Results from Beyond the Oasis: Excavations of the 2022–23 Field Season of the Bat Archaeological Project

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ABSTRACT

While the UNESCO World Heritage Site of Bat, Oman, is famous as an exceptionally large and well-preserved Early Bronze Age oasis settlement, the site's archaeological landscape extends far beyond the oasis. The Bat Archaeological Project (BAP) aims to better understand the complex array of Umm an-Nar period (ca. 2700–2000 BCE) cultural activity and human-environment interactions evidenced at the site and its environs in the Wadi al-Hijr. This paper presents the excavation results and preliminary interpretations of BAP's winter 2022–23 field season, which targeted three areas of suspected Umm an-Nar period settlement in the Bat landscape within a 10 km radius of the oasis: "Operation A," al-Khutm Settlement, and Rakhat al-Madrh. In choosing to look beyond the site's oasis center and examine ancient occupation in three geographically distinct areas within the 'greater' Bat landscape, this research sheds light on the diverse cultural processes and socioecological strategies practiced by the region's Umm an-Nar period inhabitants.

KEYWORDS: Arabia, Early Bronze Age, UNESCO, Umm an-Nar period, Cultural Landscape

نتائج من وراء الواحة:

أعمال التنقيب في موسم ٢٠٢٢-٢٠٢٣ الميداني لمشروع بات الأثري

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الملخص

في حين أن موقع بات، عُمان، المدرج على قائمة اليونسكو للتراث العالمي، مشهور بأنه عبارة عن مستوطنة واحة كبيرة جدا ومحفوظة جيدًا من العصر البرونزي المبكر، فإن المشهد الأثري للموقع يمتد إلى ما هو أبعد من الواحة. يهدف مشروع بات الأثري إلى فهم أفضل للنشاط الثقافي المعقد في فترة أم النار (حوالي ٢٧٠٠-٢٠٠٠ قبل الميلاد) والتفاعلات بين الإنسان والبيئة التي تم إثباتها في الموقع ومحيطه في وادي الحجر. تقدم هذه الورقة نتائج الحفريات والتفسيرات الأولية لموسم الشتاء الميداني ٢٠٢٢-٢٠٢٣ لمشروع بات الأثري، والذي استهدف ثلاث مناطق يشتبه في أنها استيطان في فترة أم النار في منطقة بات ضمن دائرة نصف قطرها ١٠ كم من الواحة: «العملية أ»، ومستوطنة الخطم، ورخة المدرة. من خلال اختيار النظر إلى ما هو أبعد من مركز الواحة في الموقع وفحص العمران القديم في ثلاث مناطق جغرافية متميزة داخل مشهد بات «الأكبر»، يلقي هذا البحث الضوء على العمليات الثقافية المتنوعة والاستراتيجيات الاجتماعية والبيئية التي مارسها سكان المنطقة في فترة أم النار.

الكلمات المفتاحية: الجزيرة العربية، العصر البرونزي المبكر، اليونسكو، فترة أم النار، المشهد الثقافي

1. INTRODUCTION

The winter of 2022–23 marked the 16th season of research by Bat Archaeological Project (BAP) at the UNESCO World Heritage Site of Bat, Al Khatum, and Al Ayn, in northwestern Sultanate of Oman (Figure 1). While initially focusing on the Early Bronze Age monuments within the ancient Bat oasis and UNESCO-defined zone (Thornton et al, 2016), over the years BAP's research agenda has expanded to include the site's third millennium BCE settlement spaces (Swerida 2018, 2022; Swerida and Thornton, 2019a, 2019b), mortuary traditions (Cable and al-Jabri, 2018; Dollarhide, 2019), and land-use patterns (Swerida, Cable, and Dollarhide, 2020). Most recently and with support from the US National Endowment for the Humanities, the project has shifted its focus to better understand the complex array of Early Bronze Age cultural activity and human-environment interactions evidenced at the site.[1]

This paper presents the excavation results and preliminary interpretations of BAP's winter 2022–23 field season, which targeted three areas of suspected Umm an-Nar period (ca. 2700–2000 BCE) settlement in the Bat landscape and its environs in the Wadi Al Hijr. Drawing on the theoretical framework of cultural landscape (see Morrison, 2018; Smith, 2007), BAP aims to understand how the Umm an-Nar inhabitants of Bat and its surroundings both shaped and were shaped by the landscape in which they lived. In choosing to look beyond the site's oasis center and examine ancient occupation in three geographically distinct areas within the 'greater' Bat landscape, this research sheds light on the diverse cultural processes and socioecological strategies practiced by the region's Umm an-Nar period inhabitants.

2. BAT AND THE WADI AL HIJR

The site of Bat and its surroundings provide an exceptional setting in which to examine the Umm an-Nar period cultural landscape (Figure 2). Located within the Wadi Al Hijr of the Hajar Mountains' interior foothills, Bat is more accurately conceptualized as an archaeological landscape rather than a single site. The 23 ha UNESCO-defined zone, where the densest concentration of Early Bronze Age remains are found, is centered on an ancient oasis on the northern side of the wadi floodplain and extends into the raw stone hills of the Jebel Wahrah (Beuzen-Waller et al, 2018; Janjou et al, 1986). Ample archaeological features dating to the third millennium BCE can also be found well beyond this zone, with at least seven monumental towers (Cable, 2012; Thornton et al, 2016), over 1000 tombs (Dollarhide, 2019; Cable and al-Jabri, 2018; Gentelle and Frifelt, 1989), three areas of domestic occupation (Swerida, 2018), and extensive evidence for hydraulic management (Brunswig, 1989; Desruelles et al, 2016) spread over a 400+ ha area.

While a high water table and sparse seasonal rainfall provide access to water and fertile soils in Bat's oasis center, the landscape rapidly transitions to one of raw stone hills and hyper-arid plains. Despite these limitations, a network of small Umm an-Nar domestic settlements can be found within a 20 km radius (i.e., a walking distance of roughly one day) of the Bat oasis (Cable and al-Jabri, 2018; Dollarhide, 2019). These sites—including Al Khatum, Al Wahra, Rakhat Al Madrh, Al Zebah, and Al Dariz—are strategically located on hillsides and in wadi catchment zones where their inhabitants could exploit the intermittent resources and environmental refugia that characterize the space.

1 The grant project, "Beyond the Oasis: The Ancient Cultural Landscape of Bat and the Sharsah Valley" (RFW–279340–21), adopts the definition of oases as irrigated spaces that are co-produced through the interaction of humans, date palms (Phoenix dactylifera L.), and various geophysical aspects of the landscape in which a diversity of flora and fauna survive in otherwise arid landscapes (see Beuzen-Waller et al., 2018; Cleuziou, 2009). While many of the third millennium remains at Bat are beyond the greenery of the modern oasis, archaeological, geomorphological, and archaeobotanical evidence discussed in this paper and others support an interpretation of the site as an Early Bronze Age oasis (Desruelles et al., 2016; Tengberg, 1998; 2016; see also Swerida et al., in prep — "Cultural & Ecological Resilience at Early Bronze Age Bat").

Figure 1*: Map of southeast Arabia showing the location of Bat (image by Eli Dollarhide).*

In order to better understand the diversity of Umm an-Nar period lifeways and place-making activities on this diverse landscape, BAP has begun a broad program of excavation and mapping of Umm an-Nar occupational sites both within the Bat oasis and in its surrounding environs in the Wadi Al Hijr (Dollarhide and Swerida, 2022). This research builds on previous excavations of Umm an-Nar domestic spaces at the Settlement Slope (Swerida, 2020; 2022; Swerida and Nugent, 2022; Swerida and Thornton, 2019b) and Al Khafaji (Swerida and Thornton, 2019a), as well as earlier research on Bat's Early Bronze Age tombs and tower monuments (Thornton et al*,* 2016). The results of the 2022–23 field season excavations are reported below. In addition to these excavation results, the project also sponsored a series of arts-based community outreach and engagement activities; a geomorphological and geological study of the greater Bat landscape; and a program of botanical analysis from domestic spaces across Bat's different environs. The findings of these aspects of the project will appear in future publications.

3. EXCAVATION

In pursuance of BAP's research goals, excavations during the 2022-23 field season were conducted at three locations believed to be stages for Umm an-Nar domestic occupation and cultural place-making activities: (1) an area known as "Operation A" just south of the UNESCO zone; (2) Al Khatum Settlement, located approximate 3 km to the northeast of the Bat oasis; and (3) the satellite settlement of Rakhat Al Madrh approximately 7.5 km to the southeast of the oasis (see Figure 2). All Early Bronze Age sub-phases and stylistic date approximations are based on the material culture typology established in Swerida, Dollarhide, and Jensen 2021 (see Table 1).

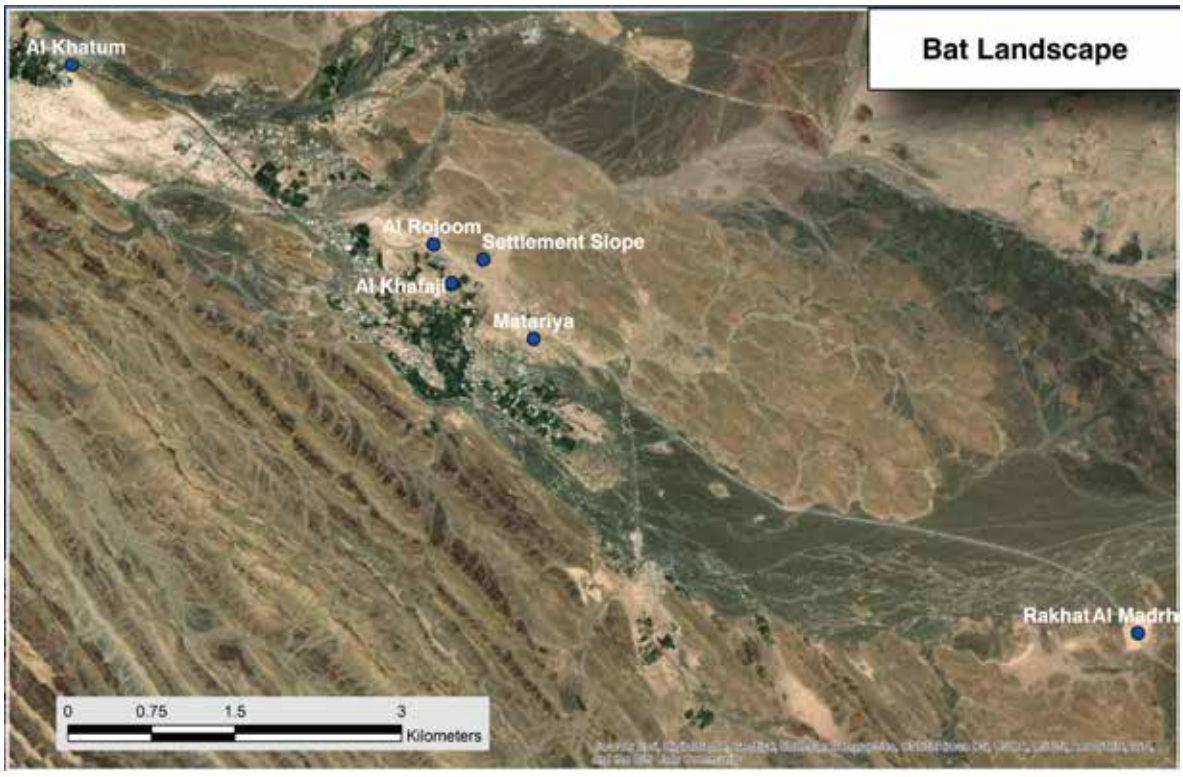

Figure 2*: Map of the Bat landscape indicating notable locations within the oasis and the two closest satellite sites, Al Khatum and Rakhat Al Madrh (image by Eli Dollarhide).*

Table 1: *Bat third millennium BC chronological sub-phases (updated from Swerida, Dollarhide, and Jensen 2021: Table 1).*

Absolute Dates (BCE)	Archaeological Period	Bat Phase	Active Bat Area
2000	Early Bronze Age	Late Umm an-Nar	Settlement Slope Rakhat Al Madrh
2100			
2200		Middle Umm an-Nar	Settlement Slope Al Rojoom Al Khafaji Operation A Al Khatum Rakhat Al Madrh
2300			
2400			
2500			
2600		Early Umm an-Nar	Settlement Slope Al Khafaji Matariya
2700			
2800			
2900		Late Hafit	Al Khafaji Matariya
3000		Hafit	Settlement Slope Al Khafaji Matariya Rakhat Al Madrh

3.1 "OPERATION A"

The site known as "Operation A" is a circular collection of low mounds located at the northern edge of the wadi plain, just outside the Bat UNESCO zone (Figure 3). This location is significant due to its proximity to the Bat necropolis ca. 500 m to the north, the famous Al Rojoom tower ca. 350 m to the southeast, and the monumental "Operation B" tower less than 50 m to the west. While preliminary explorations of Operation A were conducted by both BAP (Possehl and Thornton, 2007) and the German Mission to Oman (Weisgerber, 2010), the date and nature of the site remained undetermined.

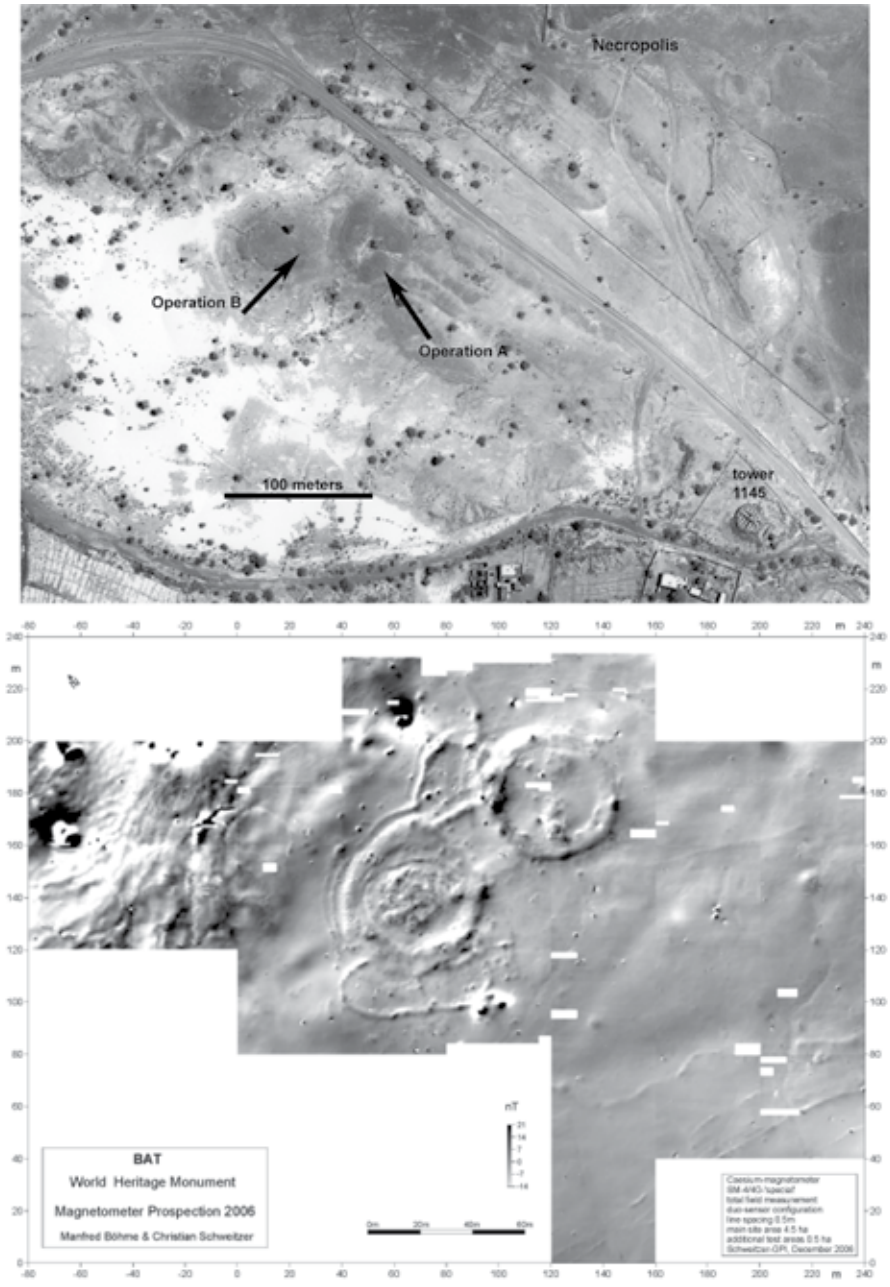

Figure 3*: Overhead imagery of the Bat landscape ca. 2006 showing the locations of Operations A and B, Rojoom Tower (1156), and the Early Bronze Age necropolis (top); Results of magnetic prospection at Operations A and B (bottom; images courtesy of the German Mission to Oman 2007).*

Operation A and B first came to BAP's attention during the project's first excavation season in 2007 through the generosity of the German Mission to Oman in sharing the results of their earlier magnetic prospection of the area. The magnetic survey documented two large circular structures on the wadi plain, each approximately 50 m in diameter and corresponding with two small hillocks. Excavations carried out by BAP at both mounds were intended to test the hypothesis that the sites were the locations of third millennium BCE domestic settlement (Possehl and Thornton, 2007).

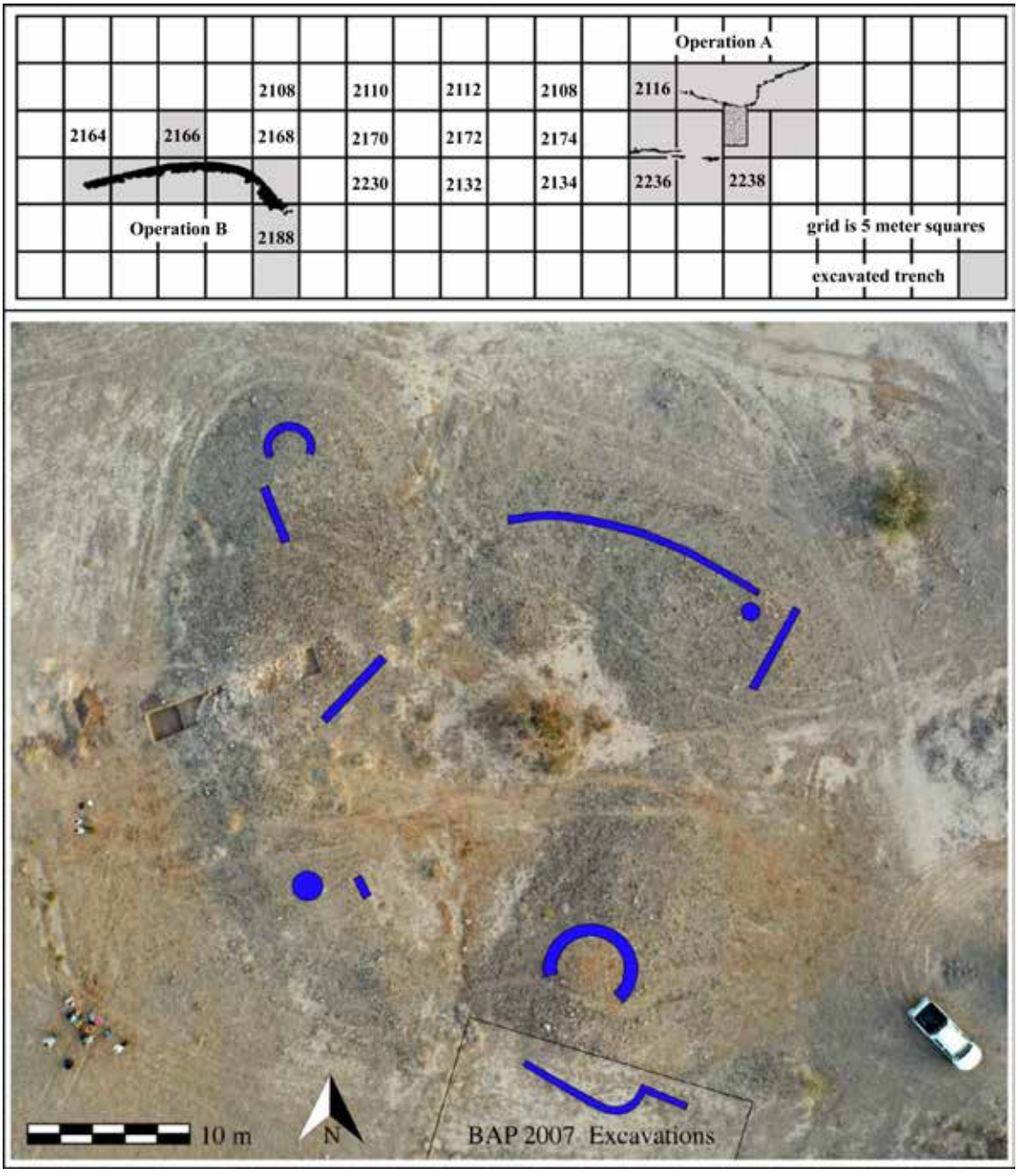

Figure 4: *BAP 2007 site grid indicating locations of Operations A and B (top; after Possehl and Thornton 2007: Fig. 6); Overhead view of Operation A with plan of architecture visible on ground surface in 2023 and location of BAP 2007 excavations (bottom; plan by Robert Bryant and Jennifer Swerida).*

The BAP 2007 excavations targeted the narrow space between the two mounds, including the southwestern edge of Operation A and the northeastern edge of Operation B (Figure 4). Results revealed Operation B to be a stone tower monument surrounded by a ditch feature, comparable in scale and construction style to the stone phase of the nearby Matariya tower (see Cable, 2016). Later excavations by a new German Mission to Oman confirmed these findings and date the monument's use to 2900–2300 BCE (Döpper, 2018), roughly corresponding with the Early and Middle Umm an-Nar periods. At Operation A, BAP uncovered a series of fragmentary stone walls and clay or cobble surfaces on and to the south of the mound. Recovered artifacts include a small assortment of lithic tools and ceramic sherds in secondary contexts, stylistically datable to the Umm an-Nar, Iron Age, and early Islamic periods.

During the winter 2022-23 field season, BAP conducted a program of surface documentation and test excavation at Operation A (see Figure 4). Pedestrian survey found significant damage due to erosion and human activity, which has revealed traces of previously undocumented architecture. These features include linear wall fragments and circular stone features. While it is not possible to determine a date or function for most of these fragmentary remains without further excavation, two large semi-circular walls at the top of the northwestern and southeastern mounds can be tentatively identified as tombs. Both are similar in scale and construction style to Umm an-Nar tombs elsewhere on the Bat landscape (see Böhme and al-Sabri, 2011; Frifelt, 1985; Miki, Kurounma, and Kondo, 2019).

In order to probe the contexts within the Operation A mound, an 11 x 2 m trench was excavated into the west-facing side of the site and into the wadi plain beyond. This location was selected due to its proximity to linear features detected in the magnetic survey and complementary position relative to the BAP 2007 investigations. Excavations found the upper layer of the mound to be composed of rounded pebbles and small cobbles in a loose, light grey-brown silt. This surface matrix gradually grades into a light brown silt as contexts move off the mound and into the flat of the wadi plain (Figure 5).

Approximately 20 cm below the top of the mound, excavation encountered a ca. 5 m expanse of pebble surface and an associated assortment of marine shell and ceramics stylistically datable to the Iron Age III (Figure 6a), with parallels at Salut (Philips 2010) and Rumeilah II (Boucharlat and Lombard 1985: pl. 57-58). The irregular western edge of this surface curves roughly in line with the mound, possibly due to erosion, while the eastern edge is formed by a straight face of small, angular blocks of local limestone set in silt. These remains likely reflects a later use-phase of the earlier hillock.

On the outer edge of the site, below the level of the pebble surface, excavation revealed a series of concentric curving stone alignments that step down the side of the mound. The stones are unworked, of varying sizes, and are set in a compact clay. The curvature of the stone alignment(s) is notably of a smaller circumference than the mound in which they are embedded. No datable material was collected from the fill above or within these stone features. Stylistically, the scale and construction style are roughly comparable to Wadi Suq tombs known elsewhere on the Bat landscape (see Williams and Gregoricka, 2016) and in the broader region (Düring and Olijdam, 2015; Frifelt, 1975; Kuronuma, Miki, and Kondo, 2021).

The deeper stratigraphy encountered in the wadi plain to the west of the hillock suggests that the whole of Operation A is situated on a clay mound. Below the silt and cobble topsoil, excavators encountered a layer of soft, light grey-brown silt that is probably accumulated wind-blown sediment caught against the side of the mounded terrain and architecture. Beneath the westernmost and lowest curving stone alignment is a layer of compact, sterile, grey-brown clay sloping downhill to the west in alignment with the slope of the Operation A hillock. In contrast, at the western end of the trench a layer of crumbly, dark brown clay was found below the wind-blown silt. Several ceramic sherds stylistically datable to the Umm an-Nar period were recovered from this

matrix (Figure 6b-d). The compact, grey-brown clay layer was only encountered in the eastern end of a 2 m sounding excavated at the far western end of the trench. This stratigraphy suggests that the crumbly, dark brown clay has accumulated around and partially atop a mound of the compact clay. Comparable packed clay mounds are known to exist at Bat below tower monuments Kasr Al Khafaji (Swerida and Thornton, 2019b) and Kasr Al Rojoom (Frifelt, 1985).

Figure 5*: Oblique image of Operation A from the west the results of the 2x11m trench (top); Overhead of Operation A excavation (middle; image by Robert Bryant); South profile of the Operation A excavation (bottom; profile by Jennifer Swerida).*

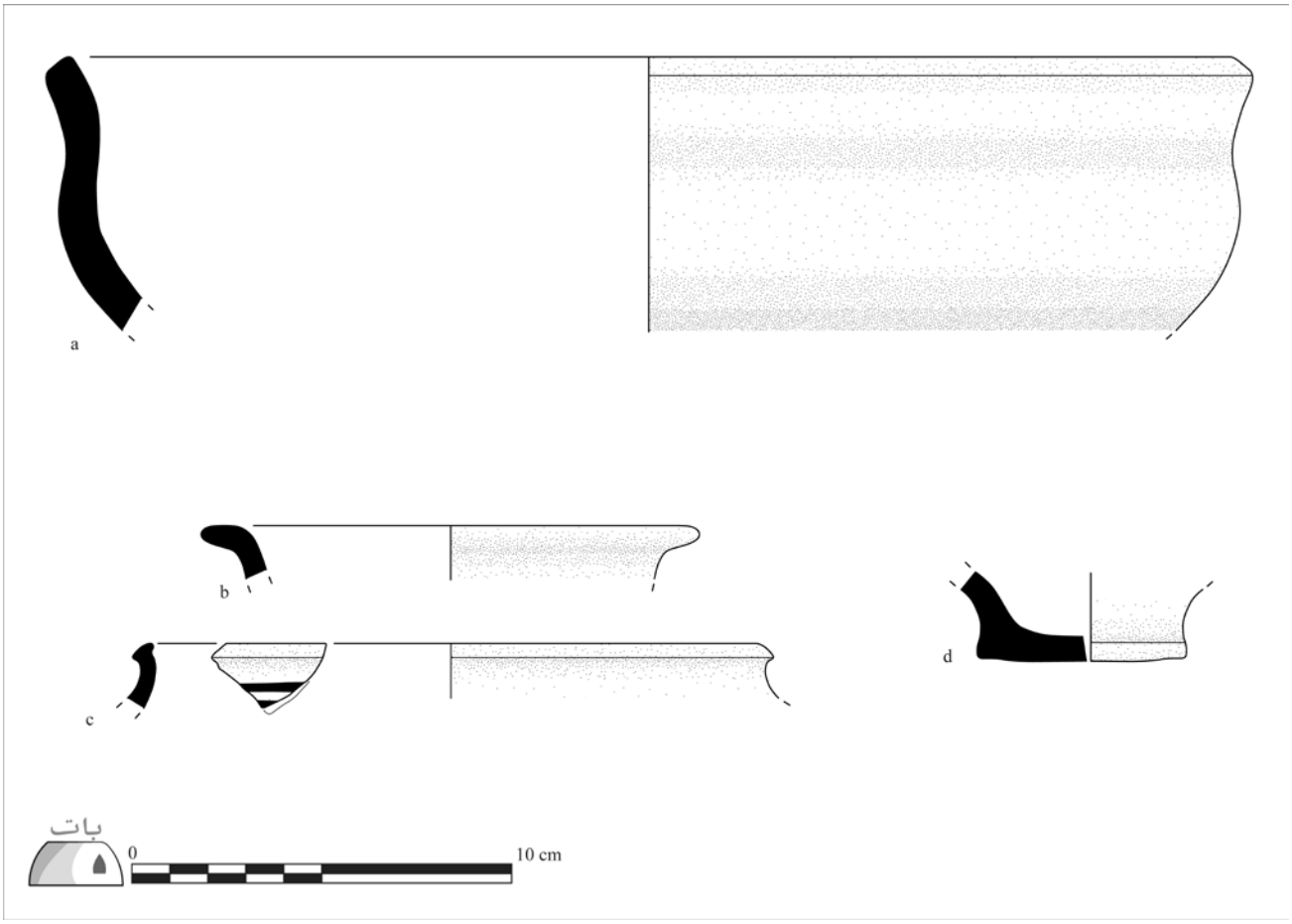

Figure 6*: Iron Age III bowl (a) from Operation A pebble surface and Umm an-Nar sherds (b-d) from clay layer at the base of the Operation A mound (illustration by Jennifer Swerida).*

3.2 AL KHATUM SETTLEMENT

Located on the southern face of a ca. 500 m long hill within the Wadi Al Hijr, approximately 3 km northwest of the Bat oasis, the Al Khatum Settlement is the closest of Bat's network of satellite sites (Figure 7). Al Khatum is best known for the monumental Umm an-Nar tower that sits at the western end of the hill ridge (Cattani et al*,* 2017; Cocca et al, 2019). The lesser-known settlement was first identified by Charlotte Cable (2012) and was systematically surveyed and mapped by BAP between 2013 and 2015 (Kondo and Swerida, 2013; Hatfield and Cable, 2014; Swerida, 2018). In 2022, BAP returned to Al Khatum Settlement to begin a larger program of study at the site that incorporates survey, test excavation, and photogrammetric mapping (Bryant, Smith, and Swerida, 2022).

A total of four test trenches were excavated at Al Khatum Settlement during the BAP 2022-23 field season: (1) KS Test Trench B: a strip trench sampling a large building complex at the eastern end of the settlement; (2) KS Test Trench C: salvage excavation of a destroyed Umm an-Nar tomb; and (3) KS Test Trench D: a deep sounding within an extremely large building at the western end of the site. The results of KS Test Trench A, excavated in the eastern complex during the winter of 2022, are also reported below.

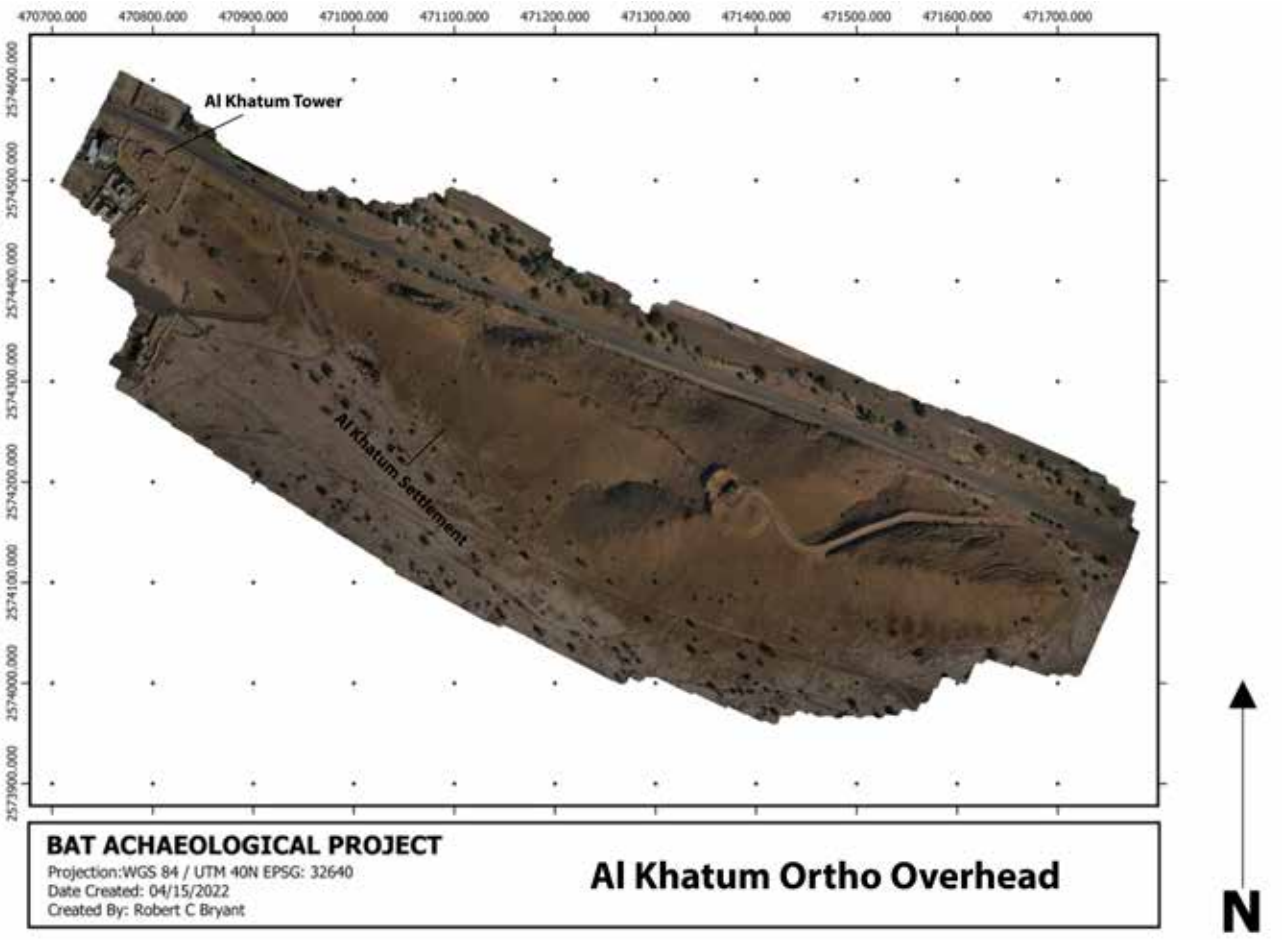

Figure 7*: Photogrammetric plan of the Khutm site indicating the positions of the Khutm tower and settlement (image by Robert Bryant).*

3.2.1 KS TEST TRENCHES A–C: UMM AN-NAR COMPLEX

A large, rectilinear building complex located on a plateau at the eastern end of Al Khatum Settlement was selected for test excavation. The complex was identified during BAP's initial survey of the site (Kondo and Swerida, 2013) and is associated exclusively with Umm an-Nar period ceramics (Hatfield and Cable, 2014). A total of three test trenches—KS Trenches A–C—were excavated to sample the complex and its surroundings. Additionally, a structural plan was compiled based on architectural elements visible on the modern ground surface and portions exposed through excavation (Figure 8).

KS Test Trench A, a 2 x 2 m sounding, was excavated abutting the building's northwestern exterior wall in 2022 (Bryant, Smith, and Swerida, 2022). The wall foundations were found to rest on or just above the bedrock of the hillside and slope gently downhill to the southwest. A limited collection of ceramics stylistically datable to the Middle Umm an-Nar period (ca. 2500–2200 BCE) were recovered within the top 20 cm of excavated silt and gravel. The presence of fine mortuary wares in this collection suggest that at least some sherds are eroded downhill from an Umm an-Nar tomb located approximately 15 m uphill to the north of Trench A. The silt and gravel matrix encountered in this trench grade into a friable limestone bedrock approximately 30 cm below the level of the modern surface.

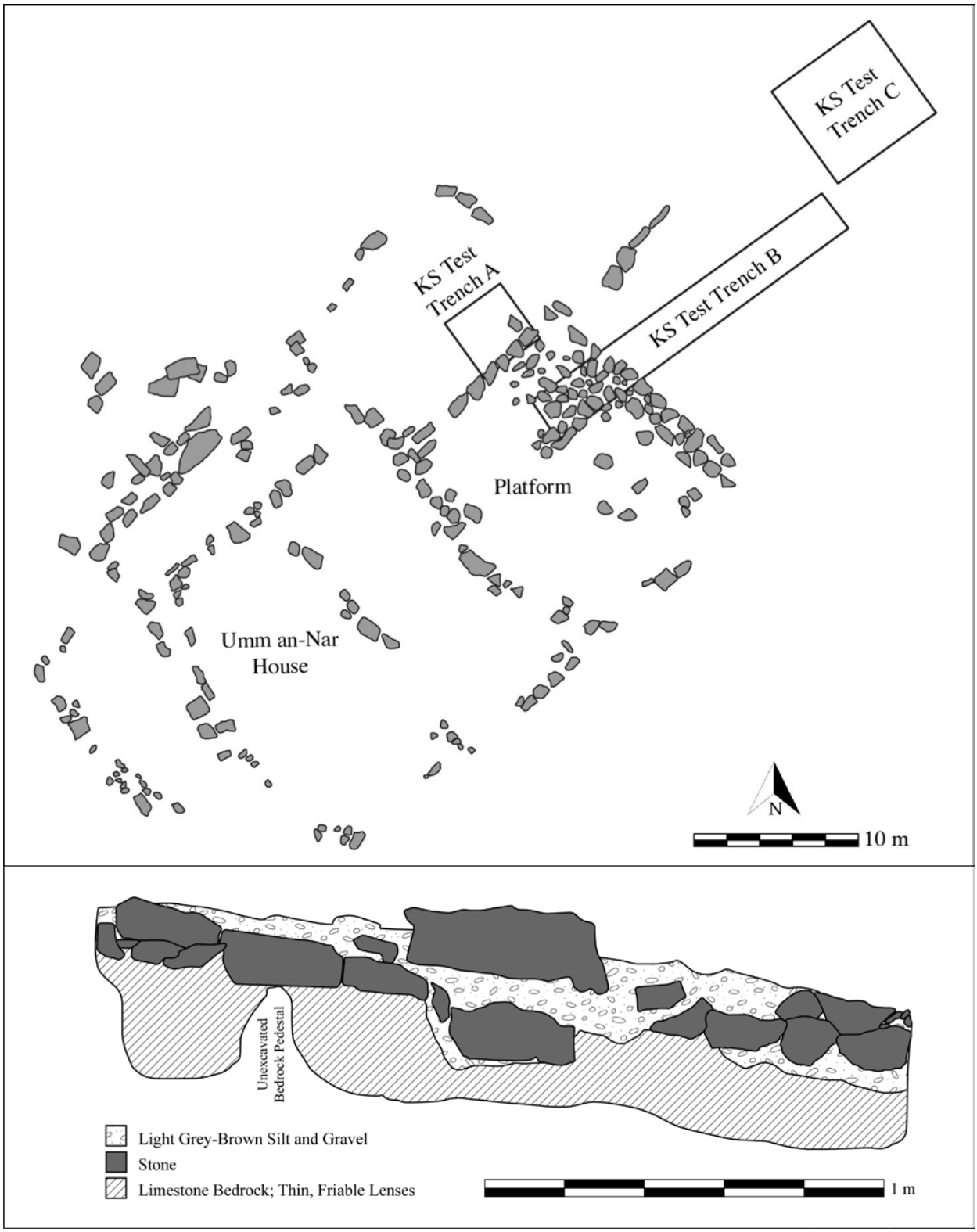

Figure 8*: Plan of Khutm east complex indicating locations of the probable Umm an-Nar house and platform, and Test Trenches A–C (top; plan by Jennifer Swerida); KS Test Trench A southeast profile (bottom; profile by Robert Bryant).*

In order to further explore the date, preservation, and function of the complex, a 1.5 x 10 m trench—KS Test Trench B—was excavated to bisect spaces tentatively interpreted as a courtyard and the interior of a large room. The northeastern half of Test Trench B revealed a shallow (5–25 cm) stratigraphy composed of an upper pavement of angular gravel above a thin layer of light brown silt and an underlying friable limestone bedrock. All ceramics are stylistically consistent with the Middle Umm an-Nar 1 (Figure 9a–f).

Excavation in the southwestern half of KS Test Trench B, situated to sample a large room at the northeastern end of the building complex, quickly determined this space to more likely be the stone foundations of a roughly square stone platform. A stone alignment expected to form the northeastern exterior wall of the building was instead revealed to be the face of an 8.8 x 8.1 m feature of packed unworked stones of varying sizes. Similar square platforms of uncertain function are known from Umm an-Nar contexts at Bat and elsewhere in the Hajar inner piedmont. These are most often associated with tower monuments, such as the platform at Bat‘s Kasr Al Khafaji (Swerida and Thornton, 2019a) and Kasr Al Rojoom (Frifelt, 1985). Less commonly, large stone platforms are found at Umm an-Nar sites as lone monuments, such as Structure 1 at Al Khashbah (al-Jahwari and Kennet, 2011:203–5), or as components of architectural complexes, as at Amlah 5b (de Cardi, Collier, and Doe, 1976:114–115). Of these parallels, the Khutm platform is closest in size and proximity to the Al Khafaji platform, where excavation found the stone foundations to have supported a mud brick superstructure (Swerida and Thornton, 2019a:9–10). The dense clay encountered between the stones of the Khutm platform may indicate that it once featured a similar mud brick surface.

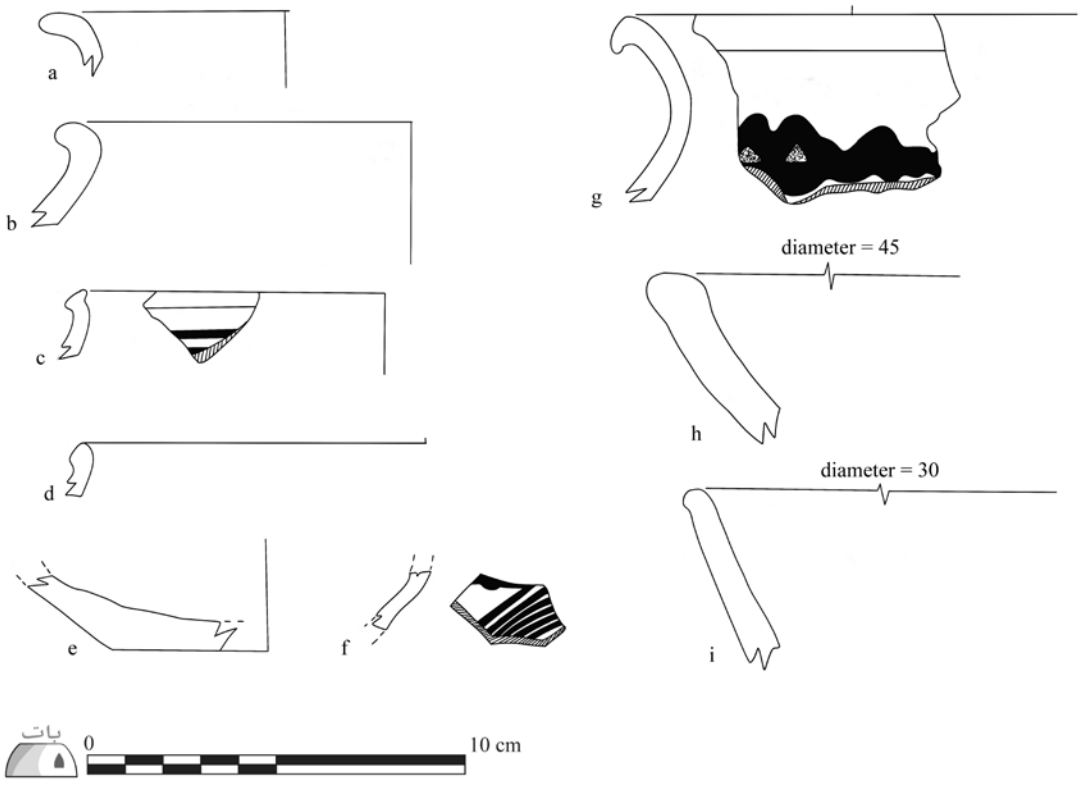

Figure 9*: Selection of Middle Umm an-Nar (a–f) and Iron Age II (g–i) ceramics from KS Test Trenches A (a, d–e), B (c), and D (b, f–i) (illustration by Jennifer Swerida; digitization by Selin Nugent).*

The plan of architectural features visible on the modern ground surface in Al Khatum Settlement shows a direct relationship between the platform and stone walling to the southwest. Although it has not yet been possible to excavate the southern portion of this complex, the architectural layout is reminiscent of Umm an-Nar houses excavated elsewhere on the Bat landscape at the Settlement Slope (Swerida 2022; Swerida and Thornton 2019b), Al Khafaji (Swerida and Thornton, 2019a), and Rakhat Al Madrh (Dollarhide 2020; Dollarhide, Rissman, and Swerida 2022). A comparable relationship between an Umm an-Nar platform and house has not yet been documented at Bat or other sites in the region.

Over the course of fieldwork, it became apparent that a mounded area to the northeast of Test Trench B was the remains of a destroyed Umm an-Nar tomb. This area attracted attention due to an unusually high concentration of Umm an-Nar funerary ware sherds on the surface. Closer inspection identified a total of 14 displaced limestone blocks as semi-circular facing stones typical of Umm an-Nar tomb construction (Figure 10i). While the preserved tomb mound was ca. 5 m in diameter, the original structure was likely significantly larger. The curvature on the recovered tomb facing stones is consistent with tombs with a diameter of ca. 8 m.

As the tomb structure was entirely displaced or absent, leaving its contents to erode down the hillside, the decision was made to conduct a brief salvage excavation—KS Test Trench C—of the remaining materials. The tomb mound was primarily composed of silt and angular gravel with significant quantities of ceramic sherds, ash, and occasional bone fragments. No stratigraphy was discernible below the surface gravel layer. All recovered bone was fragmentary and disarticulated. The best preserved fragments are identifiable as adult human, however the quality of preservation is insufficient for more detailed analysis. Artifacts recovered from the tomb include a large number of black-on-red funerary ware sherds from jars of various sizes, typical of Umm an-Nar tombs throughout the period, as well as a large fragment of an imported Iranian grey ware jar and a lithic flake of local radiolarite (see Figure 10a–h).

In its complete form, the tomb would have been situated on a flat, elevated area of bedrock to the northeast of Khutm's eastern Umm an-Nar complex. This location would have been behind and slightly above the square platform encountered in Test Trench B. The unknown relative heights of the tomb and platform would determine their visibility from elsewhere on Al Khatum hill or the neighboring wadi plain.

3.2.2 TEST TRENCH D: IRON AGE II FORT

During the BAP 2021-22 field season, an exceptionally large building stretching across at least 150 m of Al Khatum hillside closest to the site's Umm an-Nar tower was tentatively identified as an Iron Age fort or walled settlement (Bryant, Smith, and Swerida, 2022) (Figure 11). Overhead imagery and opportunistic walking survey found this large structure to continue at least as far west as the modern dirt road that crosses the hill ridge. The structure is characterized by ca. 1 m wide wall foundations constructed of local limestone blocks and a sparse surface collection of mixed Iron Age II, Wadi Suq, and Umm an-Nar ceramics. A ca. 40 x 25 m portion of the building plan has been lost to modern earthmoving activities.

In order to better understand the occupational history of Al Khatum Settlement, in the 2022-23 season BAP excavated a 1.5 x 1.5 m sounding—KS Test Trench D—within this large structure (Figure 11). The chosen location is enclosed by walls to the south, east, and west that were possibly foundations for a small watchtower on the southern edge of the fortification wall. Excavations encountered a layer of silty fill associated with the surrounding architecture extending from immediately below the surface to a depth of approximately 30 cm. A large stone, likely associated with the neighboring walls, and small collection of ceramics stylistically datable to the Iron Age II were found resting on a floor surface of packed clay (see Figure 9g–i). The elevation of this floor is approximately 10 cm above that of the neighboring monumental wall foundations, which are visible in profile downhill to the east.

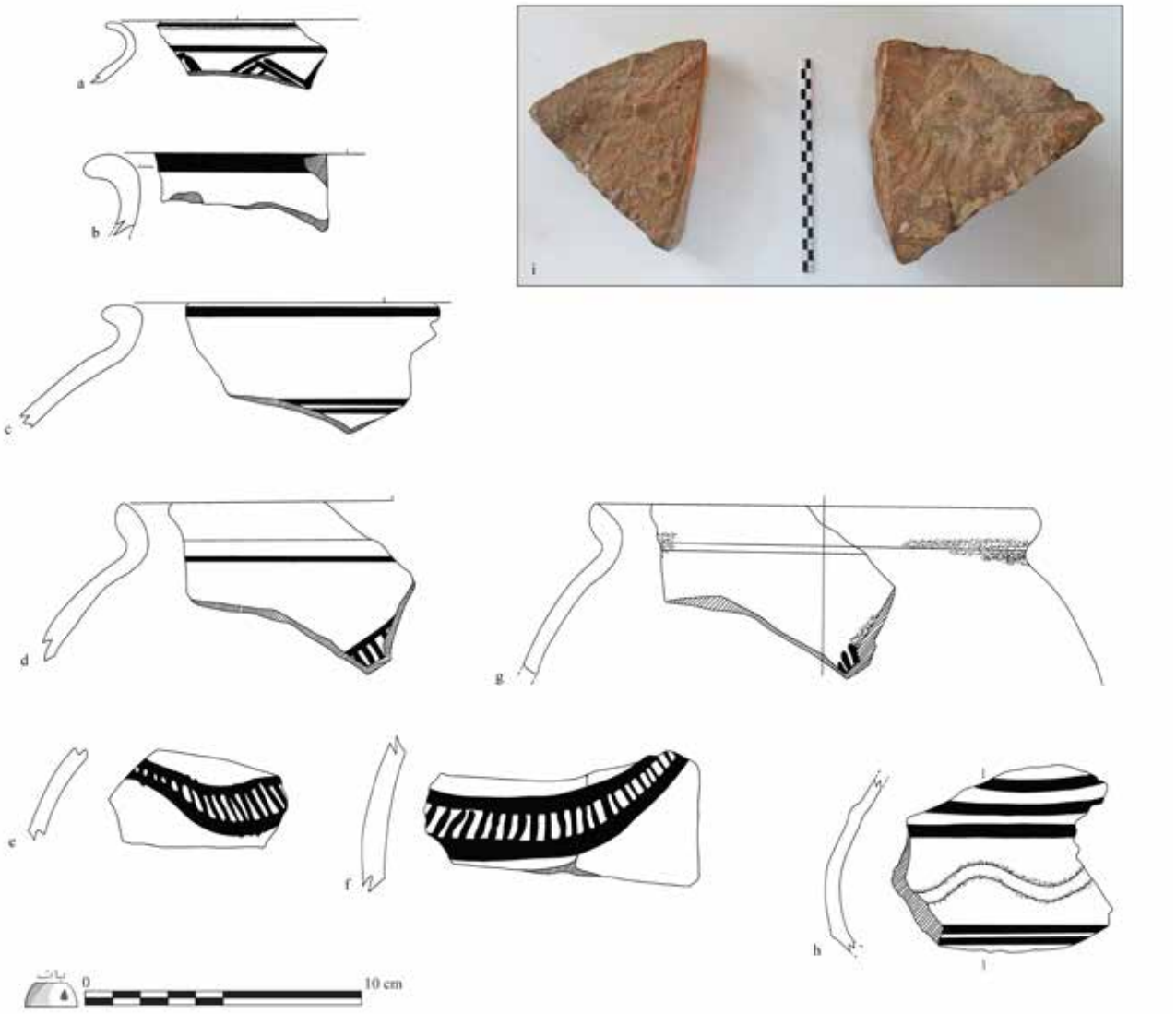

Figure 10*: Selection of ceramics from KS Test Trench C, including Umm an-Nar funerary ware sherds (a–g) and an imported Iranian grey ware sherd (h); Examples of Umm an-Nar tomb facing stones (i) from KS Test Trench C (illustration by Jennifer Swerida and Reilly Jensen; digitization by Selin Nugent).*

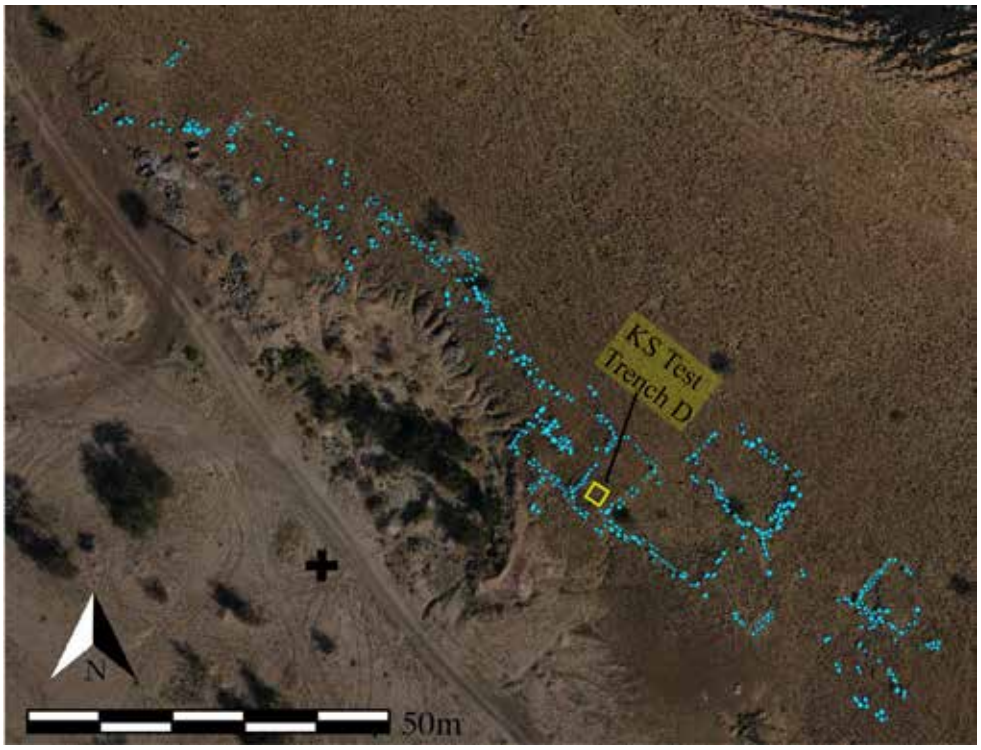

Figure 11*: Plan of Khutm Iron Age fort indicating the location of KS Test Trench D (image by Robert Bryant and Jennifer Swerida).*

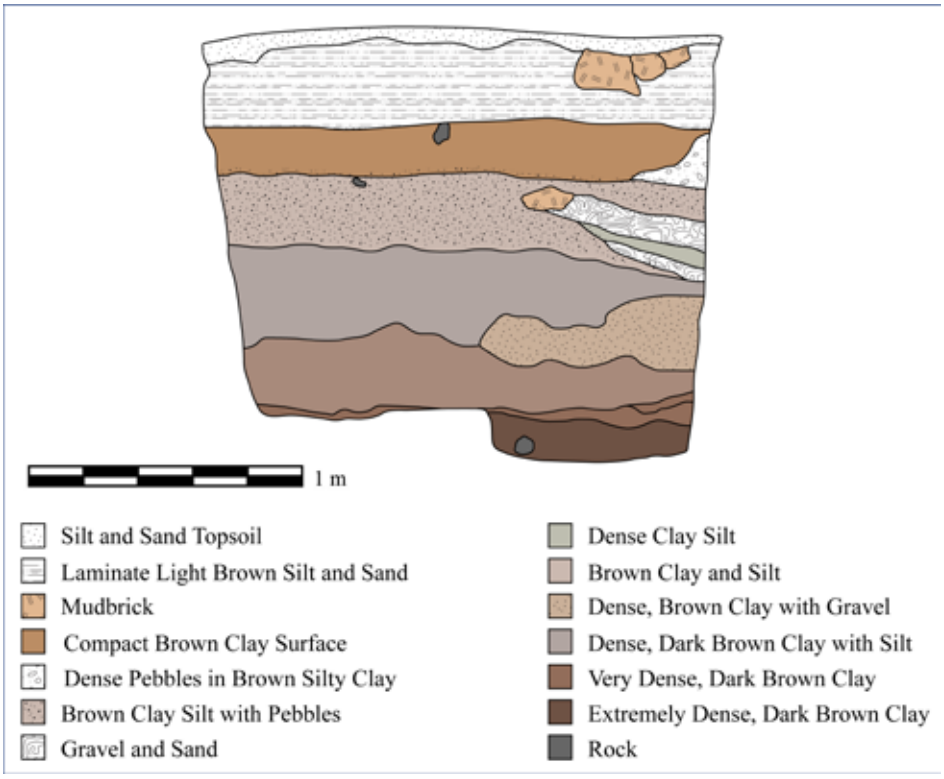

Figure 12*: West profile of Khutm Test Trench D (profile by Robert Bryant).*

Below the Iron Age occupation, excavations revealed a 20–25 cm layer of silty clay with frequent floating charcoal pieces. The majority of the ceramic assemblage from the test trench (12 sherds) were recovered from this layer and stylistically date to the Middle Umm an-Nar. Notable examples include a large sherd of a black-slipped Indus storage jar, two sherds from a single Umm an-Nar funerary jar, and a painted jar decorated with an undulating ladder motif. While not found in their original contexts, these materials suggest that the Umm an-Nar occupation preserved at surface level at the eastern end of Al Khatum Settlement continued across the hillside before being eclipsed by the Iron Age occupation. The Umm an-Nar layer ends on a surface of packed clay, the irregular character of which is akin to a naturally occurring ground surface cemented by cultural habitation rather than a prepared floor.

Beneath the level of the Umm an-Nar materials, contexts are characterized by moderately to poorly sorted layers of silt, sand, and rounded gravel typical of wadi flood events. Occasional charcoal flakes in the layers immediately below the Umm an-Nar occupation are the only indication of earlier human activity. Lower stratigraphic layers are composed of increasingly compact lenses of clay. Excavation ended on an extremely dense clay layer approximately 65 cm below the last instance of charcoal.

3.3 RAKAT AL MADRH

The winter of 2022-23 marked BAP's third season of excavations at the Umm an-Nar settlement of Rakhat Al Madrh (Figure 13). The site was first identified during a BAP survey conducted between Bat and 'Amlah during winter 2017 (Dollarhide, 2019; Dollarhide, Garret, and Rissman, 2017). Located approximately 7.5 km southeast of the modern Bat oasis, the site is situated around a sub-recent alluvial fan (Janjou et al*,* 1986)—an area of ancient above-ground water catchment located just outside the main channel of the Wadi Al Hijr. This environmental setting differs substantially from other known areas of Umm an-Nar settlement on the Bat landscape—as well as those of any other contemporaneous settlement in southeastern Arabia.[2]

Surfacing mapping has documented four Umm an-Nar structures (RaM 1–4) located along the upper edge of the site's natural basin, just above the level where seasonal flooding events have deposited a concentration of silty clay (Dollarhide, 2020). The remains of each Rakhat Al Madrh structure are similar in plan and construction style to excavated Umm an-Nar houses at Bat—double-faced, dove-tailed stone wall foundations that form compartmented, rectangular rooms organized around a central walled courtyard (see Swerida, Dollarhide, and Jensen 2021:57–59, Fig. 4). Two previous seasons of excavation at the site, BAP 2019–20 and 2021–22, confirmed the domestic nature of two structures: RaM 1 and RaM 2. This work found that the stone architecture visible on the surface was two-three courses tall and served as a foundation for mudbrick walls (Dollarhide, 2020; Dollarhide, Rissman, and Swerida, 2022).

Previous excavations at RaM 1 and 2 also uncovered a substantial quantity of charred material and subsequent ^{14}C dates (Table 2). An initial date based on a wood charcoal sample collected from within a wall confirmed a Middle Umm an-Nar 1 date for the construction of RaM 1. A second wood charcoal sample collected within compacted mudbrick related to the building's primary occupation provides a slightly later Middle Umm an-Nar 2 date, suggesting a longevity of occupation over at least a century. Finally, a third charcoal sample collected from a level below RaM 1's walls produced a date range falling entirely within the Hafit period. This early date suggests that the Rakhat Al Madrh area was already occupied at the beginning of the third millennium and was at least intermittently occupied for a span of over 750 years.

2 Full results of BAP's archaeological research at the settlement site of Rakhat Al Madrh are in preparation by Dollarhide et al. — "Rakhat al-Madrh: an agro-pastoral settlement beyond the Oasis".

Figure 13*: Overview of Rakhat Al Madrh basin indicating the locations of Umm an-Nar buildings RaM 1, RaM 2, RaM 3, and RaM 4 (image by Eli Dollarhide).*

Table 2: *14C samples from Rakhat Al Madrh*.

Phase	Bat Site	Contest Description	Sample	Conventional 14C Age	OxCal – IntCal 2020 Caleb. (2-sigma) cal. BC
Hafit	RaM 1	Wood charcoal sample from cultural level below the RaM 1 foundations	D-AMS 048471	4272 ± 29	2926-2871 (92.4%); 2800-2781 (3.1%)
Middle Umm an-Nar 1	RaM 1	Wood charcoal extracted from mortar in RaM 1 interior wall foundation	D-AMS 038700	3987 ± 29	2576-2460 (95.4%)
Middle Umm an-Nar 2	RaM 1	Wood charcoal extracted from mudbrick associate with the RaM 1 primary occupation	D-AMS 048472	3879 ± 30	2465-2283 (91.3%); 2250-2233 (2.9%); 2219-2210 (1.2%)
Middle Umm an-Nar 2	RaM 2	Charred seed from ash context associated with oven Feature 221844	D-AMS 053202	3765 ± 24	2286-2247 (17.1%); 2237-2132 (70.8%); 2086-2050 (7.6%)
Middle Umm an-Nar 2	RaM 2	Wood charcoal from within oven Feature 221844	D-AMS 053203	3752 ± 26	2282-2251 (9.1%); 2231-2220 (1.3%); 2210-2122 (65.3%); 2095-2039 (19.7%)
Middle Umm an-Nar 2	RaM 3	Wood charcoal from hearth on lowest identified floor level, at bottom of sounding	D-AMS 053204	3806 ± 26	2342-2192 (82.8%); 2180-2142 (12.6%)
Late Umm an-Nar	RaM 3	Wood charcoal from burned context on floor associated with Wall 233221 in sounding	D-AMS 053205	3755 ± 24	2282-2251 (10.0%); 2231-2220 (1.3%); 2210-2127 (68.4%); 2092-2041 (15.7%)

Ceramics recovered from previous excavation at RaM 1 and 2 revealed a variety of domestic Umm an-Nar wares and styles consistent with Middle Umm an-Nar types known elsewhere from Bat (see Swerida, Dollarhide, and Jensen, 2021). Architecturally, excavations at both structures suggest alterations occurred over the course of their occupations, both enlarging the structure through the addition of enclosed courtyards and further compartmentalizing the space inside the structure. Excavations at RaM 2 also revealed botanic-rich contexts associated with an oven (Feature 221844; see Figure 14), dated to the Middle Umm an-Nar 2 by ^{14}C analysis of carbonized wood and seeds (see Table 2). Botanical remains—seeds, animal dung, and phytoliths—include wheat, barley, goatgrass, cyperaceae, and date palm.[3] These species identifications add to our understanding of Rakhat Al Madrh's unique and environmentally rich setting in the Wadi Al Hijr.

3.3.1 RAM 2

A second season at RaM 2 continued to define the structure's architecture and function. Trenches were positioned to provide continuity with previous excavations and to clarify the interior layout of the

3 Archaeobotanical analysis conducted by Abigail Buffington.

building (Figure 14). A suite of long, narrow rooms located along the southeastern edge of the building were sampled, as well as interior contents of a large courtyard. Architecturally, these excavations confirmed the presence of mudbrick superstructure above the dove-tailed wall foundations of local limestone and conglomerate sandstone. Mudbrick fragments were found adhering to the surface of several walls, while melted mudbrick wash composed the primary matrix of the fill within the building. An interior floor of hard-packed clay was encountered below approximately 30–35 cm of this bricky matrix.

Excavations within the RaM 2 eastern suite targeted contexts related to the botanically-rich oven identified in 2022. Concentrations of wood charcoal, ash, and other features associated with pyrotechnic activity were found surrounding this feature. These include several fire pits and a 1.8 x 0.97 m concentration of burnt and broken wadi cobbles and pebbles, large chunks of wood charcoal, and distributions of ash located in the room corner behind the oven. The stones may have served as heat insulation for the oven or an aspect of a trash deposit associated with production activity.

Artifacts were generally rare in RaM 2, as is the case across most of the Rakhat Al Madrh structures. Several sherds of non-diagnostic Umm an-Nar domestic ware were recovered from both within the eastern suite and the large courtyard. A fragment of technical ceramic, likely a piece of a crucible, was found in the building's courtyard along with several small round copper fragments that suggest domestic metallurgical production. Unfortunately, the preservation of both pieces is so poor that neither presents itself photographically in a useful way. Additionally, two blades made of radiolarian chert were recovered from the room fill near to the oven feature.

3.3.2 RAM 3

RaM 3 is the largest of the four known structures surrounding the Rakhat Al Madrh basin, both in terms of its walled surface area and the scale of its masonry (Figure 15). A 5 x 15 m excavation unit —three contiguous 5 x 5 m trenches labeled A–C—running east-west through the center of the building was planned to sample interior and exterior contexts and to clarify architectural relationships. The building layout differs somewhat from that of RaM 2, consisting of a large courtyard lined with rectangular rooms on its northern and western edges. Walls are constructed of large limestone blocks (ca. 45 x 35 x 15 cm) and are preserved 3–4 courses in height. Excavations throughout this space encountered similar stratigraphic compositions: (1) an uppermost layer of fine silt and sand; (2) a thick layer of compact clay and superimposed floor surfaces associated with the RaM 3 building; and (3) an underlying layer of clay that is the natural matrix of the depression.

Contexts outside and to the east of RaM 3 (Trench A) were disturbed by repeated inundations from the neighboring basin. A layer of bricky matrix atop the compact clay and occupational debris in this area suggests that the building's wall foundations once supported a mudbrick superstructure that collapsed downhill. An exterior clay surface level with the foundations of RaM 3's large perimeter wall is associated with a small fire pit and collection of 33 ceramic sherds. While key examples are stylistically datable to the Middle Umm an-Nar, these sherds and all ceramics recovered from RaM 3 are small and provide limited typological information.

Within the courtyard (Trench B), excavations in the upper layer of silt and sand encountered five ephemeral, shallow fire pits associated with a small collection of coarse, Julfar-type sherds typical of the Medieval period (see Kennet, 2004:85). Due to time limitations, excavation of the dense clay occupational matrix within the courtyard continued in a 1.5 x 1.5 m sounding abutting the interior face of the perimeter wall (Figure 16). A 25 cm thick clay layer of occupational fill ended on a compact clay floor covered in a thin lens of burned material radiocarbon dated to the Late Umm an-Nar (see Table 2). Associated finds include a collection of 24 sherds with diagnostics stylistically datable to the Late Umm an-Nar period (Figure 16a-f). A rubble-filled foundation trench for the courtyard perimeter wall begins at this floor level and cuts into earlier contexts.

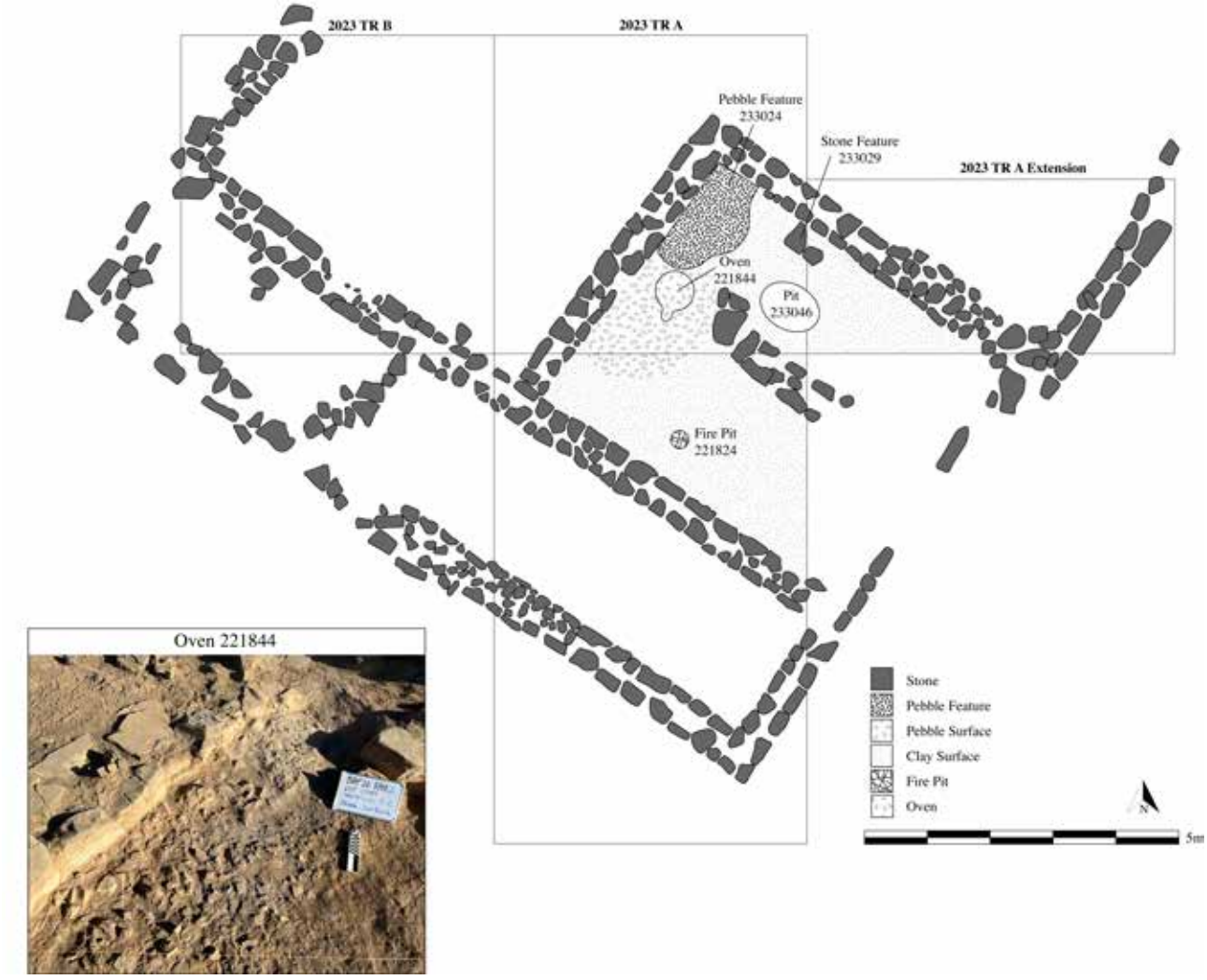

Figure 14*: Architectural plan of RaM 2 indicating the location of BAP excavations and notable features; Inset photograph of Oven Feature 221844 (plan and photograph by Jennifer Swerida).*

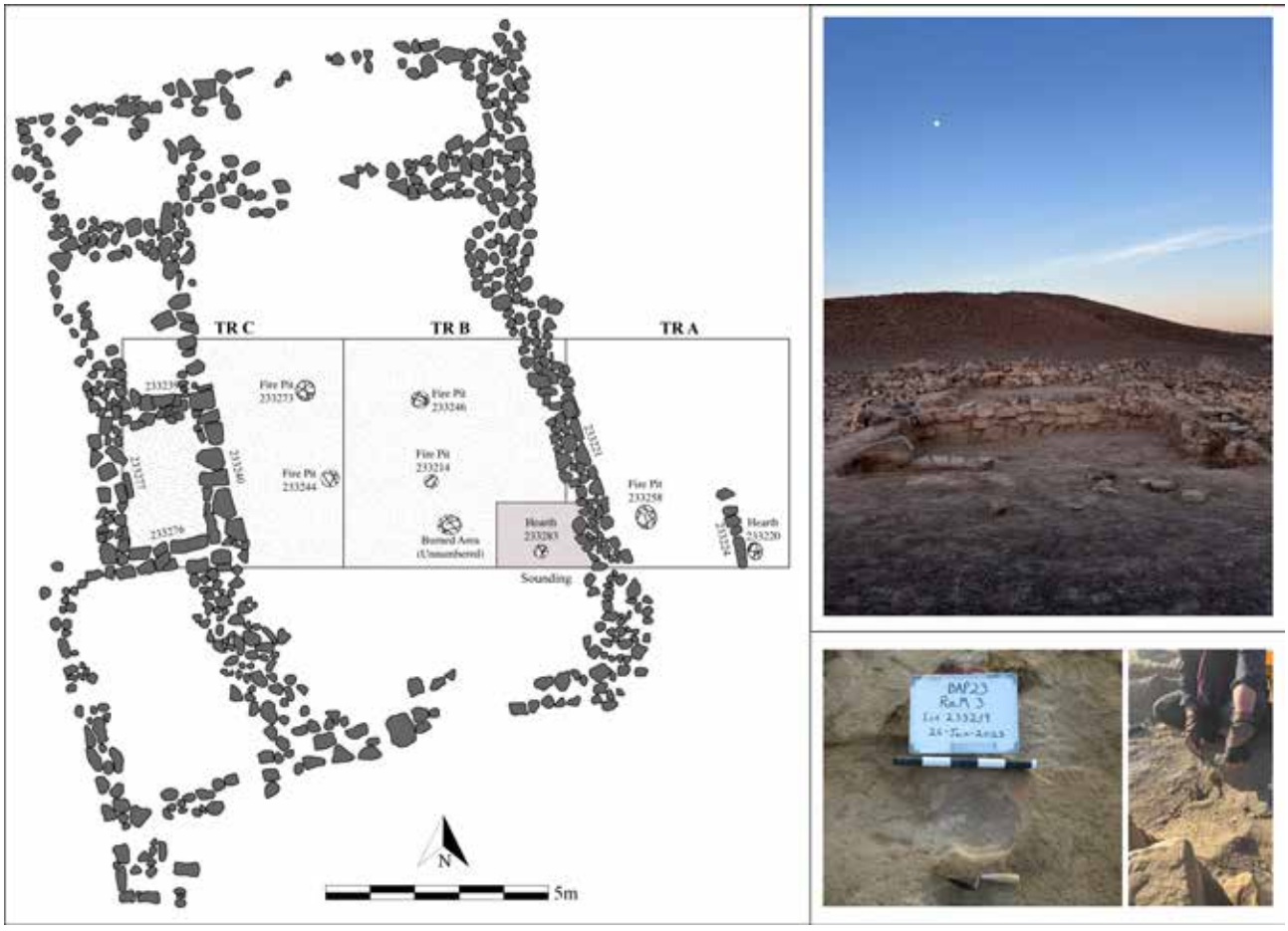

Figure 15*: Architectural plan of RaM 3 indicating the location of BAP excavations and notable features (left); Photograph of masonry from west (top right); Fire feature 233214 preservation and sampling (bottom right) (plan and photographs by Jennifer Swerida).*

The matrix below the RaM 3 Late Umm an-Nar floor is a 15 cm layer of compact brown clay with occasional charcoal flecks. A collection of 11 sherds was recovered from this fill, including four stylistically datable to the Middle Umm an-Nar 2 period (Figure 16g-j) and one from an Indus black-slipped jar.[4] Excavation ended on a floor layer of hard-packed, whitish-brown clay. Associated with this surface is a large, clay-lined hearth containing ample quantities of wood charcoal and animal dung, providing a 14C date in the latter half of the Middle Umm an-Nar 2 (see Table 2).

The western end of the RaM 3 excavation (Trench C) was situated to capture the contents of two rectangular rooms lining the outer edge of the building. Piled against the east face of the courtyard's western wall was a densely packed jumble of limestone blocks of varying sizes. This stone feature was likely intended to support the neighboring wall, preventing it from collapsing downhill to the east. A sherd of a jar form highly diagnostic of the Middle Umm an-Nar 2 period (Swerida, Dollarhide, and Jensen, 2021: Fig. 5o–r) was found in the lowest excavated layer of the stone feature and provides a terminus post quem.

Excavation within the two outer rooms was restricted by stone collapse. The smaller northern

4 More detailed analysis on the Rakhat Al Madrh ceramics will be presented in a paper in preparation by Dollarhide, Swerida, & Jensen — "Rakhat Al Madrh: an agro-pastoral settlement beyond the Oasis."

room was completely filled with fallen stone. The larger southern room was also covered by a layer of sandy silt and fallen stone. Once cleared of stone collapse, this room contained an additional 25 cm of sandy silt with an assemblage of 18 sherds stylistically datable to the Wadi Suq and Umm an-Nar periods. Below the silt, excavation continued through approximately 20 cm of clay room fill and stopped on a packed clay floor associated with a four Umm an-Nar sherds. Wall foundations were not identified in excavation; it is possible that further room contexts are yet to be excavated.

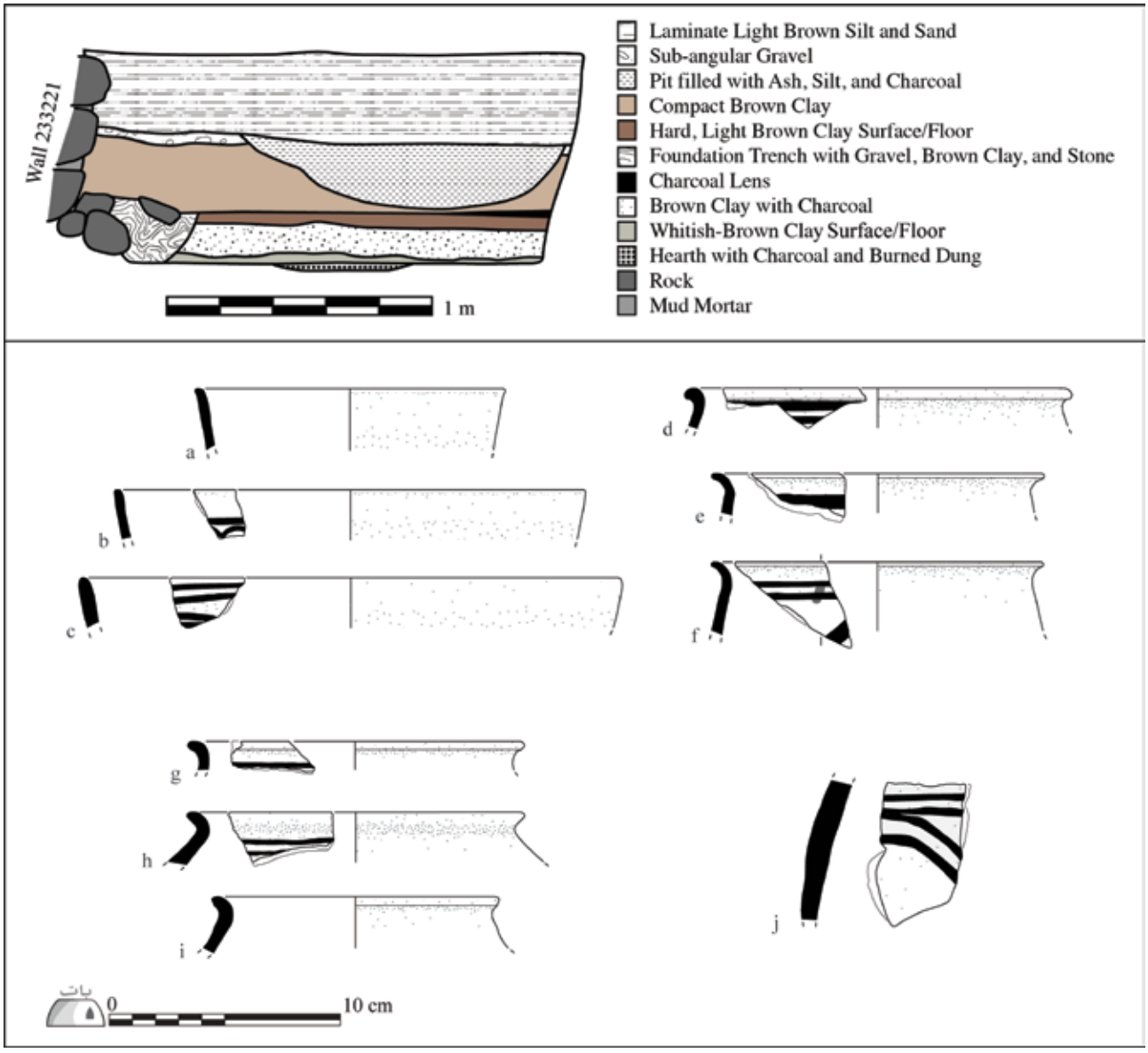

Figure 16*: South profile of RaM 3 sounding (top); Pottery associated with the Late Umm an-Nar light brown clay floor (a-f); Pottery associated with the Middle Umm an-Nar 2 whitish-brown clay floor (g-j) (profile and photographs by Jennifer Swerida).*

3.3.3 RAM 4

The most fragmentary of the known Rakhat Al Madrh structures, RaM 4, is situated between a conglomerate sandstone slope to the south and the seasonally flooded depression in the north (Figure 17). It is evident from the surface remains that the structure suffered from several taphonomic issues, including the placement of a modern power line which disturbed large portions of the building. Trenches were positioned to better understand their chronology, function, and preservation in light of these disturbances.

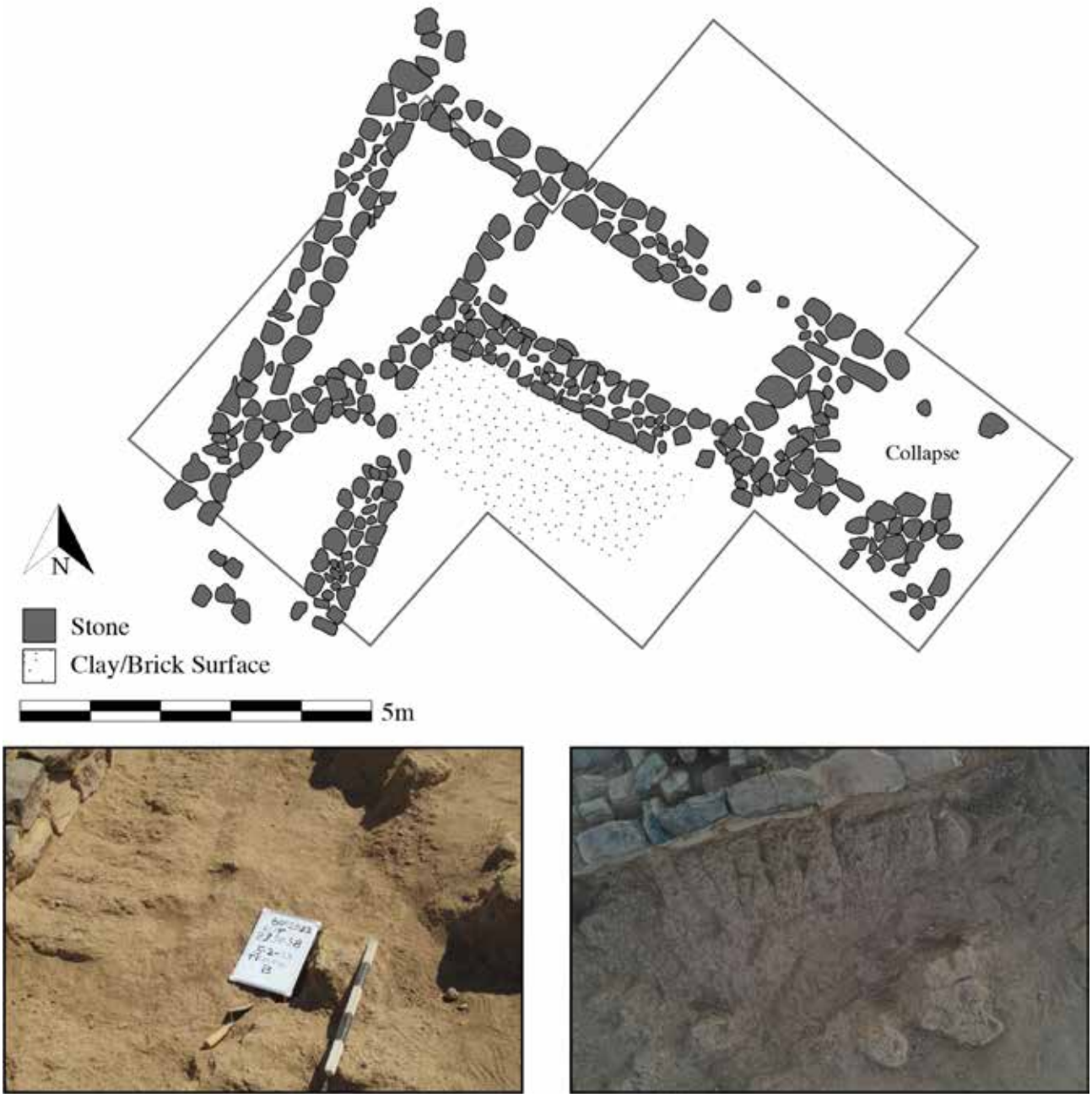

Figure 17*: Architectural plan of RaM 4 indicating the location of BAP excavations; Inset photographs of mud brick in the central courtyard (plan by Jennifer Swerida; photographs by Paul Rissman).*

Beneath a ca. 15 cm layer of alluvial wash, excavations revealed the northwestern corner of a building of small, rectangular rooms lining a central courtyard. The wall foundations are preserved a single course in height and are constructed with a mixture of rounded wadi cobbles, angular limestone blocks, and lumps of conglomerate sandstone. Although no mudbrick was preserved in situ on the wall foundations, a surrounding ca. 35 cm layer of mudbrick melt and collapse suggest that the material once formed the building superstructure.

The RaM 4 courtyard in particular contained mudbrick features and melt. These are quite fragmentary and difficult to define due in part to the frequent inundation of this courtyard space and gravels washing down from the nearby sloping edge of the Rakhat Al Madrh basin. In the clearest instance it is possible to identify six individual bricks set along the edge of the courtyard. The function of these bricks may have been to support or secure the adjacent parameter wall.

Few artifacts were recovered in RaM 4, the most noteworthy of which are the small collection of Umm an-Nar ceramics sherds found within the building's small rooms. These include several fragments of one or more suspension jars typical of the Middle Umm an-Nar 1 (see Swerida, Dollarhide, and Jensen, 2021). A collection of lithic debitage including two flakes of radiolarite was also found in the RaM 4 courtyard, although it is possible these artifacts are in a secondary context after being washed down the hillside.

4. PRELIMINARY INTERPRETATIONS

The three locations on the greater Bat landscape—Operation A, Al Khatum Settlement, and Rakhat Al Madrh—explored by BAP in the 2022-23 field season illustrate the diversity of cultural place-making activities and human-environment interactions that took place in the region during the Early Bronze Age. The enduring importance of place is apparent through the repeated reuse of these locations in later periods. While BAP's work in the Bat oasis and its surrounding sites is ongoing, it is possible to posit some preliminary interpretations.

Within Bat's ancient oasis, excavations at Operation A reveal multiple phases of cultural activity and cast the site's use history in a new light. BAP's original 2007 interpretation of the hillock as an Early Bronze Age domestic settlement is now contradicted by architectural features resembling Umm an-Nar and Wadi Suq tombs. The clay mound underlying this architecture is also noteworthy, given the association of such human-made mounds with Umm an-Nar towers elsewhere on the Bat floodplain (see Frifelt, 1985; Swerida and Thornton, 2019b). These foundation mounds would have elevated the monuments above seasonal floodwaters and maximized their visibility in the landscape. The Operation A mound can be understood as serving a similar function for the probable tombs constructed on its surface.

These factors in combination with the proximity of Operation A to the Bat necropolis suggest a plausible interpretation of the site as an extension of the Umm an-Nar cemetery into the wadi plain. Visitation and reuse of Umm an-Nar mortuary spaces by later populations, well attested at Bat and elsewhere (Döpper, 2015; 2023), also provide comparanda for the Wadi Suq and Iron Age materials documented at Operation A. While this assessment remains speculative and the supporting material culture assemblage small, the existence of such a mini-necropolis would add to the diversity of Umm an-Nar mortuary practices known at Bat and introduce a new case study of cultural place making that reshaped the site's Early Bronze Age landscape.

At Al Khatum Settlement, BAP's 2022-23 research adds clarity and complexity to our understanding of site's composition and use history. The pattern of architecture and pottery sherds spread along the lower slope of the hillside is reminiscent of the Umm an-Nar occupation on the Bat Settlement Slope and is likely a similar example of past populations utilizing the natural terrain to elevate their buildings above seasonal floods. Excavations in the eastern complex produced an entirely Middle Umm an-Nar ceramic and architectural assemblage. Rather than the hypothesized Umm an-Nar domestic

complex, excavation and surface imagery suggest that the built expanse is composed of an unusual house, platform, tomb architectural set. While further excavation is necessary to conclusively determine the date, contemporaneity, and function of these structural elements, this new understanding of Khutm's Umm an-Nar occupation expands the known corpus of third millennium BCE settlement compositions.

In the western half of Al Khatum Settlement, the deep sounding in Test Trench D confirms the suspected presence of Iron Age II and Umm an-Nar phases. Both cultural layers appear to be relatively shallow, making this area of the site a promising candidate for future horizontal excavation. The general scarcity of artifacts or other datable material in the test trench is not unusual for settlement contexts in southeast Arabia and may account for the low density of surface finds. It is highly likely that the site's Iron Age residents utilized the full southern face of the Khutm hill, from the tower at the far western end of the ridge to the fort's eastern extent. This occupation atop the shallow Umm an-Nar contexts on the sloping terrain has resulted in a conflated Iron Age/Bronze Age palimpsest that BAP is working to untangle. Such complex, multi-period surface remains are attested at sites throughout the region (see Carter, 1997; Cleuziou, 1989; Eddisford and Phillips, 2009; Degli Esposti and Phillips, 2012) and underscore the importance of excavation as a means of ground-truthing date estimates based on survey finds (cf. Düring, 2022).

Just southwest of Bat, the site of Rakhat Al Madrh represents a different type of settlement. BAP's investigations of the site have so far revealed a primarily Umm an-Nar community located in a starkly different environment from Bat's other Early Bronze Age environs. At Rakhat Al Madrh, domestic architecture, consisting of at least four structures, ring an above ground water catchment area. The preliminary results of ongoing geomorphological research suggest this catchment was an intermittently marshy grassland during the Early Bronze age. Botanical evidence from Umm an-Nar contexts offers support for this theory. Micro- and macroscopic plant remains including wheat and barley phytoliths, palm leaf, and other plants suggest not only the presence of a moist environment, but also the cultivation of agricultural crops as early as 2400 BCE and the potential for long distance trade. Carbonized goat dung found in Umm an-Nar contexts further reveals the pastoral potential of Rakhat Al Madrh. This subsistence evidence from the site demonstrates that early plant cultivation and potential agricultural activity also occurred beyond oasis environments. Whether the agro-pastoral strategies that led to the rise of subsequent complex societies in Southeastern Arabia arose first in the marsh/wetland environment of sites such as Rakhat Al Madrh, as has been convincingly argued for Mesopotamia (Pournelle 2003), remains to be seen.

Despite the dramatic ecological differences of Rakhat Al Madrh, the site is clearly culturally connected to Bat and the larger Umm Al Nar complex. The structures at the site are constructed in a familiar Middle Umm an-Nar style, albeit with larger courtyards that may have functioned as animal enclosures. RaM 3 appears significantly larger than the other buildings at the site and requires further excavation to understand its function and the reason for this greater resource investment. Across all the RaM buildings, the wall foundations are constructed with locally-sourced stone, including conglomerate sandstone sourced from the immediately surrounding hills, and cobbles, taken from the flow path of the Wadi Al Hijr. The ingenuity and resourcefulness demonstrated by the site's Umm an-Nar inhabitants in utilizing different environments and materials to produce familiar cultural products, including architecture, appear to be a hallmark of Rakhat Al Madrh and greater Bat's prehistoric occupation.

5. CONCLUSIONS AND FUTURE DIRECTIONS

BAP's 2022–23 studies beyond the oasis are beginning to shed light onto the diversity of cultural activity and human-environment interactions practiced by Bat's Early Bronze Age communities.

These findings are also informing the project's future directions. In collaboration with the Oman Ministry of Heritage and Tourism, the project will continue its focus on Bat's prehistoric cultural landscape. In the years to come, BAP plans expand horizontal excavations at Operation A and the nearby Settlement Slope to better understand the relationship between mortuary, ritual, and domestic space and how they worked together to shape the lived experience of Umm an-Nar period Bat. Targeted excavations at Al Khatum Settlement will endeavor to untangle the dense palimpsest of Bronze and Iron Age occupation at the site. Additionally, research at Rakah Al Madrh will expand methodologically—incorporating geomorphology, malacology, archaeobotany, and geophysical prospection—to investigate the site's third millennium BCE environmental conditions and corresponding human socioecological strategies. Excavations will also sample contexts in the large RaM 3 to determine the building's function and role in Umm an-Nar period life at the site. By considering the greater Bat landscape both within and beyond the oasis, BAP aims to produce a wholistic understanding of its component sites and the cultural activities and human-environment interactions that helped to shape them.

ACKNOWLEDGEMENTS

This research was made possible through the generous and longstanding support of the Oman Ministry of Heritage and Tourism. We are especially grateful to the then Director General of Archaeology Dr. Amina Abdullah al-Balushi, the present Director General Ms. Yousra Khalif al-Subhi, Director of World Heritage Sites Ms. Ibtisam al-Mamari, and Director of the Department of Excavations and Archaeological Studies Mr. Ali al-Mahroqi. Thanks are also due to our many friends and colleagues in the Ministry of Heritage and Tourism representatives at Bat who made this work possible, including Mr. Mohammed al-Kalbani, Mr. Mohammed al-Essai, Mr. Suleiman al-Jabri, and Mr. Badr al-Badi. Field research and analysis was funded by an Archaeological and Ethnographic Field Research Grant from the US National Endowment for the Humanities (RFW–279340–21). Institutional support was provided by the Penn Museum, University of Pennsylvania, and New York University Abu Dhabi. Fieldwork was carried out with the help of Gabriela Daza, Anna Hopper, Qi Liu, John Burgess, and Josephine Schmollinger. Supporting geophysical, geomorphological, and outreach work was conducted by Jesse Casana, Petra Creamer, Eric Fouache, Tara Beuzen-Waller, Claude Cosandey, Max Engel, Laurence le Callonnec, Stephane Desruelles, Alexandre Prosperini, and Cindy Srnka.

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