, except where modern earth moving has resulted in mounds (e.g., from fence construction) made from the caliche-like buried deposits seen elsewhere (from persistent flooding?).
200072	200073	40 x 25 m (triangular)	Pottery; lithic	This is a mostly empty survey transect with a western edge truncated by a farm (its fence forms the western boundary of the transect). It was surveyed to provide information for the MHC regarding VC locations. Few finds, including one flake with retouch. One low mound of shattered stones and soil that may once have been a tomb.
200074	0	25 x 100 m	Lithic	Transect bounded on its western side by a farm fence and widest on its northern end. It was surveyed to provide information for the MHC regarding VC locations. This transect includes few artifacts and no features—but the soft alluvial sediments may cover features (as tombs are ubiquitous in this area).
200075	0	25 x 100 m	Lithic	A small, more or less "empty" transect in an area of silty alluvial deposit. It was surveyed to provide information for the MHC regarding VC locations. The surface is strewn with fencing posts and their associated cement blocks, while the holes (which were dug in ca. 2013) have mostly filled in with wind- and water-borne deposits.
200085	200086–200089	25 x 100 m	Pottery; lithic	Located in the al-Qa'a area, the southern boundary of this transect follows over the top of a ca. 12 m tall hill. There is a possible tomb at the peak as well. Mostly from tomb rockfall with significant soil deposits on and rubble at the base of the hill, thus decreasing some of the visibility. Numerous white stone fragments (some ashlar, some chunks) were found on the eastern half of the transect.

Lot Number	Associated Lots (Features Contained)	Dimensions	Finds	Description
200090	200091–200099	25 x 100 m	Pottery; lithic	Located in the al-Qa'a area, this transect covers the southern half of a ca. 12 m tall rocky hill covered in colluvial scree (collected at its base), with alluvial silt deposits forming on the hill's eastern and western ends (particularly on the western, side, where it becomes the al-Qa'a wadi plain). A modern structure (most likely a barn), ca. 14 x 10 m, is located in the western part of the transect and could be responsible for the accumulation of soil and stone on the western face of the hill.
200501	200502, 200503	25 x 100 m	Pottery; lithic; metal	This transect lies immediately to the southwest of the unpaved road that bisects Rakhat al-Madrh. It contained few features or artifacts, though some UaN body sherds were found on it western side. Several Islamic sherds were also collected.
200504	200505–200508; 200509–200522 (RaM 1)	25 x 100 m	Pottery; lithic; metal	This transect covers the southern edge of the RaM subrecent alluvial fan, including the transition from exposed bedrock (to the south), the pan margin (upon which the structures are visible), and well into the alluvial pan itself. This transect contains structure RaM 1 and several (n = 4) other features (see below).
200523	200524, 200525	25 x 100 m	Pottery; lithic	Transect 200523 covers the southern edge of the RaM subrecent alluvial fan, including the transition from exposed bedrock (to the south), the pan margin (upon which the structures are visible), and well into the alluvial pan itself. Several retouched lithics were collected. The transect includes two circular stone features - one a potential fire pit and the other is a larger enclosure-like feature (see below).
200526	200527–200541 (RaM 2); 200542–200545	25 x 100 m	Pottery; lithic	This transect covers the southern edge of the RaM subrecent alluvial fan, including the transition from exposed bedrock (to the south), the pan margin (upon which the structures are visible), and into the alluvial fan. This transect contains structure RaM 2 and additional stone features.

Lot Number	Associated Lots (Features Contained)	Dimensions	Finds	Description
200546	200547	25 x 100 m	Pottery; lithic	This transect covers the southern edge of the RaM alluvial fan, including the transition from exposed bedrock (to the south), the fan margin (upon which the structures are visible), and just to the edge of the alluvial fan. The bedrock here transitions from conglomerate (to the east) to bedded schist (to the west and south). Few lithics or sherds were collected here (and the lithics found primarily on the slope) but the aeolian deposits -- surprisingly deep within the exposed upright schist beds -- partially obscures the surface (40%).
200548	200549	25 x 100 m	Pottery; lithic	This transect lies immediately east of the modern dirt road bisecting the RaM alluvial fan. It covers the conglomerate bedrock on the southern edge of the fan, the short terrace (upon which the structures are visible), and a large amount of what appears to be fairly deep alluvium. It includes a single stone concentration in its western quadrant. The ceramics appear to date to the UaN.
200550	200551–200566 (RaM 3), 200567	25 x 100 m	Pottery; lithic; metal	Transect 200550 was the easternmost transect survey this season and extends from the conglomerate bedrock on the south through the ca. 12 m of terrace (upon which RaM 3 sits) and into the alluvial fan itself. It contains structure RaM 3 and several other features. Parts of the southern half of the transect (including RaM 3) were highly disturbed by the installation of an electrical pole and its supports.
200568	0	25 x 100 m	Pottery; lithic	This transect covers the exposed upright bedded schist outcrop that forms the western edge of the RaM subrecent alluvial fan as well as part of the alluvial fan itself (in the transect's eastern quadrant). It was empty of features and there were few artifacts.

Lot Number	Associated Lots (Features Contained)	Dimensions	Finds	Description
200569	200570–200597 (RaM 4)	25 x 100 m	Pottery; lithic	This transect covers the edge of the exposed bedded schist bedrock on the western edge of the fan, a relatively wide terrace (ca. 30 m), upon which structure RaM 4 is visible, and a large amount of the alluvium itself. Structure RaM 4 appears to have been appended with many later (IA? Medieval?) walls. Few artifacts were present on the surface, and primarily in association with RaM 4.
200598	200599–200604	25 x 100 m	Pottery; lithic	This is the most northerly transect surveyed at Rakhat al-Madrh this season. Unlike other transects it contained a number of stone features that were difficult to associate with either functions or periods. This is likely due (at least in part) to the topography: this transect includes the inter-valley area between two of the bedded schist hills on the western-northwestern sides of the alluvial fan, and thus the terrace seems to be much wider and shallower than on the southern side of the fan and a number of the stone features (if that is what they are) are partially buried. Further study of these and adjacent features will be necessary to understand their functions and dates of use.

9.2 Features

Table 10. List of features and descriptions.

Lot Number	Finds Present	Within Transect	Spot Date	Description
200002	-	200001	Modern	A stone alignment, possibly a canal or wall, running N-S and ca. 8.8 m long. On the edge of a shurghi so the feature appears intermittent and misaligned (especially at its western end, where the shurghi is). Its northern end is ca. 70 cm wide with stones on the "outside" oriented straight up - on that end some stones between the outer stones are visible but it is unclear whether they are a "bottom" -- i.e., of a canal -- or an end -- i.e., of a wall. The south end is much more disturbed. Probably late Islamic or Modern periods.
200003	-	200001	Islamic or Modern	Small alignment of white stone blocks and cement-like plaster (jiss? sarouj?) exposed in a drainage channel. Stones are ca. 25 x 15 x 15 cm. The feature is aligned roughly E-W. The function and full feature extent are unclear.

Lot Number	Finds Present	Within Transect	Spot Date	Description
200005	-	200004	unkn.	Wall (possible terrace wall), oriented archaeological N-S along the modern fence line of the cemetery and ca. 2 m above the level of the al-Qa'a wadi plain. Its length is ca. 10.3 m. The wall is made up of a row of rough stones, 1–4 "courses" (or ca. 20–45 cm) tall, with individual stones arranged perpendicular, flat, and upright in the wall (i.e., individual stones follow no particular orientation). Thus, the feature is unlikely to be Bronze Age.
200006	-	200004	unkn.	A collection of stones visible in a steep erosion cut. The stones, ca. 40 x 30 x 20 cm or smaller, are laying at all angles at the bottom. They have likely fallen out of the (steep) section above to the bottom of the channel and probably indicates that there was once a feature hereabouts.
200008	Y	200007	UAN	Tomb, partially visible in plan. The ashlar is almost completely absent except for a few mostly buried pieces, but only the "front" arc (its southeast side) is visible on the slope. The plinth and abutting wall are visible on the southeast side for almost 5.5 m (ca. 40% of the arc). Stones are large (ca. 50 x 35 cm in plan); the plinth includes pecking and the "shelf" for the missing ashlar. The total wall width is roughly 1 m. Among other finds an Umm an-Nar funerary ware sherd was present, as was a coarse Iron Age body sherd.
200009	-	200007	Islamic?	Large stone wall running roughly northeast-southwest for a distance of approximately 25 m. The stones that make it up average 15 x 30 x 20 cm. The feature is one course wide and at least 2 courses tall.
200010	-	200007	unkn.	Wall, oriented roughly NW-SE, most visible on its southeast end for a distance of up to 9.5 m. It is possibly a double-faced or filled wall but only 1 course is generally visible; the rest of the feature is buried in alluvium. The stones that make it up are mostly lying flat but some are angled or perpendicular to each other.
200012	-	200011	unkn.	Linear stone feature (possibly a collapsed wall), roughly 15 m long, in the southeast quadrant of transect 200011. It is composed of an accumulation of large limestone blocks (ca. 50 x 40 x 30 cm), small wadi cobbles, and gravel. No associated artifacts were found.

Lot Number	Finds Present	Within Transect	Spot Date	Description
200013	-	200011	Late Islamic; Modern	This is a stone alignment ca. 18 m long, oriented N-S. The first two meters of the southern end resemble a (raised) falaj channel for watering fields: small stones, oriented upright, flanking a series of flat stones "paving" the interior gap between the upright faces and ca. 50 cm maximum diameter. The southern end is on a small hill (jebel) and the next 16 m to the north are lower and therefore silt-filled and obscured.
200014	Y	200011	IA	Small (ca. 2 x 1 m) mound composed of limestone cobbles (ca. 15 x 10 x 10 cm), gravel, and sand. Some iron age pottery visible on the feature's surface; possibly an Iron Age tomb.
200015	Y	200011	IA	Likely an Iron Age tomb (or possibly tombs) with reuse of Hafit tomb stones. The feature is strewn with Iron Age (though non-diagnostic) sherds and is made up of two stone mounds with an area of more dispersed cobbles in between. A few UAN sherds were also recovered but no ashlar stones were visible. Unworked marine shell was observed but not collected.
200016	-	200011	unkn.	An irregularly shaped concentration of limestone cobbles and gravel on the al-Qa'a wadi plain. Cobbles are ca. 15 x 15 x 10 cm, but there were no associated artifacts. The date and function of this feature are unclear.
200018	-	200017	unkn.	This feature is a low mound of gravel, silt, and a few larger limestone blocks. It is possibly associated with the fallen tree just next to it (i.e., the stones collected there naturally), or possibly the tree grew next to a pre-existing feature. No associated ceramics or other datable material culture. Stones are ca. 30 x 20 x 20 cm.
200019	-	200017	unkn.	Continuation of feature 200012 --- the destroyed wall (linear feature) running approximately E-W. It is probably also the same as 200021, and probably constructed (at least in part) of tomb feature 200020 (if so it post-dates 200020). This section of the wall is ca. 23 m long and meanders slightly. Large stones, deeply embedded in the alluvium, are arranged standing upright as well as flat, but the wall is mostly visible on the surface by a mound of angular rubble. It probably dates to the late Islamic or early Modern period, based on its alignment with the field system, but possibly has its roots in as early as the Iron Age. At its maximum its width is ca. 1 m and its height is ca. 50 cm.

Lot Number	Finds Present	Within Transect	Spot Date	Description
200020	Y	200017	UAN?, IA	This feature is likely a tomb made up of large schist blocks and small rubble mounding vaguely oval in shape. Seven bits of ashlar chunks are strewn across the top of the feature. Its association with wall 200019 and 200021 is unclear. Non-diagnostic sherds --- probably Iron Age and UAN --- are visible on the surface, as is a modern glass bottle.
200021	-	200017	unkn.	Wall fragment, probably the northwest-most extension of 200012 and 200019, and probably constructed from tomb stones from 200020. The northwestern-most part consists of a large (ca. 50 x 25 cm in plan) stone with large rounded cobbles and angular and sub-angular stones in a mounded alluvial matrix. It is roughly 20 cm tall, 70 cm wide and 3 m long, and no datable materials were associated with it.
200023	-	200022	unkn.	This feature is a possible wall stub, ca. 80 x 60 cm (length x width) consisting of a collection of ca. 7 stones laying flat, each ca. 15 x 15 cm in plan, and buried in alluvium. A possible wall face is visible on the northwest side, but no other identifying aspects (though, due to the size of the stones, likely not Umm an-Nar).
200024	-	200022	UAN?	An alignment of large limestone blocks (ca. 50 x 40 x 40 cm) that may have made up a stone wall, since destroyed by erosion along the east end of the settlement slope hill. Its preserved length is ca. 10 m and runs across the erosion channels -- suggesting that it may originally have acted as a check dam, associated with the Settlement Slope occupation. In accordance with other features visible at that general level in addition to the size of its constituent blocks it likely dates to the Umm an-Nar period.
200026	-	200025	unkn.	This feature is a small stone alignment disturbed by erosion. The stones are upright with more stones probably fallen into the erosion channel (which displaced them). It is ca. 1.5 m long and 20 cm wide. No dating or function are evident.
200027	-	200025	unkn.	This feature is a wall fragment constructed of blocks 60 x 50 x 40 cm, located at the bottom of the hill slope. It is 2 m long and ca. 60 cm tall.
200028	Y	200025	unkn.	Wall feature constructed of medium sized blocks with some rubble, in-fill. Chunks of ashlar were found nearby, along with non-diagnostic pottery. The feature overall is 2 m long, 40 cm wide, and one stone tall.

Lot Number	Finds Present	Within Transect	Spot Date	Description
200029	Y	200025	UAN	This is a probable tomb, the majority of which has been completely destroyed, just northeast of the power lines near the shurghi. The schist bedrock is exposed and disintegrating, somewhat obscuring the feature's plan. Its diameter is ca. 7 m, with the stones on the western side (downslope) completely absent and remnants of a possible crosswall visible running northwest-southeast.
200030	Y	200025	unkn.	A stone concentration (and possible wall) with two faces, running southeast-northwest. A possible smaller north-south wall intersects with this larger wall on its southern side. Stones are 15 x 15 cm in size (up to 25 x 20 cm) and are laying somewhat flat.
200031	-	200025	unkn.	Relatively small wall fragment running roughly E-W and constructed of stones ca. 30 x 30 x 15 cm. It has been disturbed by water erosion from the settlement slope hill (this is located at the base of the hill) and possibly by a larger wadi cut located to the south. The stones are embedded in the silt and gravel that covers the lower extent of the Settlement Slope hill. No associated finds, and no indication from the stone organization of a date for the feature.
200032	-	200025	unkn.	This is the disturbed fragment of what was probably a stone wall damaged by water erosion from the Settlement Slope hill and from an erosion channel just to the south. The original wall alignment is unclear. The tabular limestone blocks are ca. 35 x 25 x 15cm. One large stone has tumbled into a small erosion channel just to the west, but the other stones are embedded in the silt and gravel wadi terrace.
200033	Y	200025	unkn.	This is a probable dam that heads from north to south, constructed of local stones of varying medium to large sizes and orientations (both flat and upright), with rubble fill. The feature's dimensions are about 13 x 2 m and only ca. 20 cm tall. The pottery found is both diagnostic and non-diagnostic. Chunks of ashlar stone on the surface. If the dating and association with 200034 is correct then this feature dates to the Iron Age or earlier.
200034	Y	200025	IA	A possible (Iron Age) tomb, ca. 2 x 2 m, located to the west of dam 200033. It is probably made of stone brought from the dam nearby. Mound of irregular, small stones associated with non-diagnostic Iron age sherds (identified by ware).

Lot Number	Finds Present	Within Transect	Spot Date	Description
200036	-	200025	WS, IA	This is a short wall (ca. 1 m long), the furthest feature upslope on the western end of the transect (but still near the bottom end of the slope). Only 4 stones are visible (all from the bedrock), ca. 50 x 30 cm each, mostly buried in the alluvium.
200037	-	200035	unkn.	Wall, 2 m long and running app. N-S, composed of bedded schist/limestone blocks ca. 30 x 15 x 15 cm each. The feature is situated on the steep angle of the slope, towards the base of the slope.
200038	Y	200035	WS, IA	The Great Terrace Wall, ca. 16.5 m long, oriented roughly W-E, cut in several places by drainage (erosion) channels down the slope. The feature is constructed from large tabular schist blocks. Most stones appear to be placed in an upright orientation. It is strewn with UAN non-diagnostic sherds that have likely washed downslope. The clearest upright stones are located adjacent to wall 200039. There may be two courses in a few places, and potential corners on the eastern and western ends. Considering the orientations and spatial relations to other features this is likely a late Umm an-Nar wall, but this should be determined through excavation.
200039	-	200035	UAN, WS	This is a cross-wall off of terrace wall 200038, oriented N-S and app. 3 m long and 1 m wide. It is constructed with grey-brown tabular schist. It abuts the southern face of terrace wall 200038 (with its upright stones), to which it runs perpendicular.
200040	Y	200035	UAN, WS	Wall, running SW-NE, near the south end of 200038 (terrace wall). It is very poorly preserved and its constituent stones likely not all in situ. Some of the Umm an-Nar diagnostic sherds strewn across this wall/stone alignment are likely washed downslope through water erosion. It possibly extends past or through the terrace wall and forms a corner.
200041	-	200035	unkn.	A small alignment of upright stones (n = 3), oriented NE-SW, 1.5 m in length and ca. 18 cm wide. It runs parallel to 200042. No datable materials were associated with this feature.
200042	-	200035	unkn.	This is a stone wall to the southeast of 200041, oriented roughly NE-SW and running perpendicular to 200043. It is constructed of large stones (50 x 30 cm), with smaller stones (30 x 30 cm) at its northeast end. It also forms a possible corner with three smaller stones abutting the feature's northern face on its northeastern end; if such is the case it pre-dates the smaller abutting wall, but no other date determination is apparent.

Lot Number	Finds Present	Within Transect	Spot Date	Description
200043	-	200035	unkn.	This is a possible E-W wall ca. 3 m long, constructed of stones ca. 40 x 20 x 20 cm. If it **is** a wall it has been disturbed by water erosion off of the Settlement Slope hill. No datable materials were associated.
200044	-	200035	unkn.	This feature is either the corner of two contemporary perpendicular stone walls (one roughly oriented N-S and 1.5 m long; the other roughly oriented E-W and 2.4 m long) or a platform, 2.4 x 1.5 m and ca. 20 cm tall. The stones are ca. 50 x 30 x 20 cm and all are roughly hewn tabular schist partially buried in alluvium. It has no clear date or associated finds.
200045	-	200035	unkn.	This is a stone alignment (possible stone wall no longer in situ), constructed of bedded schist/limestone blocks ca. 60 x 25 cm, aligned NW-SE for a distance of 1.5 m.
200046	-	200035	unkn.	A possible wall constructed of local blocks ca. 50 x 20 cm that have been eroded by water, aligned N-S. It is ca. 2.5 m long and 20 cm high. It is located at the end of the Settlement Slope near the bottom. No material associated and no clear date for the feature.
200047	-	200035	unkn.	This feature is a wall (3.3 x 1.35 m) made of large (60 x 25 cm) upright stones one course wide. It runs perpendicular to the hillslope. The northeast end disappears into the alluvium, but the feature extends out for 3.3 m before it possibly turns or forms a corner downhill on its eastern end. It is likely that some of the stones have been dislodged and shifted downhill.
200048	-	200035	unkn.	Stone accumulation ca. 2.4 x 1.8 m. The stones are relatively large (ca. 40 x 40 cm) but both upright and oriented flat. It was possibly once part of 200049. It is located on a flattish area of the Settlement Slope but there is evidence of possible movement of stones downward (erosion damage).
200049	-	200035	unkn.	This is an E-W linear feature located near the "base" of the Settlement Slope. Its eastern end disappears into the colluvial slope but its western end is visible for ca. 7 m. It is constructed from stones varying in size from 30 x 20 x 20 cm to 60 x 40 x 15 cm. It is relatively wide (ca. 1.3 m), with the tabular blocks oriented both upright and flat forming the rough outer "facing" while mounded silt and pebbles fill its interior. The feature's west end curves to the south and appears to have stones placed at its "end". This feature resembles a check dam.

Lot Number	Finds Present	Within Transect	Spot Date	Description
200050	Y	200035	UAN	This is the southernmost and largest of three parallel, E-W oriented stone walls. It is ca. 8 m long and appears to form the southern exterior wall of a building, along with walls 200051, 200052, and 200053. The stones here are much larger than those found in most other walls in this area, averaging 50 x 40 x 30 cm. Based on the size of the feature, its association with other walls and the associated pottery this probably dates to the Umm an-Nar period (though it may also be a later addition).
200051	-	200035	UAN	Stone wall running, roughly E-W, constructed of dovetailed limestone blocks ca. 50 x 40 cm. Appears to be an interior wall, as stones are significantly smaller than in wall 200050. The construction appears to be UaN and UaN pottery found in the near vicinity. The wall forms a building along with walls 200050, 200052, and 200053.
200052	Y	200035	UAN	Northernmost of three, parallel stone walls that together form a building (with wall 200050, 200051, and 200053). This appears to be an interior wall built of roughly rectangular stones (stones average 50 x 40 x 30 cm). The structure appears to be UaN and UaN pottery was found in the near vicinity.
200053	-	200035	UAN	This is a long stone wall built of roughly worked limestone blocks. This wall forms the eastern (exterior?) end of a building marked by walls 200050-200052. Stones in this wall average 40 x 35 x 20 cm. The wall is partially disturbed by an erosion channel running along its outer(eastern) face.
200054	-	200035	unkn.	This is a stone alignment east of walled structure (200050-3), technically outside of the eastern edge of transect 200035 (but was included within it on account of the possibility that it belongs to the structure to the west). It is ca. 2 m long and consists of 4 upright stones, located along the eastern edge of an erosion channel; it is unclear if it belongs to the walled structure or to features buried to the southeast, as that area appears to have considerable colluvial build-up. Orientation is roughly NE-SW.
200055	-	200035	UAN	Destroyed wall at the eastern end of the transect, aligned roughly NW-SE and only 1-1.5 m long, made visible in (and disturbed by) a deep erosion cut. The stones of this feature lay flat and two courses are visible. The feature is ca. 70 cm tall and 1 course (ca. 30-40 cm) wide. The northwestern end has been destroyed by erosion.

Lot Number	Finds Present	Within Transect	Spot Date	Description
200057	Y	200056	UAN?, IA	This feature is a mound of stone and soil in the southeastern part (and partially outside) of the transect, ca. 1 m tall and ca. 16 m in diameter. Some larger tabular stones, visible on the surface of the mound, may be in rectilinear alignment and may suggest concealed architecture. A rectilinear cut ca. 2.5 x 5 m is visible in the eastern side of the mound. This may be an undocumented trench excavated by K. Frifelt with a JCB. The ceramics on the surface of the mound primarily date to the Iron Age, but some UaN sherds are present, as are some lithics. Along with the tabular schist are ca. 20% rounded and sub-rounded reddish stones often found in the conglomerate bedrock exposed elsewhere.
200058	N	200056	unkn.	Mound of stone and soil at the northeastern edge of the transect, ca. 2 m in diameter and rising 1 m above the wadi plain. Two non-diagnostic sherds were found on its surface, though it is also strewn with modern broken glass. The mound extends into the transect to the north, although there is a break in the stone concentration and the height of the feature increases. The feature has ca. 20% sub-rounded wadi cobbles (similar to those in 200057).
200059	Y	200056	IA	Mound of stone and soil at the southern edge of 200056, separated from feature 200057 by a "depression" or runoff channel (or possibly an earlier excavation trench?). The highest concentration of wadi pebbles on this feature are at its eastern edge, along with some heat-treated (or simply reddish) cobbles (see 200057). A small Iron Age (post-Iron I) slipped jar sherd and a burned base sherd were found on top of the mound and suggests an Iron Age date. The slope of the mound decreases and the stone concentration thins out before reaching 200060 (located by a tree).
200060	Y	200056	unkn.	This feature is a mound of stone and soil, ca. 0.7 m tall and 7 m across, located directly south of 200056. It has no visible internal architecture. It is possible that it was originally part of 200057 but is now separated from it by a dirt track. Two cores and a chunk of slag were found on its surface. The stones in this feature are ca. 20% rounded, heat-treated (or reddish) stones that resemble those found in conglomerate bedrock outcrops seen elsewhere in the region (but not in this part of the wadi).

Lot Number	Finds Present	Within Transect	Spot Date	Description
200062	Y	200061	IA	This feature is a large mound of stone and soil with an Islamic period tomb (feature 200063) atop. It is located to the north of 200058. Overall the mound is ca. 1m tall and ca. 14 m in diameter. Some Umm An Nar-looking tabular blocks are visible in the mound. A glazed sherd, a projected base, and a buff-slipped redware sherd (all Islamic wares) were found on this feature, which further links the feature to at least this later reuse (associated with 200063). The Islamic tomb itself is built of UaN-style roughly hewn tabular blocks. The highest concentration of large pebble- and small cobble-sized rounded and subrounded stones is found along the western edge of the mound. A considerable amount of modern debris is also evident on the western surface. Lithics as well as Umm an-Nar ashlar blocks were also identified on this feature.
200063	-	200061	Islamic	This feature is an Islamic period tomb located on top of 200062. The feature measures ca. 3.5 x 2 m and is oriented NW-SE. It is covered with modern glass and other debris. No artifacts were directly associated with this feature. It is constructed of roughly hewn tabular limestone of the type used to build Umm an-Nar period tombs, and it is likely that this feature reuses some of those earlier building materials -- though it is unclear from where precisely.
200064	-	200061	unkn.	This feature is a mound of pebble- and cobble-sized sub-rounded (conglomerate) stone and silty soil. The mound rises ca. 50 cm above the wadi plain and lies between (or possibly "on") features 200057 and 200062. Two possible stone walls appear to have been constructed atop the existing mound: the stone walls, each double-faced, are ca. 50 cm wide and ca. 2 m long and are parallel. The mound could be a burial but the walls suggest some other (undetermined) use. It is also unclear how close the mound and walls are temporally. Wall stones are ca. 20 x 15 cm and are therefore relatively small. The walls themselves are composed of two rows of these small stones: a very different construction style from the UaN style. They possibly form a small rectangular room, but much more work would be necessary to understand both this potential feature and the feature overall.
200067	-	200066	unkn.	A small (n = 3) stone concentration or alignment of tabular schist to the north-northwest of the Matariya tower, located in transect 200066. The three stones form a potential (maybe faced) wall, but with no evidence of any other stone features or finds nearby it is difficult to say more.

Lot Number	Finds Present	Within Transect	Spot Date	Description
200073	-	200068	unkn.	This feature is a mound of stone and soil, ca. 7 m in diameter, on an otherwise flat wadi terrace. The gravel is more highly concentrated in the southwestern half of the feature, while there is a substantial depth to the deposit on the northeast side. No material culture is visible on the surface, but a fallen tree obscures part of the mound.
200076	-	190193	unkn.	This is a shallow hearth feature visible in profile in an erosion channel on the settlement slope, approximately 9 m south of (downslope from) structure SS12 and sealed by ca. 20 cm of deposit. It contains a number of small (15 x 10 x 10 cm), angular rocks resting on a bed of charcoal. The hearth feature is not associated with a clear surface or structure, but it is only visible in section. An UaN base was found in the erosion fill just below the hearth, however it is not directly associated with the feature.
200077	-	190193	-	C-14 sample(s) taken from within hearth feature 200076.
200078	-	190193	-	This is a soil sample consisting of three 8 x 10" bags of sediment, collected from the collapsed sections of hearth feature 200076.
200079	Y	190233	unkn.	Small mound of stone and soil approximately 1m in diameter and 5 cm high at the center. Larger stones (ca. 10 x 5 cm wide) are on the boundary of the mound. No function or date can be attached.
200080	Y	190233	unkn.	This is a stone mound ca. 2 m in diameter, disturbed by power lines on the eastern end of a mound with a concentration of small-medium angular stones on the edge of the mound forming a circle. Three larger angular stones are sitting on the center top of the mound. Only non-diagnostic sherds were found and the age and date of this feature are unknown.
200081	Y	190233	UAN	This feature is a small Umm an-Nar tomb partially excavated (mostly visible in plan) by Manfred Mohme in ca. 2007 or 2008, as a salvage project. It is located near a power line pole. The double-faced exterior wall is well preserved and in places at least 2 courses tall (each stone ca. 45 x 30 x 20 cm). One interior dividing wall is visible partially bisecting the tomb. Some ceramics were collected from the tomb's surface, and bone fragments (probably human) were eroding from the unexcavated half of the tomb. The feature is roughly 6 m in diameter, and the outer wall is ca. 1 m thick.

Lot Number	Finds Present	Within Transect	Spot Date	Description
200082	-	190233	unkn.	This feature is a short wall fragment (ca. 1 meter long) near excavated tomb 200080. The feature runs NW-SE and is disturbed by a dirt track. It is only 1 course wide, with the largest in situ stone measuring ca. 45 x 25 cm (height is unknown, as it is buried in colluvium). It is likely better preserved below the surface and to the northwest. The feature shows no associated material culture or datable construction techniques.
200083	Y	190233	UAN	This is a tomb south of excavated tomb 200080. It is definable through the circular emplacement of small boulder-sized tabular schist blocks laying flat on the same surface plane, with cobble-sized blocks on either side and sediment concentrated in the center of the feature. A possible cross-wall is visible. The interior space is ca. 2.6 m in diameter and the exterior wall is ca. 60 cm thick. The wall is face to both the exterior and interior and is two courses thick. The cross wall (if such it is) runs E-W with a width of ca. 33 cm. Ceramics and burnt stones were found outside of the structure, as well as bone shards found within and without. The small size of this feature (a total diameter of ca. 3.8 m --- probably originally slightly wider), associated with Hafit tombs, is at odds with the tomb's location (on a low terrace just above the wadi plain) as well as its construction and material preparation --- all of which is Umm an-Nar. Thus this is best identified as a small Umm an-Nar tomb.
200084	Y	190233	unkn.	This wall consists of five stones oriented northwest-southeast, each measuring between 24 and 67 cm in length. The stones are partially buried, however roughly 5 cm of wall facing is visible on the south side because of the slope on which they sit. The stones vary in size, orientation (upright/ flat), height, and possibly even the sources of the stones. The stones do not interdigitate, and the spaces between them vary 2-10 cm. Although it is unlikely that this feature dates to the Umm an-Nar period no further assessment of its date is possible without further work.
200086	Y	200085	unkn.	This feature is a 2.2 x 3.4 x 0.3 m stone concentration consisting of a ring of similarly sized small tabular blocks (ca. 10 cm long), with some rock fall visible downslope and sediment concentrated in the center of the feature. Some of the rocks are clearly sitting on the loose silty soil (rather than embedded in it), with smaller stones also present. Its age and function are uncertain.

Lot Number	Finds Present	Within Transect	Spot Date	Description
200087	Y	200085	UAN	This is probably a destroyed Umm an-Nar tomb situated on the crest of a low hill (height is ca. 10 m). Its diameter appears to be ca. 4 m, with parts of the exterior double-faced wall and a possible North-South oriented cross-wall visible, but otherwise the feature is preserved only as a raised circular mound. Some Umm an-Nar pottery was found on the surface, along with 14 chunks of white limestone (some of which were ashlar).
200088	-	200085	unkn.	This is an accumulation of small boulder-sized and cobble-sized tabular schist blocks in (and on) a low silt and angular gravel mound, ca. 2.2 x 1.8 m in total. The larger stones (ca. 50 x 40 cm in plan) are roughly hewn and laying flat, with what looks like an exterior face still visible on the "outside" of the feature. Colluvium and the cobble-sized stones have concentrated within the two rows of larger blocks that form the "outside" of the feature. The rows may be two terraced rock walls or two opposite sections of a single feature (such as a tomb). The colluvial silt and gravel likely preserves more of the feature, but no associated materials or the structure itself yield a date for this feature.
200089	-	200085	unkn.	Stone mound surrounded by broken chunks of ashlar. The mound consists of more wadi cobbles than are present in surrounding areas (and they certainly should not be on this tabular bedrock hill outcrop). The limestone ashlar could indicate a possible Umm an-Nar tomb but the feature is small (ca. 1.5 m in diameter) and may be a later burial that reuses the earlier blocks.
200091	Y	200090	unkn.	This feature is a series of small angular cobble-sized tabular schist (averaging less than 10 x 10 x 10 cm) aligned in a north-south orientation. The feature is 4-5 cobbles deep and ca. 40 cm wide. It sits at a low elevation in the plain, where water and silt have likely built up around it. The north-south length is 1.44 m long, and a cross-wall (it is unclear whether it is only abutting) extends off to the east.
200092	-	200090	unkn.	This indeterminate feature consists of several rocks of varying shapes and sizes in linear alignment. There are parallel 2 rows of stone aligned horizontally moving up the slope of the hill, as well as other large stones scattered near this area. A southern face is visible on the longer of the two (2.6 m long). No artifacts were associated with them.

Lot Number	Finds Present	Within Transect	Spot Date	Description
200093	-	200090	unkn.	This feature is a mound of stone and sediment measuring ca. 1.2 x 4.3 x 0.3 m. The backbone of the feature are several very large (up to 1.0 m long) angular stone blocks that seem to form a corner on the northwest end of the feature. Sediment and angular pebbles are built up "behind" the feature to the east and south; however, it is possible that the sediment is "in situ" and the stones were pushed against the mound of sediment instead. A small tree has sprouted at the northern corner, displacing some of the stones, and other stones themselves may be heavily disturbed by earth moving activity evident within a 10 m distance from it.
200094	Y	200090	unkn.	Possible tomb consisting of large rocks in a vaguely circular formation with some resting on sediment nearby. The stones are arranged on the slope of the hill, and some sediment from the middle of the feature appears to have been removed, meaning there is a depression in the ring of stones. There are also some large stones slightly downslope from the ring which may be associated with it. As it is likely that colluvial scree is at least partially obscuring the feature little else can be said.
200095	Y	200090	Islamic	This feature is a sherd scatter ca. 1 m in diameter consisting of nine redware sherds, including base and rim sherds. Two appear to have black paint, while others have a possible red or beige slip. The sherds were found 3 m east of a possible tomb and ca. 1 m from the crest of a low hill (i.e., ca. 9m above the valley plain).
200096	-	200090	unkn.	This feature is a possible terrace wall, 5.5 m long, running east-west along the southern side of the low hill (ca. 10 m tall). A single row of small boulder-sized tabular schist blocks curve around the upper half of the hill. Some stones appear roughly faced on their exposed (exterior) side. There is one row of stones visible with an accumulation of stones built up on its north (interior) face.
200097	-	200090	unkn.	A concentration of cobble-sized stones resting in a small heap, surrounded by angular gravels, near the highest point of transect 200090. The stones range in color, material, and origin: some are angular tabular schists that are beige or tan-gray, while others are sub-rounded orange or red (i.e., likely from conglomerate and not the bedrock of the tabular schist hill upon which the feature sits). Although clearly constructed of manuports no further interpretation is possible.

Lot Number	Finds Present	Within Transect	Spot Date	Description
200098	-	200090	unkn.	This feature is a concentration of small (ca. 15 x 10 x 10 cm) angular stones in angular gravels and aeolian deposits measuring 1.7 x 1.2 x 0.2 m. The feature is close to the apex of a low hill (ca. 10 m tall) and west of a bedrock outcrop.
200099	Y	200090	(late) Islamic	This is a sherd scatter, ca. 2 m in diameter, consisting of a redware with medium-coarse red stone (radiolarite?) inclusions. All the sherds appear to be from the same vessel, which would have been a large jar. The vessel appears to date to either the Iron Age or Early Islamic period.
200502	-	200501	unkn.	Stone alignment, 1.5 m long, oriented east-west, and located 10 m north of Structure RaM 3 in the alluvial catchment. Stones are tabular schist blocks and measure ca. 25 x 15 cm each, and are individually oriented haphazardly as opposed to carefully lain.
200503	-	200501	unkn.	This is a concentration of stones sitting in the alluvial catchment sediments. One of the stones (15 x 10 cm) is mostly buried in sediments, suggesting that there could be more stones below the surface.
200505	-	200504	unkn.	This is a circular installation of stones ca. 2.1 m in diameter, situated to the southwest of Structure RaM 1. The stones vary in size, with the average about 30 x 20 cm and the largest ca. 50 x 25 cm. Their date and function are unclear.
200506	-	200504	unkn.	This is a stone concentration, possibly nothing more than displaced stones from Structure RaM 1. The feature is covered by wadi silt and gravel and is situated in the catchment alluvium.
200507	-	200504	unkn.	This is a loose concentration of stones (ca. 35 x 20 x 20 cm) embedded in the accumulated silty sand deposit of Rakhat al-Madrh's catchment.
200508	-	200504	unkn.	Situated just to the north of Structure RaM 1, this feature is a collection of stones (some of which are burnt) arranged in a semicircle with silt filling the center and covering the eastern-most facing stones almost completely. Although it may be a fire pit, excavation is required for further elucidation.
200509	-	200504	UAN	Feature 200509 is a long double-faced wall, ca. 12 m long and 70 cm wide, running NW-SE and forming the southern end of Structure RaM 1. The constituent tabular blocks of dovetailing limestone/schist measuring ca. 50 x 35 x 30 cm each. The wall is likely the exterior wall of the building.

Lot Number	Finds Present	Within Transect	Spot Date	Description
200510	-	200504	UAN	This wall feature is oriented NW-SE, is 8 m long, and is 40-50 cm wide. It alternates between one and two courses wide, with larger roughly faced stones (40 x 50 cm) interspersed with sets of two smaller stones (30 x 15, 30 x 20, 20 x 15 cm) hewn on their visible faces, with fist-sized stones in between. This wall is perpendicular to 200513 (at its northwest end) and parallel to 200509 and 200511. The construction style suggests it was remodeled at some point, though it likely originated in the Umm an-Nar period.
200511	-	200504	unkn.	Feature 200511 is a 5 meter-long, NW-SE oriented wall that appears to be an interior dividing wall within Structure RaM 1. Its constituent stones (each ca. 40 x 30 x 30 cm) appear tumbled, making the feature somewhat difficult to define and its relationship to perpendicular walls 200513 and 200517 unclear.
200512	Y	200504	unkn.	This wall in Structure RaM 1 creates the western-most of the three long, narrow enclosed spaces and marks the eastern edge of the enclosure or courtyard area. Some facing is visible on the wall at its eastern side. Rockfall is in evidence on both its east and western sides, suggesting it was once taller (and that its base is probably not much further below the current surface of the alluvial sediment).
200513	-	200504	UAN	This is an external East-West oriented wall in Structure RaM 1. It is perpendicular to walls 200509, 200510, and 200512. Its eastern end is poorly defined and appears mostly covered by wadi alluvium. Its stones, which are clearer at its western extent (where it helps define the three enclosed long and narrow rooms) are uniform in size, faced on the exterior, and though the inner face stones are missing quite clearly once consisted of two courses of dovetailing hewn blocks. The northeastern end of the feature continues to delineate the courtyard area on its catchment-facing side. Two courses of stone-on-stone are visible in at least two places.
200514	-	200504	UAN	This wall, W-E, is 8 m long and 60-70 cm wide. It is constructed of medium-sized stones (20-25 x 10-15 cm) in two adjacent parallel lines that appear to have shifted (probably as a result of the upper courses falling). This wall runs parallel to 200513 and forms a small compartmented interior space in Structure RaM 1.

Lot Number	Finds Present	Within Transect	Spot Date	Description
200515	-	200504	IA	Wall, oriented NW-SE, 14 m long and 40-50 cm wide, and likely the result of at least one phase of remodeling. The stones on its northern end are large (ca. 90 x 70 cm) while the ones on the southern end are small (20 x 20 cm), while the Goldilocks middle section appears to be medium-sized (40 x 30 cm) tabular blocks. Some of the perpendicular cross walls appear to be interdigitated (e.g., wall 200518). Considerable rubble collapse is present on either side of the feature, making more characteristics difficult to identify without excavation.
200516	-	200504	IA	This feature is the long (ca. 17.5 m), southernmost wall of Structure RaM 1. This wall is more embedded in the accumulated sand and gravel than the others in RaM (as it is further uphill) and is thus more difficult to see. Stones appear to be smaller than elsewhere in the structure, which may be a matter of mechanical erosion acting on the tabular schist blocks rather than a function of the wall itself. It may also reflect remodeling of the wall, as the stones near its middle are roughly twice the size of those on its ends. Regardless, the feature seems well built, with few gaps between stones.
200517	-	200504	UAN	Long (ca. 8 m), NE-SW wall forming the southeastern boundary of the subdivided space in Structure RaM 1. It clearly interdigitates with walls 200512 and 200509 at opposite ends of 200504. The wall is ca. 70 cm wide but the width is somewhat obscured by wall tumble and a possible burial to the southeast. The stones that make up this wall average 40 x 30 x 30 cm.
200518	-	200504	UAN	Large, somewhat jumbled wall that forms the eastern edge of the courtyard of Structure RaM 1. The wall clearly interacts with perpendicular walls 200512 and 200515 but it is less clear how. The feature runs for approximately 12 m and is constructed of two rows of roughly dovetailed tabular limestone blocks. Most of the larger blocks form the wall face along the courtyard, while smaller stones form the face along the interior spaces. Portions of the wall are disturbed by what looks like a tomb. A "jog" in the wall mid-way along is both distinctive and confusing. The feature may belong to two or more construction phases.
200519	-	200504	UAN	A 6 m long N-S oriented wall in structure RaM 1. Lies immediately to east of 200520, a potential Iron Age burial. Dating is unclear, but likely forms a portion of the structure's large enclosure (courtyard) space, which seems to be Umm an-Nar. (lot form missing)

Lot Number	Finds Present	Within Transect	Spot Date	Description
200520	-	200504	IA	Gravel and stone mound in Structure RaM 1, ca. 2 m in diameter and 10 cm high. Stones measuring ca. 15 x 20 x 15 cm make up the outer circle of the feature, with a mound of smaller stones in the center. The feature seems to sit on top of a wall and therefore post-dates it. Possibly an Iron Age burial.
200521	-	200504	Modern	Probable fire pit, 1.1 x 1.1 m in size. Made of medium sized stones (30 x 20 cm), some smaller ones (20 x 20 cm), possibly aligned with 200522 and another (currently unnamed) wall going N-S. The void between stones could be a firepit.
200522	-	200504	UAN	This feature is an East-West interior cross-wall directly east of 200521 (the possible fire pit) and abutting 200515 (a primary wall) on its eastern end. The wall width is 50 cm (two stones), with a height of 15 cm.
200524	Y	200523	UAN	This unusual feature is a sub-circular stone alignment between 10.5 and 11 m in diameter, resembling a miniature "enclosure" (such as feature 1167 at Bat). The stones, which average 50 x 25 x 25 cm, are a combination of tabular schist (taken from the bedrock to the SW) and sub-rounded conglomerate (taken from the bedrock to the E) - this feature lies directly on the juncture between the two kinds of bedrock. The stones are also discontinuous, forming 5-6 sections partially buried in colluvial or alluvial deposits (the feature is situated slightly up-slope from the pan, but the sediments here appear somewhat soft). In this, too, the feature resembles 1167. It has no true "fill" in its center, nor any hints that there was an internal structure. However, the thickness of the deposit suggests that there may once have been a dissolved mudbrick superstructure that has since dissolved completely. It is likely that at least some of the stones used to construct 200525 were taken from this feature. The feature's date is based solely on comparisons with 1167.
200525	Y	200523	unkn.	This is a roughly circular alignment ca. 2 m in diameter with some surrounding stones. It appears to be a stone-lined fire feature of unknown date, probably built from stones robbed from the neighboring circular "enclosure" (feature 200524). Stones average 40 x 30 x 25 cm.

Lot Number	Finds Present	Within Transect	Spot Date	Description
200527	-	200526	IA	This is a primary, exterior wall in Structure RaM 2, oriented E-W. It is long (ca. 13 m) and 50 cm (usually one stone) wide. At the southeastern end of this feature is perpendicular wall 200535, while wall 200528 similarly extends perpendicular from it on its northwest end. The wall is made of large (ca. 60 x 50 cm) and medium (40 x 20 cm) sized stones, with the medium-sized stones laid in two courses to form a total wall width consistent to the sections only a single, large stone wide. Irrespective of their size some of the stones are laying flat and some are upright.
200528	-	200526	UAN; IA	This is a large exterior wall in Structure RaM 2. It is oriented North-South and at ca. 21 m long is one of the longest walls at Rakhat al-Madrh to date. The wall is composed of both medium and large (40-50 x 20-25 cm) stones oriented both horizontally and upright. It appears to have been constructed (or at least remodeled) in two phases. Midway along its length feature 200529 obscures and clearly disturbs the wall.
200529	-	200526	unkn.	Unusual stone alignment just outside of (and abutting on its western end) exterior wall 200528 in Structure RaM 2. In plan it forms a long tear-drop shape (bisected lengthwise) against the east (outer) face of wall 200528. The feature, which post-dates 200528, is composed of irregular limestone blocks that average 25 x 20 x 15 cm. It is possibly better preserved below the surface. On its larger, rounded end it contains what looks like a fire pit (feature 200530), which is likely of a late date.
200530	-	200526	unkn.	This feature --- a possible fire pit -- consists of a circle of stones within stone alignment 200528 (i.e., at the bottom of the slope and on the edge of Structure RaM 2). It is formed by three large tabular schist blocks (ca. 60 x 20 cm) angled into a triangle and several smaller stones bridging gaps between them. The feature likely postdates 200529, which itself postdates 200528 (the primary exterior wall of RaM 2).
200531	-	200526	UAN	Southern exterior wall of Structure RaM 2. The feature is constructed of two rows of roughly dovetailed tabular schist/limestone blocks, forming a double-faced wall ca. 13 m long and 70 cm wide. The stones average 40 x 35 x 20 cm. The southern face of the wall is obscured in three locations by abutting features 200532, 200533, and 200534. This wall clearly interacts with walls 200528, 200535, and 200539 to form the primary exterior walls of the structure.

Lot Number	Finds Present	Within Transect	Spot Date	Description
200532	-	200526	unkn.	This is the eastern-most of the three stone concentrations adjacent to external wall 200531. The feature is roughly rectangular, ca. 1.5 x 1 m, built of tabular blocks (ca. 30 x 20 x 20 cm each) against the southern (outer) face of wall 200531's eastern end. While it may simply be rockfall, the similarities between this and a collection of other features makes this less likely. Two better hypotheses are that it is either a buttress or a burial. Either way, it likely post-dates wall 200531 and the original Structure RaM 2.
200533	-	200526	unkn.	This is the middle of three stone concentrations adjacent to wall 200531. It is a sub-circular collection of disarranged tabular schist blocks, abuting 200531 (the main S wall of RaM 2) on its south (exterior) side. It is ca. 2 x 1 m, with ca. 15 cm of sediment fill. Angular disarranged stones jut out of and sit on the mound. The stones of 200533 seem similar to those making up 200531, so if this is a feature (as opposed to simply rock fall) it likely post-dates the primary wall. Two tentative interpretations are that it is a later buttress or a possible burial.
200534	-	200526	unkn.	This is the western-most of the three concentrations of stones adjacent to wall 200531 and Structure RaM 2. It is made up almost exclusively of tabular schist ranging in size from 15 x 15 x 15 to 35 x 25 x 15 cm -- these larger stones are trapezoidal in plan and resemble Umm an-Nar blocks. The stones are jumbled and angled (i.e., clearly not laid or emplaced). Some heated sub-rounded cobbles (possibly taken from the conglomerate bedrock near Structure RaM 1) are visible within the low alluvial mound. Overall the feature is larger than the other two, at ca. 4 m in diameter and 20 cm tall, and numerous stones are "sitting" on this mound as well as embedded in it. As with features 200532 and 200533 this feature likely post-dates RaM 2, and may be a burial or wall buttress.

Lot Number	Finds Present	Within Transect	Spot Date	Description
200535	-	200526	UAN	This is the primary north-south exterior wall of Structure RaM 2. It is ca. 19 m in length. It is perpendicular to wall 200531 at its south end, perpendicular to 200536 (mid-way along its length), and perpendicular to 200527 at its north end. The wall characteristics change over space. At its southern end the wall is made of medium-sized stones (ca. 40 x 20 cm) and is faced only on its exterior for about 6 m. It then shifts ca. 40 cm eastward and the stones become large (60 x 20 x 30) for about 3 m. Then the wall is one line of stones for about 2 m and then 2 faces of medium sized stones reappear (40 x 20-30 cm) all the way until its north end. Almost all stones are upright, with the middle section of large stones being the most vertically visible. The "collapse" is also different at different points along the wall. Small fist-sized stones are found on either side of the wall from its south end to its middle-large stone section; from there, the disorganized stone "collapse" becomes much larger. This wall is similar in many ways to feature 200516 of Structure RaM 1 and maybe a distinctive feature of each of the four RaM structures.
200536	-	200526	UAN	Internal wall (ca. 6.5 m long) running N-S in RaM 2. It runs perpendicular to 200535 at its west end and to wall 200537 at its east end. The wall is ~60 cm in width and poorly preserved, with rubble on either side, which makes distinguishing between the stones of the wall and the collapse difficult. Stones are medium to small (30 x 20 or 20 x 10 cm).
200537	-	200526	UAN	Internal north-south wall in RaM 2, ca. 6.5 m long and running parallel to 200535. It forms the western end of the partitioned room, forming clear corners with walls 200536 and 200538. This wall is constructed with two rows of roughly worked limestone blocks that are loosely dovetailed, forming a double-faced wall ~6.5 m long and 60-70 cm wide. Stones average 40 x 30 x 20 cm.
200538	-	200526	UAN; IA	Internal east-west wall in RaM 2, ca. 6.5 m long and running parallel to 200528. The north face consists of upright stones while the southern face stones are lying flat, but there is little evidence of stone or rubble fill between them. The upright stones are larger (longer and "thicker") than the southern face stones; together this suggests two construction phases.
200539	-	200526	UAN; IA	Internal north-south wall in RaM 2, ca. 3 m long, formed of medium to large local stones oriented both horizontally and upright, with upright stones notable where it meets (?) another internal wall (200538).

Lot Number	Finds Present	Within Transect	Spot Date	Description
200540	-	200526	UAN; IA	Internal wall in Structure RaM 2 running east-west and ca. 5.5 m long (25 cm wide). It is oriented perpendicular to -- but does not meet -- wall 200537 at its west end. It appears to be perpendicular to 200535 at its east end and is parallel to 200541, 200531, and 200536. Only a few medium sized (30 x 30 x 40 cm) upright stones are visible.
200541	-	200526	unkn.	Poorly-visible probable internal wall in RaM 2. It is aligned east-west and ca. 5 m long, running parallel to 200536 and 200540. It forms rooms in the subdivided portion of RaM 2, appearing to meet wall 200535 but not wall 200537. It is constructed of rough tabular limestone blocks averaging 35 x 30 cm. It is unclear whether the stones are dovetailed or how wide the original wall was.
200542	-	200526	IA	This feature is an oblong stone mound or concentration east of Structure RaM 2 and wall 200535. It is ca. 1.8 m in diameter and made of medium-sized angular and subangular stones (20 x 60 cm). Possibly an Iron Age tomb.
200543	-	200526	unkn.	This feature is a stone alignment ca. 3 m long. Covered by wadi alluvium. Upward positioned on the edge of the transect 200526 facing North East. It is poorly preserved and its relationship to structure RaM 2 is unclear.
200544	-	200526	unkn.	This stone concentration is mostly covered by wadi alluvium. It consists of a collection of medium-sized locally available stones on the far northern edge of transect 200526. It could be a fire pit. Stones are laid horizontally and are ca. 30 x 15 cm in plan.
200545	-	200526	unkn.	This is an alignment of small stones (ca. 20 x 15 cm) running for ca. 1 m near the southern edge of transect 200526.Its association with RaM 2 is unclear, as is its dating.
200547	-	200546	unkn.	This is a group of large, unworked tabular limestone blocks situated approximately 3 m west of the southern end of Structure RaM 2. It is possibly in alignment but is otherwise unremarkable.
200549	-	200548	unkn.	This feature is a concentration of relatively large stones embedded in the accumulated sediment of Ramlat al-Madrh. It has a possible NE-SW alignment and is made up of stones average 40 x 30 x 30 cm. It is located roughly south of Structure RaM 3.

Lot Number	Finds Present	Within Transect	Spot Date	Description
200551	-	200550	UAN	This feature is an external wall of Structure RaM 3. It has an east-west orientation and is 8-9 m long. The wall consists of roughly dovetailed limestone blocks (suggesting an Umm an-Nar date), but it also includes large sub-rounded cobbles of light grey locally available limestone (ca. 40 x 30 cm). The wall is 70 cm wide. Its western end is obscured by a later feature 200563.
200552	-	200550	UAN	This is a small, north-south oriented external wall (ca. 1 m long) in Structure RaM 3. It is constructed using large, sub-rounded cobbles from the bedrock (breccia or conglomerate) nearby. The stones are ca. 30 x 15 x 10 cm but the feature is mostly buried in colluvial gravels and silt.
200553	-	200550	UAN	This small, poorly preserved external wall in Structure RaM 3 is possibly disturbed by the electric pole wires to its north. The feature runs east-west and is ca. 2.5 m long and ca. 70 cm wide. Five-six stones can be seen in alignment, ranging in size from ca. 30 x 15 cm to ca. 40 x 50 cm, laying somewhat flat. Even with the disturbance by the modern electric pole wires it appears to run parallel to wall 200565.
200554	-	200550	UAN	This ca. 6.5 m-long, east-west oriented feature forms the northern exterior wall of Structure RaM 3. It is composed of both medium and large stones (ca. 20 x 15 cm to 50 x 20 cm). Some are aligned horizontally while others are upright. It abuts or interdigitates with walls 200551 and 200557.
200555	-	200550	UAN	An internal wall in Structure RaM 3, 200555 runs north-south for approximately 10.5 m or more -- its southeastern end is poorly visible and may extend further. This internal wall forms the western edge of Structure RaM 3's courtyard. Its construction is a mix of roughly worked tabular limestone blocks (ca. 35 x 30 cm) and unworked sub-rounded limestone cobbles (ca. 40 x 30 cm). It appears to be ca. 80 cm wide, but is poorly preserved in places.
200556	Y	200550	UAN	Internal wall 200556 runs east-west for approximately 6 m of Structure RaM 3. It is parallel to wall 200559, possibly demarcating an interior courtyard or other large space. It is angled at its western end, making it separate from wall 200557. On its east end its stones are buried in colluvium and are primarily unworked large sub-rounded cobbles; on the other hand at its the western end the stones are clearly worked and double-faced. Including its stone fill the total width is ca. 80 cm.

Lot Number	Finds Present	Within Transect	Spot Date	Description
200557	-	200550	unkn.	Feature 200557 is a small internal wall (ca. 2.5 m in length and 0.6 m wide) in Structure RaM 3. It runs east-west, parallel to wall 200558 and perpendicular to 200555 at its east end. The feature is made up of medium to large (30 x 30 cm to 40 x 30 cm) sub-rounded cobbles of various shapes and colors, with some smaller stones (20 x 20 or 20 x 10 cm) seemingly randomly placed. Individual stones are angled and jumbled in their orientations (neither flat or upright), however their arrangements are difficult to see because of 200563.
200558	-	200550	unkn.	This is another internal wall in Structure RaM 3. It runs east-west (parallel to 200557) for ca. 2.5 m. It is composed of both small and medium sized stones (15 x 10 cm to 30 x 20 cm). Most of the stones are laying horizontally, although the big stones are oriented vertically. The wall appears to have been heavily disturbed and may belong to several construction phases.
200559	Y	200550	UAN	Wall 200559 is inside Structure RaM 3 and runs east-west for ca. 6 m. It may demarcate a large central space or courtyard. It is perpendicular to 200558 at its west end (possibly the two walls abut, however their relationship is unclear). The wall is somewhat unclear due to rubble -- probably created during construction of the electric pole. It is 50-60 cm wide and made of medium-sized stones (20-30 x 20 cm); those stones that are clearly part of the wall are laid horizontally, but others (less clearly in situ) are somewhat angled.
200560	-	200550	unkn.	This is a mostly obscured (and probably poorly preserved) wall in Structure RaM 3, running north-south for ca. 3 m. It is located slightly south of 200561 and forms the eastern edge of the RaM 3 central courtyard; it also forms a small room with walls 200552 and 200556. It is possibly obscured by sediment wash and/or disturbed by the installation of the power line, and may be better preserved below surface.
200561	-	200550	unkn.	This small (ca. 3 m long) internal wall runs north-south in Structure RaM 3. Heavily disturbed by what seems to be another structure or wall within RaM 3. It is constructed of variously sized stones (from 25 x 15 cm to 40 x 30 cm). Most of the stones are oriented vertically.
200562	-	200550	UAN	This is an internal sub-dividing wall in Structure RaM 3 that runs north-south between 200556 and 20051. Although somewhat disturbed the 3 m-long wall seems to align well with the other walls (i.e., 200551, 200555, 200556, and 200561) to form two evenly sized small rectangular rooms in the northern side of Structure RaM 3.

Lot Number	Finds Present	Within Transect	Spot Date	Description
200563	-	200550	unkn.	This stone mound or concentration consists of a 2 m-diameter group of medium and large stones forming what seems to be a low circular wall on the northeast corner of Structure RaM 3. The feature looks like it sits on top of several other features, including walls 200557, 200554, and 200555. It is possible that this is a tomb feature but the presence of similar features in other structures suggests it may hold a different function.
200564	-	200550	unkn.	This is a stone concentration in Structure RaM 3 that may simply be the result of disturbance from placement of an electrical pole. It overlays aspects of wall 200565 and possibly wall 200559. It is constructed of differently sized stones ranging up to ca. 30 x 20 cm (but as small as pebble-sized), in no visible arrangement or order.
200565	-	200550	UAN	This east-west wall makes up part of Structure RaM 3. It is unclear whether it is an internal or external wall. It is 4 m long and 30 cm wide. Only a few stones of this wall are visible, as there is a stone concentration (probably a disturbance) to the north and a gravelly soil accumulation (also probably a disturbance) on the other end. Its outer face is clear and made of large dark limestones (50 x 25 cm, 30 x 30 cm) primarily oriented vertically; its inner face is less clear due to the disturbances (and soil accumulation behind it).
200566	-	200550	unkn.	This east-west oriented stone alignment is located ca. 3.5 m to the west of Structure RaM 3's northwest corner. It is visible for a distance of ca. 2.5 m. The depth of the alluvium appears deeper in this area, downhill from RaM 3 and therefore probably also further into the catchment basin. The feature may be better preserved further down. The alignment is comparable to that of RaM 3 and therefore possibly associated with the structure.
200567	-	200550	unkn.	This feature is a barely visible stone concentration west of RaM 3 in the alluvial catchment. It consists of medium-sized stones (ca. 20 x 15 cm) forming what looks like a semi-circle facing north.
200570	-	200569	UAN	This is an 11 meter-long (ca. 60-70 cm wide) wall oriented east-west and forming the outer western wall of Structure RaM 4. It clearly interacts and forms corners with walls 200571 and 200575. Its stones average ca. 40 x 30 cm in plan and are laid horizontally and may be dove-tailed, but preservation makes this unclear. The construction style looks Umm an-Nar. A 2.5 meter-long section in the middle of the wall is obscured by accumulated silt and wadi gravel.

Lot Number	Finds Present	Within Transect	Spot Date	Description
200571	-	200569	UAN	External north-south wall in RaM 4, ca. 16 m long and 90 cm wide. Lower stones appear to lie flat and upright but are evenly coursed. Where it is most visible the wall is 2 stones wide, double-faced, with possible rubble fill (especially on its south end).
200572	Y	200569	UAN	External wall in Structure RaM 4, running east-west, ca. 11.5 m long and ca. 70 cm wide. The wall is well-preserved, but stones are not visible in the mid-point. Built of massive blocks (ca. 60 x 90 cm) oriented horizontally (primarily), the wall is ca. 2 stones wide and double-faced, with some dovetailing and possible rubble fill.
200573	-	200569	UAN	External wall in Structure RaM 4 running north-south, approximately 6 m long, and ca. 70-80 cm wide. It forms the outer southern wall of what appears to be an addition to the east half of the original Structure RaM 4. This wall runs slightly further south than wall 200575, which forms the outer southern edge of the rest of the building. Its stones are laid horizontally and are loosely dovetailed. Its stones average 40 x 25 cm with a few significantly larger stones (70 x 40 cm) its eastern edge. Abutting it on its end is a rectangular stone feature (200583). Tentatively dated to the Umm an-Nar.
200574	-	200569	UAN; IA	This east-west oriented wall in Structure RaM 4 is ca. 5 meters long and ca. 70 cm wide. The internal part of the wall is made of 2 faces of thick tabular limestone schist (ca. 40 x 30 x 20 cm) up-ended; these are very likely sitting atop stones that are laid flat, as is visible in the western half (which is preserved to a lower height and does not appear to have the extra layer of upright stones). This suggests that the wall visible now consists of at least two phases of construction.
200575	-	200569	UAN	This is a long north-south running exterior wall forming the western side of Structure RaM 4. The wall is ca. 12 meters long and 60 cm wide. Due to rockfall the wall characteristics are somewhat unclear, however the stones that are clear are mostly lying flat, of medium size (30 x 30 cm to 30 x 40 cm), and then laid in pairs to create a double-faced wall; this is particularly evident on its north and south ends.
200576	-	200569	unkn.	Internal East-West wall in structure RaM 4, ca. 11.5 meters long and 70 cm wide. Rockfall makes it difficult to define the wall's attributes but it appears to be made of medium to large stone (ca. 20 x 20 cm to 40 x 30 cm). Its western end shows some evidence that it may be double-faced and two stones wide but clearing would be necessary to know more.

Lot Number	Finds Present	Within Transect	Spot Date	Description
200577	-	200569	IA	This is a ca. 4 m-long internal wall in Structure RaM 4. It runs east-west and is composed of medium to large local stones (25 x 15 cm to 70 x 30 cm), oriented both horizontally and upright on its eastern end. The wall has collapsed inside one of the "rooms" formed by 200577, 200575, and 200578 and thus further obscures the in situ remains.
200578	-	200569	UAN	This is an internal wall in Structure RaM 4. It runs north-south for ca. 8 meters and is composed of large local tabular stones (70 x 30 cm) that appear to have collapsed inside the structure and are thus disordered. Along with several other features, wall 200578 forms a series of rooms or alcoves on the eastern side of Structure RaM 4.
200579	-	200569	UAN	This is a well-built but somewhat irregular wall in Structure RaM 4. It is 5 m long, ca. 70 cm wide, and runs north-south. It is composed of horizontally placed limestone tabular blocks, each ca. 40 x 30 x 25 cm, roughly two stones wide and double-faced. However it is not in clear alignment with 200578 and is not bonded with 200572 on its southern end; therefore it is either a later extension of the original structure to the west or a remodeling of the original wall for some other purpose. It is abutted on its western (inside) face by feature 200580.
200580	-	200569	unkn.	This is a small, internal wall in Structure RaM 4. It is roughly parallel to 200574 and may be the remnants of a buttress to support a ceiling (formed by walls 200572, 200573, 200574, and 200579) or to support a wall. It is roughly 2 m long and 70-80 cm wide, constructed of roughly worked limestone blocks ca. 40 x 30 x 30 cm. It is somewhat jumbled and may be a later addition or obscured by later construction activity. The stones are oriented in a mix of horizontal and vertical alignments and are therefore probably not Umm an-Nar in date.
200581	-	200569	unkn.	This feature is a ca. 2 m-long linear stone structure inside the large open "courtyard" of RaM 4. This feature is constructed of a single row of limestone blocks (ca. 30 x 25 x 15 cm), some laid vertically and others horizontally, but preserved at least 3 courses tall in one location. It also runs parallel to the courtyard walls, but is likely later than the original structure.

Lot Number	Finds Present	Within Transect	Spot Date	Description
200582	-	200569	unkn.	This north-south stone alignment or possible irregular wall is ca. 11 m long and extends from 200571 (a later addition?) towards the south side of RaM 4. The stones are mainly small-to-medium sized (20 x 15 to 15 x 10 cm). A fire pit (200597 -- a later addition) is built into the wall part-way along on, its southern face.
200583	-	200569	unkn.	This is one of five rectangular stone features located in and around Structure RaM 4, this ca. 1 x 2 m stone feature sits against the outer eastern wall of RaM 4 (wall 200572). Its alignment is north-northwest to south-southeast and it is built of stones ca. 35 x 30 cm in plan.
200584	-	200569	unkn.	This is one of five rectangular stone features located in and around Structure RaM 4. It is ca. 2 x 1 m, built against the outer face of wall 200575, on the southwest corner of the structure. It is aligned true north-northwest to south-southeast and constructed of stones ca. 35 x 30 cm in plan. It is probably a later addition to RaM 4 and possibly a burial.
200585	-	200569	unkn.	This is a small rectangular stone feature (ca. 1.5 x 1 m) located near the corner of walls 200576 and 200571, in the "courtyard" of Structure RaM 4. It was built using wall 200571 as its eastern side (and thus post-dates that primary wall). It is oriented roughly north-south and is built of mostly upright stones (when in situ), with tumble obscuring its "walls". Its center is empty of stone.
200586	-	200569	unkn.	This is a rectangular stone feature (possible burial) similar to 200583, 200584, 200585, and 200596. It is located in the courtyard of Structure RaM 4 but is likely a later installation. It is roughly rectangular (1.5 x 1 m) formed with upright stone blocks and capped with small stones and aligned northeast-southwest. If it is a burial its alignment (similar to the others) does not appear to conform with the east-west alignment preferred in Islamic burials.
200587	-	200569	unkn.	This 1.5 x 1.3 m feature is a collection of tabular schist in a low mound of soil a few meters north of wall 200571 in RaM 4. The stones vary considerably in size (ca. 20 x 15 x 15 cm to 50 x 25 cm in plan). The lower stones are laying flat in the alluvium while the upper stones are angled away from RaM 4 to the (archaeological) North, suggesting that the upper stones may have fallen. It is possible that this feature was originally a wall or corner but it likely post-dates the original RaM 4 structure.

Lot Number	Finds Present	Within Transect	Spot Date	Description
200588	-	200569	unkn.	This is a stone concentration north of 200571 and Structure RaM 4. The stones are clustered into an oblong alignment oriented roughly northeast-southwest, with a small boulder-sized stone stacked on top at the northeast end of the feature. This may indicate that it is an Islamic period burial. The roughly hewn angular stones are likely robbed from structure RaM 4, but other stones are sub-rounded cobbles (likely taken directly from the conglomerate bedrock). It is possible (probable) that the misaligned stones are tumbled and obscure the feature beneath.
200589	-	200569	unkn.	This is a concentration of stones (ca. 15 x 15 cm to 30 x 15 cm in plan) oriented at random forming a ca. 1 x 1.8 m pile. Its function and date are unknown.
200590	-	200569	unkn.	This feature is a stone concentration in an alluvial matrix located 3 m from the northeast corner of RaM 4. It consists of 6 stones primarily arranged horizontally and ranging from 20 x 20 x 20 cm to 40 x 25 x 15 cm. The larger stones are trapezoidal in plan and probably originate from Structure RaM 4, thus suggesting that this feature post-dates the Umm an-Nar period.
200591	-	200569	unkn.	This feature is a small stone concentration, ca. 80 x 80 cm. It consists of a varied assemblage of stones (angular to subrounded), ranging from pebble to fist sized, with the largest stone at ca. 30 x 15 cm. Individual stones also vary considerably in orientation (e.g., flat, angled, horizontal). Its function and dating are unknown.
200592	-	200569	unkn.	This feature is a stone alignment (possible wall) running true north-south for approximately 1.5 meters. It consists of four, roughly rectangular tabular limestone blocks ca. 35 x 30 cm. No clear date can be established. The apparent sediment accumulation suggests that more of the feature may be preserved below.
200593	-	200569	unkn.	This possible stone alignment has a roughly north-south orientation and is ca. 2 meters long. The stones, which are almost all on end, vary in size with an average size of ca. 35 x 15 x 15 cm.
200594	-	200569	IA	This feature is an oblong concentration of limestone blocks on the low slope northwest of structure RaM 4. It is possibly a burial but if so it is pre-Islamic: it is aligned northwest-southeast. The stones may have been robbed from RaM 4 and average 35 x 30 cm.

Lot Number	Finds Present	Within Transect	Spot Date	Description
200595	Y	200569	unkn.	This wall feature runs NW-SE for ca. 3.5 m. It is constructed of stones that are ca. 30 x 15 cm. Its eastern face "downslope" has slipped downward but the wall appears to have originally been double faced and two stones wide (ca. 35 cm) and probably lacked fill. The tabular schist is very blocky as opposed to inner "dovetailing" quadrilaterally shaped UAN stones. this may be related to the source material properties rather than a chronological indicator (see pottery). It probably continues to the north and south. This feature lies well outside of Structure RaM 4 and may be unrelated.
200596	-	200569	Islamic?	This is a rectangular stone feature (possibly a small burial) outside of RaM 4. It is oriented West-East and is ca. 1.5 x 1 m. The stones are primarily upright; only a single block on the eastern end is laying flat. It is possible that 200598 consists of two much smaller features with a shared wall. It is situated north of RaM 4, at the base of the slope.
200597	-	200569	Modern	This is a modern fire pit constructed along the alignment or irregular wall 200582. The stones (roughly worked tabular schist) were likely taken from RaM 4.
200599	-	200598	unkn.	This feature is a "stone concentration": four stones, angled and roughly equidistant from each other, forming a circular space 1.5 m in diameter. The feature is located 15 m from the edge of RaM 4 edge and the alluvial pan. Two of the stones appear to have been roughly faced but so little is visible above the alluvium that it is difficult to determine.
200600	-	200598	unkn.	Stone alignment with a northwest-southeast orientation. It is potentially just collapsed rockfall from RaM 4. But possibly a separate feature. It is approximately 2 m long.
200601	-	200598	unkn.	Stone concentration (possible tomb) that lies southwest of RaM 4. Some mounding is evident but there is no clear orientation. The feature is 1.5 m in diameter at its greatest extent. Individual stones appear to be local.
200602	-	200598	unkn.	Irregular accumulation of stones at the edge of the silted basin of RaM. It is possibly a tumbled grave marker, but this is only when considering the other possible graves in the vicinity. No associated material culture, but lots of accumulated sediment. It is constructed of medium-sized sub-angular, sub-rounded, and angular limestone.
200603	-	200598	unkn.	This is a small rectangular stone feature ca. 1 x 0.5 m. It is oriented north-south and formed with upright stones (ca. 35 x 20 cm) marking the edges and small stones (ca. 20 x 15 cm) capping it.

Lot Number	Finds Present	Within Transect	Spot Date	Description
200604	-	200598	unkn.	Stone concentration with two squared-off stones in close alignment. There is a substantial sediment accumulation in this area and if there is more to this feature, then it might be preserved below. Possible wall. Stones are ca. 30 x 25 cm.

9.3 Finds

Table 11. Summary of survey ceramic and lithic totals.

Number of Transects	Ceramic					Lithic
32	**Total Ceramics**	**Diagnostic**				**Total Lithics**
	1885	291				166
		Bronze	Iron	Islamic	Modern	
		143	28	119	1	

Table 12. Survey ceramic and lithic totals by transect.

Transect	Ceramics						Lithic
	Bronze Age	**Iron-PIR**	**Islamic**	**Modern**	**Total Diagnostics**	**Total Ceramics**	**Total Lithics**
190233	8	2	8	0	**18**	**102**	**0**
200001	20	4	12	0	**36**	**201**	**15**
200004	4	0	7	0	**11**	**86**	**12**
200007	8	1	2	0	**11**	**86**	**5**
200011	3	0	2	0	**5**	**101**	**15**
200017	11	1	4	0	**16**	**236**	**2**
200022	4	0	30	0	**34**	**182**	**7**
200025	8	5	23	0	**36**	**150**	**0**
200035	18	0	0	0	**18**	**124**	**12**
200056	1	2	6	0	**9**	**59**	**22**
200061	0	0	3	0	**3**	**56**	**5**
200065	0	0	4	0	**4**	**39**	**7**
200066	0	1	1	1	**3**	**17**	**5**
200068	0	0	0	0	**0**	**21**	**0**

Transect	Ceramics						Lithic
200069	2	0	3	0	**5**	**35**	**9**
200070	0	0	0	0	**0**	**4**	**2**
200071	0	0	0	0	**0**	**1**	**0**
200072	0	0	0	0	**0**	**2**	**1**
200074	0	0	0	0	**0**	**0**	**0**
200075	0	0	0	0	**0**	**0**	**0**
200085	0	0	2	0	**2**	**29**	**5**
200090	6	10	6	0	**22**	**140**	**2**
200501	1	0	5	0	**6**	**6**	**3**
200504	12	0	1	0	**13**	**13**	**8**
200523	5	0	0	0	**5**	**6**	**6**
200526	14	0	0	0	**14**	**14**	**0**
200546	2	0	0	0	**2**	**2**	**0**
200548	2	0	0	0	**2**	**2**	**0**
200550	1	0	0	0	**1**	**1**	**12**
200568	1	1	0	0	**2**	**2**	**1**
200569	8	0	0	0	**8**	**8**	**7**
200598	4	1	0	0	**5**	**5**	**3**
TOTALS	143	28	119	1	**291**	**1885**	**166**
	Bronze Age	**Iron-PIR**	**Islamic**	**Modern**	**Total Diagnostics**	**Total**	**Lithic**
	Ceramics						

9.4 Phasing

Table 13: Summary of survey by period.

Major Phase	Number of Features	Number of Transects
Unknown	93	22
Bronze Age	57	22
Iron Age	25	10
Islamic period	7	17

Major Phase	Number of Features	Number of Transects
Modern	6	2

Table 14. Phasing of features and transects.

Major Phase	Sub-Phase	Number of Features	Number of Transects	Survey Area(s) Represented
Bronze Age		57	22	
	Hafit	1	1	al-Qa'a
	Umm an-Nar	54	22	Settlement Slope; al-Qa'a; Matariya; Rakhat al-Madrh
	Wadi Sûq	3	1	al-Qa'a
Iron Age		25	10	Settlement Slope; al-Qa'a; Matariya; Rakhat al-Madrh
	Early Iron Age	0	1	Settlement Slope
	Late Iron Age	0	4	Settlement Slope; al-Qa'a; Matariya
	Late Iron Age/ PIR	0	0	Not present
Islamic Period		7	17	Settlement Slope; al-Qa'a; Matariya; Rakhat al-Madrh
	Early Islamic Period	0	1	Settlement Slope
	Middle Islamic Period	0	1	Settlement Slope
	Late Islamic Period	0	6	Settlement Slope; al-Qa'a; Matariya
Modern Period		6	2	al-Qa'a; Rakhat al-Madrh

9.5 'Aflaj Project

Table 15: List of people interviewed for 'Aflaj Project.

Title	Name	Occupation	Institution	Site
Dr.	Abdullah Al-Ghafri	Associate Professor & Director	University of Nizwa, Falaj Research Unit	Nizwa
Mr.	Ishaq Al-Shabibi	Research Assistant	University of Nizwa, Falaj Research Unit	Nizwa
Dr.	Dennis Powers	Head of Projects	University of Nizwa, Falaj Research Unit	Nizwa

Title	Name	Occupation	Institution	Site
Dr.	Rashi Al-Abri	Director of Water Assessment	Ministry of Regional Municipalities and Water Resources	Muscat
Dr.	Hammed Al-Thuli	Director of Irrigation	Ministry of Agriculture and Fisheries	Muscat
Mr.	Mohammed Al-Abrid	Engineer	Ministry of Agriculture and Fisheries	Muscat
Mr.	Abdullah al-Jasassi	Ibri falaj agent	Ibri falaj	Ibri
Mr.	Mahmoud Siad	Ibri falaj agent	Ibri falaj	Bat
Mr.	Talib al-Jabri	Buraimi falaj agent	Buraimi falaj	Buraimi
Mr.	Abdullah Muhammed Al-Zani	Buraimi falaj agent	Buraimi falaj	Buraimi
Mr.	Salaim Kaleb	Mahad falaj agent	Mahalad falaj	Mahalad
Mr.	Sheikh al-Salam	Falaj Daris agent	Nizwa falaj	Nizwa
Mr.	Issa Al-Naimi	Engineer	Ministry of Agriculture and Fisheries	Muscat
Mr.	Mohamed Al-Abri	Head, Dept of Dams and Falaj	Al-Dahara Region, Ministry of Regional Municipalities and Water Resources	Ibri
Mr.	Issa Abdullah	Geologist, Dept. of Dams and Falaj	Dhahirah Region, Ministry of Regional Municipalities and Water Resources	Ibri
Mr.	Mubarak Al-Jabri	Geologist, Director of Water Resources, Al-Dhahirah Region	Dhahirah Region, Ministry of Regional Municipalities and Water Resources	Ibri
Mr.	Nassaer Al-Rawahi	Geologist, Director of Aflaj Inscribed in World Heritage List	Ministry of Regional Municipalities and Water Resources	Muscat
Mr.	Zahra Said Al-Abri	Research assistant, Hydrologist	University of Nizwa, Falaj Research Unit	Nizwa
Eng.	Duaa Al-Saeed	Engineer	Ministry of Regional Municipalities and Water Resources	Muscat
Mrs.	Miriam Al-Azri	Head of Irrigation	Ministry of Agriculture and Fisheries	Muscat

Interview Questions:

1) What is your current position? Please describe your role.
2) Are you involved in water conservation or management? If yes, how?
3) What is your view on the current falaj system?

4) How could water resources management be improved?
5) Who controls the water system at the falaj and why?
6) What programs do you offer to help farmers manage their falaj and/or agricultural system?

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