

# THE KARAK ‘NEOLITHIC’ SURVEY: PILOT SEASON, OCTOBER 2021

*Pascal Flohr, Bill Finlayson, Zeidan Kafafi, Elizabeth Gibbon, Laith Alshboul,  
Lily Graham-Stewart and Mohammad K. Tarawneh*

## Introduction

The Late Neolithic is a key period in the history of Jordan, during which farming became consolidated as the main mode of subsistence. Small communities of people conducted mixed farming and it appears pastoral groups, whether or not part of the farming communities to the west, were present in the steppe and desert areas (Kafafi 1993; Gibbs and Banning 2013; Rollefson *et al.* 2014). While research in these more arid zones has increased, especially over the last decade (*e.g.* Rowan *et al.* 2017), the period remains relatively underrepresented in particular in the agricultural zone (with the notable exception of the work in the *wadis* Ziqlāb and Quṣaybah (Banning *et al.* 2015), despite its importance as the time when the 4000-year-long processes of transition from hunting and gathering coalesced into a farming lifestyle that formed the basis of the later complexity on which our current world is founded.

Profound climatic changes occurred during the period although it is unclear what the local impact on environments in Jordan was. The so-called 8.2ka event is the most significant cold event during the Holocene as recorded in Greenland ice cores, and has been attested throughout the northern hemisphere (Alley and Agustsdottir 2005; Rohling and Pälike 2005). Conditions appear to have become more arid in the Eastern Mediterranean area (evidence summarized in Flohr *et al.* 2016) and it is possible the climate started to become more arid from around 6600BC onwards (Rohling and Pälike 2005). However, this is superimposed on a generally wetter Early Holocene and

more research is needed to establish what exactly climate and environment were like in Late Neolithic Jordan. Nonetheless, it makes the period very interesting for the study of the effects of climate change on early farming societies, as has been done, for example, in Northern Mesopotamia (Nieuwenhuyse *et al.* 2016). We know there were no large-scale collapse or large-scale population movements (Flohr *et al.* 2016), but we do not really know how (and if) people in the Southern Levant adapted to changing conditions.

Our project, “Climate, environment, and early farming societies: Late Neolithic settlement patterns on the Karak Plateau, Jordan”, aims to study the resilience to climate change of early farming communities in Jordan. It will achieve this by studying Late Neolithic settlement patterns and chronology through ground survey in combination with experimentation in the use of remote sensing and predictive modelling to aid in the discovery of these sites. Late Neolithic sites are under-represented in the record not just because of a research bias (for example not collecting or studying chipped stone during surveys), but also because of other factors, including: a lack of training of survey crews in prehistory; the poor preservation of Neolithic pottery; the scarcity of diagnostic tools; the sites often being small; and site location being especially prone to have been covered by colluvium or later occupation (Banning 2015). While deflated sites on hilltops and in steppe and desert areas may be found during intensive survey, in wetter areas many parts of the Neolithic landscape will have been destroyed

by erosion (*wadi* downcutting) or covered by colluvium (Banning 2015). An approach that uses an iterative Bayesian allocation approach to target areas with a higher probability of containing preserved prehistoric remains has been successful in northern Jordan (Hitchings *et al.* 2016). We aim to use the same approach, although the pilot season presented here was used mainly to gather more data to assign such probabilities within the study region.

### The Study Region

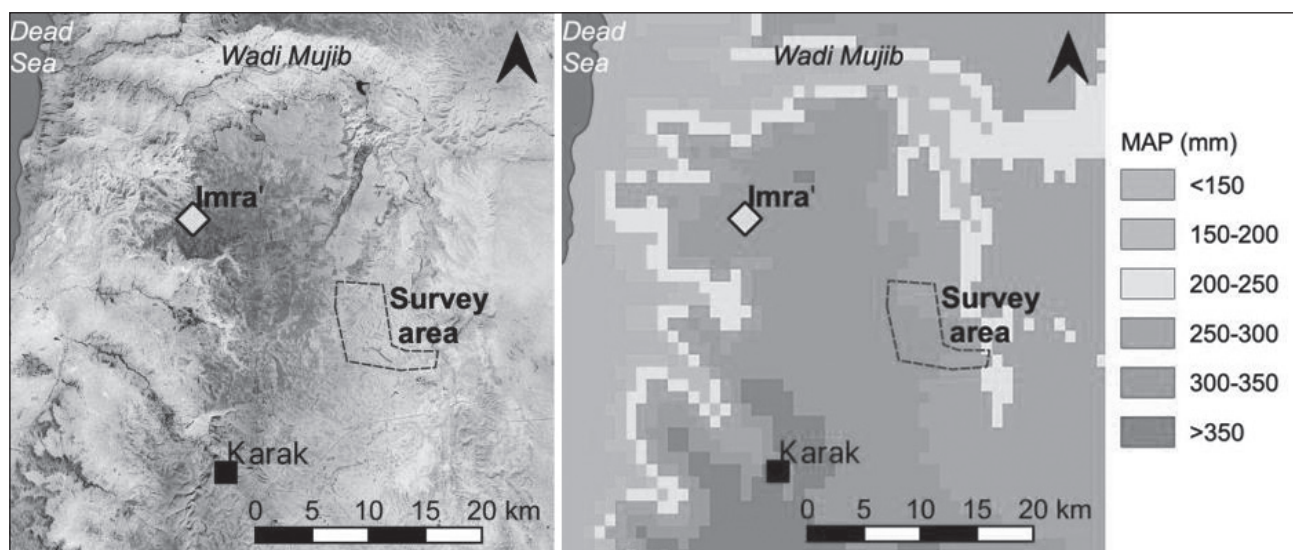
Our study region is the Karak Plateau, as this encompasses a range of environments and climatic zones. Moreover, large parts are under threat because of intensive farming in the west and mining in the east. Our aim is to compare parts of the plateau with different environmental characteristics, but the 2021 season focused on a *ca.* 7×8km L-shaped area (*ca.* 38km<sup>2</sup>) stretching from the agricultural into the steppe zone (Fig. 1). The mean annual precipitation ranges from *ca.* 250mm in the southeast, *ca.* 290mm in the northeast, to *ca.* 315mm in the west (based on Worldclim 2.0, Fick and Hijmans 2017), so the study area sits on the current edge of the rain-fed farming limit. The area runs from the villages As Samākiyyah, Humūd, and Al Judayyidah on the west to the known Late Neolithic site of LAS 188 on the Wādī Abū Ash SHA'r on the southeast, being L-shaped to exclude a fenced area and keep the size of the area more manageable. In addition, the single

site of Imra' in the northwest of the plateau, about 14km northwest of As Samākiyyah, was included, since likely Late Neolithic chipped stone had been observed here in 2019 in a bulldozer/*wadi*/road cut (Flohr and Finlayson 2020), which we wished to study before the area was filled, destroyed, or covered.

The Karak Plateau has been the subject of previous surveys. Our study region was covered partly by the 1979 season of the Archaeological Survey of the Karak Plateau (ASKP) (Miller 1991) and partly by the 1980s Limes Arabicus Survey (LAS) (Parker 2006), with the two overlapping in the middle part of the survey area. However, the ASKP specifically targeted later periods, did not collect chipped stone, and was not intensive. The LAS did document many prehistoric sites, but the project director expected many others to remain unrecorded (S. Thomas Parker pers. comm. 2019), while we also wished to gather more information especially on LAS 188, described as a “village site” with 40 Late Neolithic lithics (Clark *et al.* 2006: 73). Musil and Glueck also visited the area (cited in Miller 1991).

### Methods

It is important to note that while the focus was on the Late Neolithic and on areas where remains from this period may be more likely to be found, once we were at a location we collected material irrespective of period. In addition to the difficulty of ascertaining the

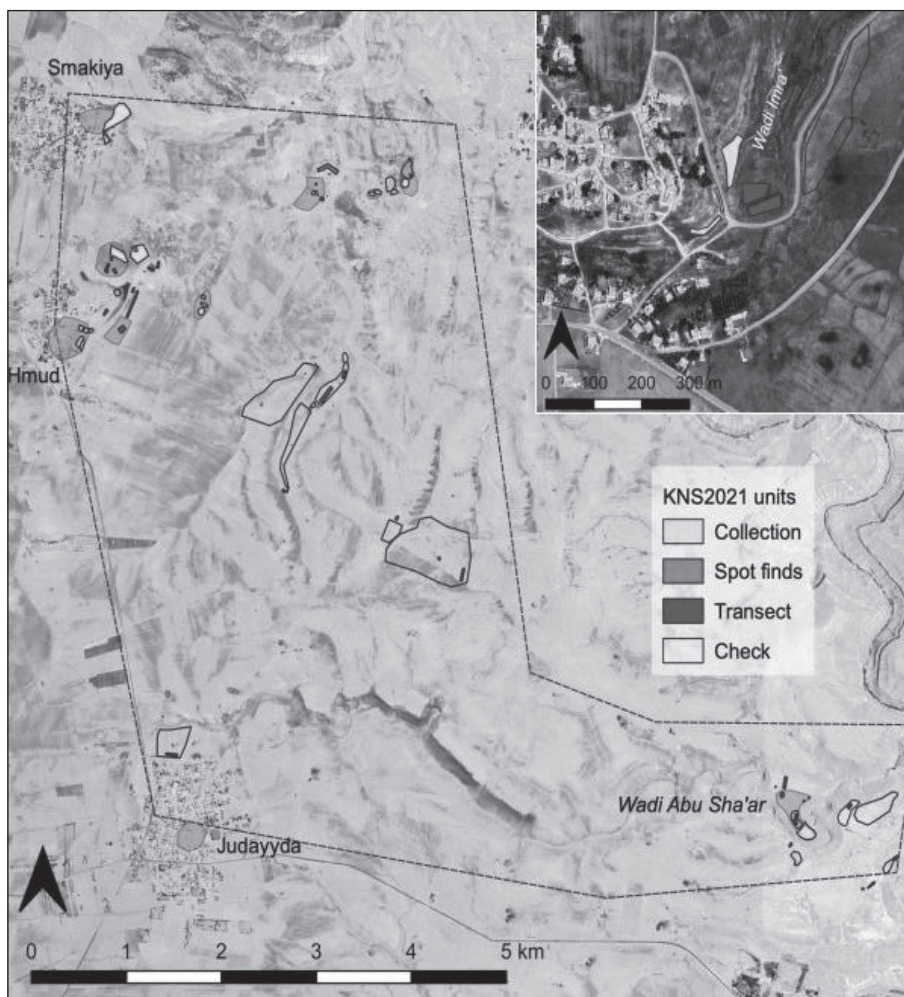


1. The survey area and the site of Imra' on the Karak Plateau, with a) modern satellite imagery (Google Earth) showing relief and differences in land use, and b) gridded mean annual precipitation derived from Worldclim 2 (Fick and Hijmans 2017).

date of the material in the field, we consider it important to document all archaeology.

As this season was the pilot season, aimed to gather information for more systematic survey using predictive modelling and Bayesian allocation as described above, different parts of the study area were assigned approximately equal time and areas both likely and unlikely to contain preserved prehistoric archaeology were visited so that these assumptions could be checked. Using a combination of remote sensing (mainly satellite imagery freely available through Google Earth Pro), and information from existing studies regarding Late Neolithic and other prehistoric sites (see Flohr 2022 for a compilation of most of the previously documented, published Late Neolithic sites in Jordan). No model was set up, but areas with likely and less likely to contain preserved and visible prehistoric remains were defined based on: 1) accessibility and modern disturbances as visible on the imagery (*i.e.* the exclusion of the

large fenced area from the survey); 2) surfaces/terraces potentially intact since the Neolithic (*i.e.* not eroded or covered); also taking into account 3) slope and aspect (Banning *et al.* 2013). We also tentatively identified areas with more or less likely locations of Late Neolithic settlement/habitation sites, *i.e.* locales where people lived and not, for example, 'special' burial locations, knapping, or hunting sites. We based this on a general presence of drinking water, but especially of perennial water sources like springs, and the presence of naturally wetter areas, which would have been important for these early farming communities. Except for the presence of *wadis* and known spring locations, we based this on several proxies: 1) the presence of (seasonal) vegetation; 2) current (Bedouin) occupation; and 3) the presence of (pre-mid-20<sup>th</sup> century) occupation, as such 'old' villages are often associated with springs. Moreover, we identified areas of *wadi* confluences, as these can be also naturally



2. The main study area and the extra study site of Imra' (inset) with the 2021 survey units and the type of investigation. In grey are the estimated areas of the archaeological 'sites' as based on previous information, remote sensing, and the new information from our survey.



wetter and have been shown to be favoured locations for Late Neolithic sites (Banning *et al.* 2013; Flohr and Finlayson 2020). These areas were then visited during the survey, as well as ‘control areas’ assumed to be less likely to contain prehistoric remains. All wider areas identified prior to the survey were visited, but priorities changed based on the information gained during the season.

Once at the location of a survey unit, we used three different methods, depending on the site/(non-site) type and balancing the available time (**Fig. 2; Table 1**):

1. **Transects:** Systematically walked transects, walked in rows at set distances (these distances varied). The total area and transect area were recorded by GPS, and the number of walkers, and sometimes the time were also noted down (in future we will ensure to always record time, see Banning *et al.* 2011).
2. **Collection:** when the main current question was either the presence or absence of archaeology and/or certain periods, or when the place was not suitable for transects (*i.e.* within and directly around a feature like a cairn or structure) timed collection was performed. By documenting the number of people and the collection duration time we are able to relatively compare different collection areas (keeping in mind the relation between search time and artefact detection is exponential, Banning *et al.* 2011), but direct comparisons with transects or a measure of artefact density are not possible.
3. **Check:** In areas where no or very little material was present, nothing was collected, or only in smaller parts, while the larger areas were simply ‘checked’. The walking over these areas was also done in lines of people, but generally speedier than with transects (since no material was picked up) and with larger distances between individuals.

Each of the visited survey units was described for each archaeology and survey parameters (like visibility) using standardized forms, photographed, and its location and extent measured with a Garmin 64st GPS. Surface archaeological material was collected in the transect and collection units, and all picked up chipped stone was retained (non-worked

stone was however removed, directly or later). When possible, pottery was sorted in the field as to only retain diagnostic items. Nonetheless many non-diagnostic items made it into the collection due to time limits and/or non-specialists collecting the material in some of the units. Other material was not generally collected, with the exception of ancient glass (1 piece in one unit) and a few accidentally collected ground stone objects.

The surveyed pottery sherds were washed, sorted, and studied. Diagnostic sherds were assigned to period based on a typological parallel study with others found at well-stratified excavated archaeological deposits at major sites. A detailed study of the surveyed pottery sherds will be published later in another communication.

The chipped stone was washed and then sorted into basic debitage categories, with pieces of interest (retouched and potentially used pieces, cores, core rejuvenation pieces, and any other pieces with specific technological information) put aside. A second pass was made through the pieces kept aside to describe these and pull out a sub-sample for illustration. A more detailed paper containing the full chipped stone results will be published elsewhere.

### **Results and (Preliminary) Interpretation**

In total 82 survey units were visited and documented: 23 transects (survey unit KNS002 contains two transects), 42 collection units, 15 check units, plus 6 spot find units (**Table 1**). Roughly 2% of the total area was covered by our 2021 season survey units, and within each survey unit coverage was also never 100% (for the transects, estimated coverage varied between *ca.* 24 and 86%). We focused specifically on the two most contrasting areas, the somewhat wetter, more agricultural north and the drier southeast of the survey area. We also extensively visited areas in the middle of the survey area, but as expected there were very few (visible) remains. Chipped stone was abundant especially in the southeast but also in some locales in the north of the survey area. Palaeolithic chipped stone appeared present in many of the units, but the Neolithic and later prehistory were also represented. Pottery, in contrast to the chipped stone, was almost

**Table 1:** KNS 2021 survey units with site or area names; the type of survey (way of collecting material); site type (where 'background' scatters are also off-site, but off-site areas contain even less to no material); number of collected chipped stone pieces and where known periods indicated by diagnostic material; numbers of pottery sherds collected/kept with the preliminary period indication as designation during the field season. Indeterminate period chipped stone and sherds are not indicated; all units with chipped stone or pottery contained indeterminate pieces.

KNS unit	Site name / indication / area	Survey type	Site type	Chipped stone	Ceramics (prel.)		
				n	periods	n	periods
001	WAS Neo site; LAS 188	Coll.	Settlement / habitation site? Structures	484	LN; MP	1	1 ?Byz
002	WAS Neo site	Trans.		351	LN	0	
003	WAS Neo site	Coll.		222	LN	0	
004	WAS Neo site	Coll.		37	LN	1	
005		Trans.	Background	146		3	3 ?Iron
006		Coll.	Cairn	3	1 MP; Pal; ?late preh.	0	
007	WAS Neo site	Coll.	Structure(s), cairn	84	LN; ?Pal	0	
008		Trans.	Background	145	?late preh.	0	
009		Coll.	Knapping site	128	1 ?EP	13	2 Byz; 1 ?Rom; 1 ?Byz
010		Check	Off-site	NC		0	
011	WAS Pal. scatter(s)	Trans.	Scatter	263	Pal; ?late preh.	3	
012	WAS Pal. scatter(s)	Trans.	Scatter	419	Pal; MP; 2 LN	0	
013		Check	Off-site	0		0	
014		Check	Off-site	0		0	
015		Check	Background	NC		0	
016	Al Makhārīm	Coll.	Site halo?	288	1 LN	14	1 Byz; 1 Rom
017	Al Makhārīm area	Coll.	Off-site	69	1 LN	0	
018	Al Makhārīm	Coll.	Settl./hab. site	73	mixed	49	1 Iron; 1 Rom
019	Al Makhārīm	Trans.	Site halo	158		10	1 Nab; 2 Rom
020	Al Makhārīm	Coll.	Features	67		0	
021	Al Makhārīm	Coll.	Features	82		NC	
022	Al Makhārīm	Coll.	Background	85	2 MP	1	
023	Al Makhārīm area	Check	Off-site	0		0	
024	Al Makhārīm	SF	Not in situ	2	2 MP	0	
025	WG general	SF	Background	5	Pal	2	1 Ayy/Mam
026	WG site	SF	Terrace system, 1+ structure(s)	0		1	1 LBA
027	WG site	Coll.		0		20	5 LB/Early Iron
028	WG site	Coll.		5	1 MP	9	1 LBA
029	WG site	Coll.		3		24	1 ?LBA; 7 Ayy/Mam; 1 Iron
030	WG site	Trans.		1		37	9 LB/Early Iron; 8 Ayy/Mam; 1 Iron II; 1 Abb
031	WG cistern	SF	Cistern	0		1	?Iron
032	Humūd site 1	Coll.	Slopewash / erosion of settlement / habitation site	81	Mixed; MP; 1 ?EP	97	1 EBA; 1 LBA; 15 Iron I; 3 Early Iron II; 2 Iron IIC; 15 Ayy/Mam; 3 Ab; Rom/Hell

033	Ḥumūd site 1	Coll.		43		29	1 Ayy/Mam; 1 ?Um; 2 LBA; 15 Iron I/II
034	Ḥumūd site 3	Trans.	Terraces, enclosure, cairn(s), scatter	175	?late preh.	14	1 Iron
035	Wādī Ḥumūd	Trans.	Background	20		1	
036	Wādī Ḥumūd cistern/cairn	Coll.	Feature	77	1 ?MP	4	3 LBA/Early Iron
037	Wādī Ḥumūd	Trans.	Off-site	47	Mixed; MP	3	1 Iron
038	Wādī Ḥumūd	Trans.	Off-site	18	mixed	NC	
039	Wādī Ḥumūd	Coll.	Off-site	9		0	
040	Wādī Ḥumūd	Check	Off-site	0 / NC	n/a	0	
041	Ḥumūd site 1	Coll.	Slopewash / erosion of settlement / habitation site	44	Pal	43	9 Ayy/Mam/ LBA; 12 Iron I; Hell/Rom/Byz
042	Ḥumūd site 1	Coll.		92	MP; mixed	12	5 LB/Early Iron
043	Ḥumūd site 1	Coll.		95	?LN/Chalc	3	1 Early Iron
044	Wādī Ḥumūd	Trans.	Background?	19		1	
045	Wādī Ḥumūd	Check	Off-site	0		0	
046	Ḥumūd site 2	Coll.	Neolithic scatter; possible structures	168	LN	2	
047	Ḥumūd site 2	Coll.		143	PPNB; LN	0	
048	Ḥumūd site 2	Trans.		145	LN	6	1 Iron
049	Ḥumūd site 2	Coll.		93	LN	0	
050	Ḥumūd site 2	Trans.		416	LN	0	
051	Imra'	Coll.	Settlement / habitation site	233	1 LN/EChalc	94	1 ?LN/Chalc; 4 EBA; 23 Iron I; 14 Iron II; 1 Um
052	Imra'	Coll.		16		21	1 LBA/Ayy/Mam; 4 Iron I; 9 Iron II
053	Imra'	Trans.	Site halo	141		23	13 Iron I; 3 Iron II; 2 Rom; 1 Byz
054	Imra'	Trans.	Site halo	93	1 ?LN	23	13 Iron I; 5 Iron II; 1 Rom
055	Imra'	Coll.	Site halo	45			IA; Classical
056		Check	Off-site	0		0	
057		Trans.	Off-site	2	1 ?LN	0	
058		SF	SF	2	2 ?Pal	0	
059		Trans.	Off-site	4		0	
060		Coll.	Cairn	9		0	Classic; IA/EIsl
061		Check	Background – off-site	10	1 ?LN	0	Classical
062		Coll.	Cairn	2	?late preh.	15	1 Rom
063		Coll.	Background	46	Not Pal	2	
064		Coll.	Cairns (?)	88	1 ?LN/Chalc	15	1 Iron; ?Classical
065		Trans.	Background	70	Pal; MP; late preh.	7	
066		Check	Cairn	NC		0	
067		Check	Dam	0		0	
068		Check	Background – off-site	NC		0	?Iron (NC)
069	Ḥumūd site 4	Coll.	Terrace system, cairns, scatter	147	1 ?LN	15	1 Byz; 3 Rom; 1 Hell

070	Humūd site 4	Coll.		105	1 MP; 1? PPNB	18	5 Neo/Chalc/EBA; 1 Rom; 1 Byz
071	Humūd site 4	Coll.		54		18	1 Byz
072	As Samākiyyah	Coll.	Settl. / hab. Site	25	3 ?LN/Chalc	33	16 Ayy/Mam; 7 Iron; 4 Rom
073	As Samākiyyah area (off-site)	Check	Off-site	15		9	1 Rom
074	Humūd site 2	Coll.	Neo scatter	20	PPNB; LN	25	1 Rom
075		Coll.	Background	4	1 ?late preh.; ?Chalc	6	2 Byz
076		Check	Pal. scatter	NC	Pal (?MP)	0	
077		Coll.	Background	6	Pal; 2MP	26	2 Ayy/Mam; 7 Iron; 4 Rom
078		Trans.	Off-site	27	Mixed; MP	0	
079		Check	Off-site	NC		0	
080	ASKP site 111	Coll.	Structures	83		20	9 Rom; 5 Byz
081	Al Judayyidah area	Check +Trans.	Off-site	27	MP	0	
082	ASKP site 111	Trans.	Site halo?	NC		0	

WAS = Wādī Abū Ash SHa'r;  
WG=Wādī Al GHuwayr;  
Coll.=Collection;  
Trans.=Transect;  
SF=spot find(s);  
Settl. / hab. = Settlement / habitation;  
NC = not collected;  
Pal=Palaeolithic;

MP=Middle Palaeolithic;  
EP=Epipalaeolithic;  
Neo=Neolithic;  
PPNB=Pre-Pottery Neolithic B;  
LN=Late Neolithic;  
Chalc=Chalcolithic;  
EChalc=Early Chalcolithic;  
EBA=Early Bronze Age;

LBA=Late Bronze Age;  
Hell=Hellenistic;  
Rom=Roman;  
Byz=Byzantine;  
Um=Umayyad;  
Ayy=Ayyubid;  
Mam=Mamluk;  
late preh.=late(r) prehistoric.

absent in the southeast and more abundant in the north. No intact pots were encountered, and Late Neolithic sherds were very rare, if they were found. The most important pottery assemblage to document for the first time in the Karak Plateau was a handful of Midianite pottery sherds that were collected from the site KNS072 (As Samākiyyah) (**Fig. 15**; see below). The findings are described into more detail for each of the wider survey areas and by 'site' within each of these.

#### *Southeast of the Study Area: Wādī Abū Ash SHa'r*

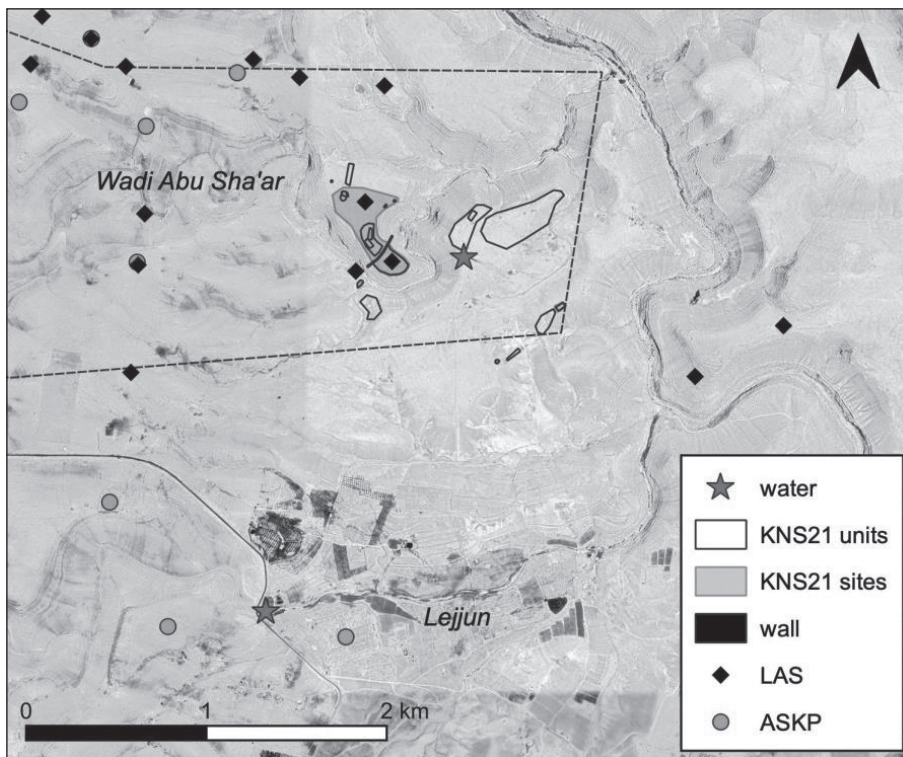
The reason for including this area were two-fold. Firstly, a Late Neolithic site had been reported by Parker (2006, Limes Arabicus Survey site 188), and this seemed to be confirmed by visits here by some of us in 2018 and 2019, during which we also noticed a prehistoric presence in the wider area (Flohr and Finlayson 2020, 2021). We therefore wished to study the Late Neolithic site more closely and explore the area around it to investigate whether more Late Neolithic material was present.

Furthermore, the steppe environment contrasts with the agricultural zone further in the north of our survey area.

#### *The Wādī Abū Ash SHa'r Area*

The area currently receives on average around 250mm of annual precipitation, and while conditions were probably wetter during certain periods in the past, such as the Neolithic, other water sources would have likely been important. The Wādī Abū Ash SHa'r, at this point, is presently deeply incised and at least seasonally dry, but it is interesting that there is a pumping station on the south bank. It is not clear if this uses an existing, but now otherwise dry, spring, but if not, it seems likely that the water table is relatively shallow here. A spring or perhaps multiple springs are (or used to be) also present in the Al Lajjūn area less than 2km to the south. The Wādī Abū Ash SHa'r south bank is currently home to several Bedouin families, although it is not clear if this is only because of the presence of the pumping station or goes back further in time. Our area of focus sees several minor *wadis* coming together into





3. The southeastern part of the study area in its context. Shown are the 2021 survey units (see Fig. 4 for a close-up), previously recorded archaeological remains by the LAS (black lozenges) and ASKP (circles), and known or suspected water sources (star). Background Google Earth.

the Wādī Abū Ash SHa'r, and not far east from our 2021 survey units, this *wadi* runs into one of the major, now deeply incised *wadis* of the region, the Wādī Ad Dab'ah, one of the main tributaries of the Wādī Al Mūjib.

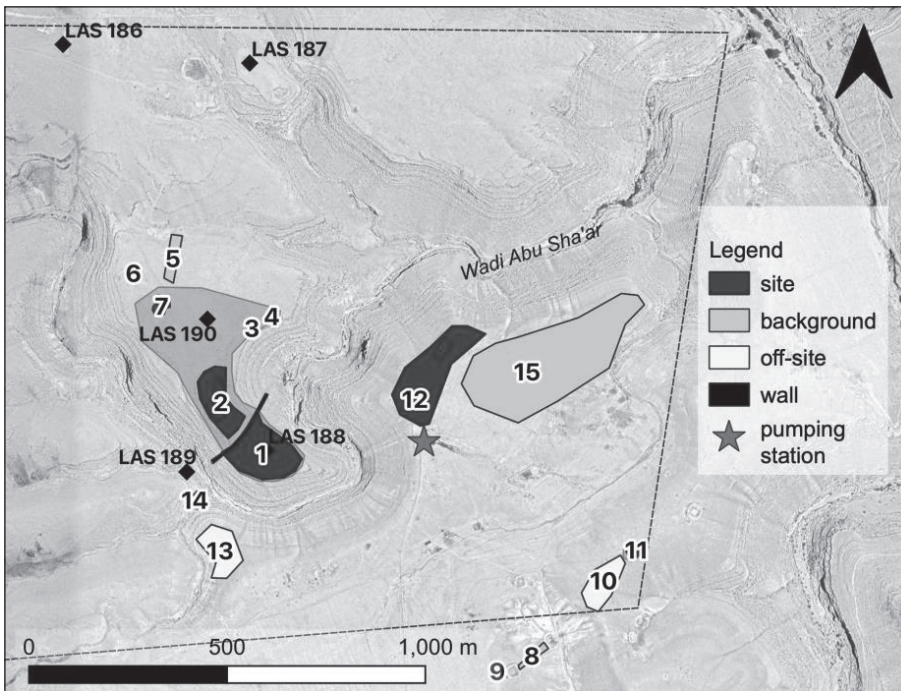
#### *Wādī Abū Ash SHa'r North Bank*

Here, our main focus was on the area of LAS Sites 188 and 190 (Clark *et al.* 2006), located on a sort of peninsula in a sharp bend of the Wādī Abū Ash SHa'r (Fig. 4). At least nowadays there is a rather steep slope towards the *wadi* bed, although the people living locally are able to cross the *wadi* easily. Using a combination of collection units and transects we documented features and collected material, which was almost all chipped stone, as units KNS001-007 (see Table 1). The far southern end of this peninsula is 'closed off' by a man-made, now collapsed wall, which appears to have been substantial (Fig. 5). To the south of, and enclosed by, this wall lies LAS 188, our unit KNS001, for which the LAS team reported "many circular structures" (Clark *et al.* 2006: 73). These are currently not very clear in this area; possibly they have become more disturbed since the 1980s. However, north of the wall, in our unit KNS002, mostly subcircular structures and curvilinear wall lines are clearly present,

made of limestone and basalt stones. These include a *ca.* 8.5×9.4m subcircular double ring. As also reported by Clarke (2006) for LAS 188, at both KNS001 and 002 the deposits appear shallow, with the limestone bedrock visible in many places. As the chipped stone scatter was not particularly dense even for this apparently deflated surface, it is not clear how intensive occupation would have been; however, it is perhaps possible that artefacts have been washed downslope and carried away by the *wadi*.

Further northeast, along the edge of the escarpment, are further structural remains (units KNS003 and KNS004). KNS003 contains a small group of 2-3 subcircular adjoining stone structures, with a later cist inserted into them (Fig. 6). KNS007 is formed by a stone sub-circle of *ca.* 36×20m with a low 8×8m cairn and further internal features within, including the remains of a smaller stone circle. Units KNS003, 004, and 007, and perhaps also 002, might be part of LAS Site 190 (Clark *et al.* 2006: 74). Further north the already not very dense scatter becomes even less dense, and it appears unit KNS005 (a transect) and KNS006 (a 1.5×1.5×1.5m well-built cairn) are 'off-site' with just a background scatter of material present. In KNS005 deposits are deeper, so the





4. Southeastern part of the survey area, the eastern Wādī Abū Ash SHa'r area, with units KNS001-015 and estimated locations of Limes Arabicus Survey (LAS) sites. Within units KNS002 and KNS012, the outlines of the survey transects are indicated. The dashed line indicates the outline of the study area (KNS008 and KNS009 fall outside the study area but were included as the area is heavily disturbed and at risk of being destroyed).

context might not be deflated, and the material might be simply less visible.

Except for a couple of small sherds, all collected material from units KNS001, 002, 003, 004, and 007 consists of chipped stone. Although the overall assemblage here indicates a Late Neolithic presence, the sample varies

over the site. The largest quantity of material, collected from the peninsula enclosed by the wall (KNS001) is the most diverse and includes at least one clearly Palaeolithic tool, a Mousterian point. There are heavily rolled and battered pieces, including one rolled bifacial fragment from KNS007, that also likely indicates a Palaeolithic presence. There are marked differences between KNS001 and 002 (both transects) on the one hand, and KNS003, 004 and 007 on the other. The first three are predominately flake-based assemblages, with KNS001 having the highest representation of blades at only 12%. In contrast, KNS003, 004 and 007 all have significant blade proportions around or over 20%. This difference is matched in the proportions of concave truncation burins, one of the most clearly diagnostic Late Neolithic tools present. KNS004 has the most in absolute



5. The wall between KNS001 and KNS002, looking SW over its length (top) and SE to its northern face (bottom).



6. One of the structures at KNS003.

numbers (20), 19% of the retouched tool count, while they represent 62% in 004 and 42% in 007. In KNS001 and 002 concave truncation burins are present consistently less than 4%.

The diversity of material in KNS001 may indicate a habitation site, although the diversity might also be a product of a palimpsest of material. In addition, the large effort and time spent by the team at this part of the site (see **Table 1**) and the therefore larger assemblage collected might have biased the sample. In any case, KNS003, 004 and 007 appear far more specialised in nature. A Late Neolithic date with some Palaeolithic presence is in line with the interpretation by the LAS project (Clark *et al.* 2006: 73, based on analyses by G. Rollefson), during which 40 Late Neolithic and eight Palaeolithic lithics were identified at LAS188. On the other hand, they identified mostly Chalcolithic/Early Bronze Age material at LAS190 (Clark *et al.* 2006: 74).

#### *Wādī Abū Ash SHa'r South Bank*

This area is currently busy with Bedouin camps and includes opportunistic fields. It is not clear if these are still in active use, as we only visited the area outside of the growing season in October (we have not yet asked the people living there). As mentioned, these fields and even the presence of people living here might be a consequence of the pumping station. We surveyed, more and less intensively (see **Table 1**), several areas here, units KNS008-015. No architectural remains were observed, but a background scatter was present almost everywhere, except for in units KNS013 and 014 and apparently also the minor *wadi* leading to these. The density varied - our mapping of this, however, is not in detail as our main aim was to establish a presence/absence of Neolithic material. Nonetheless it is clear that in units KNS009, 011, and 012 the chipped stone density is higher, while in KNS015 it was much more of a background scatter, and in KNS010 even lighter again. KNS008 might be slope wash from KNS009/the modern reservoir and contains a large, apparently worked stone. KNS014 is a rock shelter apparently used as animal shelter, probably one of the rock shelters described as LAS 189 (Clark *et al.* 2006). Clark (2006: 73) mentions Chalcolithic/EBA and Early

Roman/Nabataean material, but we did not see artefacts; they would in any case likely be covered by the dung layers.

There is a clear Palaeolithic element in the studied chipped stone. KNS011 includes Levallois cores, flakes with truncated faceted butts, hard hammer thick blades, and convergent retouched points, all of which suggest a Palaeolithic date for this unit, although angled scrapers may indicate a later prehistoric element. KNS012 contains Levallois points, Mousterian points, large blades with isolated platforms, plus some rolling, all indicating that this was also part of a Palaeolithic site. Flakes removed after rolling and patination suggest the area was subsequently used as a resource for later flint knapping, and the presence of two concave truncation burins and several angled scrapers suggests a Late Neolithic date for this activity. This is perhaps not surprising given its location just across the *wadi* from KNS001-007. There are platform renewal and scraper resharpening flakes not seen elsewhere in the survey area. KNS009 attracted our attention in the field as it was a fairly well-defined scatter. Numerous primary elements, simple cores on pebble fragments, and bashed pebbles, suggest this was a primary knapping site. No pieces are specifically chronologically diagnostic, the sole dihedral burin might suggest an Epipalaeolithic date. Later material was also around, with 13 pottery sherds, and preliminary analysis indicates a Byzantine date for at least two of these. While KNS008 material could theoretically have eroded out of KNS009, this is not borne out by the chipped stone, which is poor in retouched pieces and is not diagnostic to period, although one angled scraper and an absence of anything else diagnostic suggests later prehistory. Except for KNS009, little is known about the type of activity at these locations, but all of the units with higher densities of chipped stone have excellent views of the *wadi* and/or general landscape (**Fig. 7**), although we (in our team) are not aware how the landscape has evolved since Palaeolithic times.

#### **Southwest of the Study Area**

Hardly any of our attention was focused on this area during this season, because the





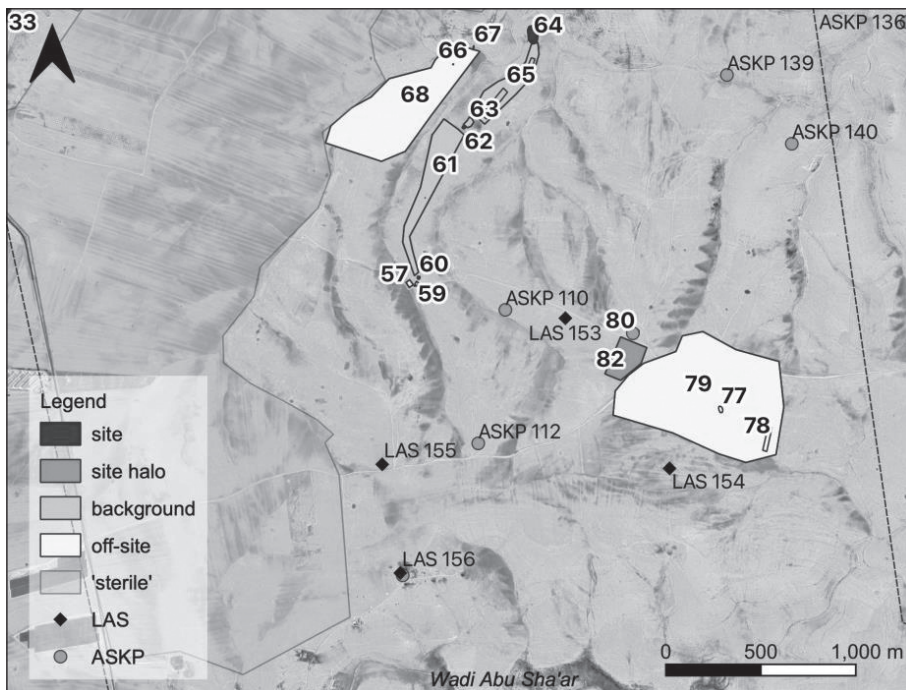
7. View from KNS009 towards to north. The pumping station and, across the wadi, site KNS001-007 beyond are visible; to the right (east) of the pumping station are units KNS012 and KNS015.

old village of Al Judayyidah (/Judaiyida) had already been studied by both the ASKP (ASKP 119) and the LAS surveys (LAS Site 158), and partly also because of a lack of time. The LAS studied a road-cut on the east side and found sherds dating back mostly to Classical periods, but also to the Iron Age, Mamluk, Ottoman, and modern periods (Clark *et al.* 2006: 70-71). Our survey and transect on the north slope of the modern village yielded an extremely low density of artefacts, including one discoidal core and one Levallois point. Because of the disturbances present in the area it is not clear if these are *in situ*, and they are more generally in line with the general background scatter of Palaeolithic remains in our study area.

### Middle of the Study area Area

Based on the criteria described above (*e.g.* the presence of drinking water and naturally irrigated areas), we did not expect to find much evidence, at least of settlement/habitation sites, in this part of the survey area, and our pilot investigations show that this is correct. There are large areas of rolling hills with shallow *wadis* that yielded no (visible) material to an extremely low-density background scatter of mixed/undiagnostic material (mostly chipped stone) (*e.g.* KNS068, 077-079). These are interspersed with structures like (burial) cairns, sometimes already recorded by Miller and/or Parker (**Fig. 8**).

The western/north-western part of this middle area is agricultural land and heavily ploughed with very few stones visible, suggesting it has been intensively prepared for agriculture (**Fig. 8**). It appears devoid of artefacts: in some places it is almost 'sterile'. We were not able to confirm this, but it appears possible a layer of fine sediment was put on the natural surface to increase the cultivatable soil depth, perhaps derived from places like a sediment quarry we observed just north of KNS075. In this case the absence of artifacts would be caused by a visibility issue. Nonetheless the artefact scarcity was repeated in the area to the southeast of this, where shallow *wadis* are present with 'ridges' in between. These are also ploughed and used



8. Middle of the study area with the KNS survey units numbered and in shades of red to white, the seemingly 'sterile' area (see text), and the estimated locations of known Limes Arabicus Survey (LAS) and Archaeological Survey of the Karak Plateau (ASKP) sites. The boundaries of the study area are indicated by the dashed lines.

for opportunistic agriculture, but as visible on the satellite image (**Fig. 8**) the surface appears to be different and perhaps agriculture is less intensive here. There are generally very few artefacts, at least on the surface. During this pilot season we investigated these areas mainly by walking over large areas in lines, spaced far apart, documenting features and doing occasional more intensive transects.

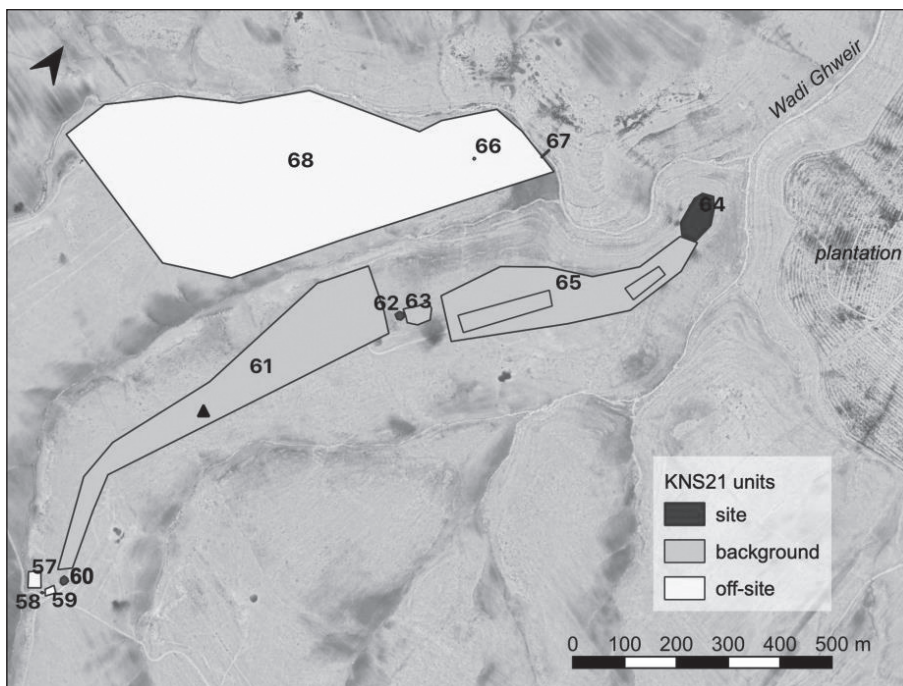
For the most north-western ridge, very little material was observed in general (KNS068), both on top of the ridge and towards the *wadi* beds (**Fig. 9**). Most material appeared present in the northeast of the context, perhaps somehow related to the cairn there (KNS066). A dam of unknown date was also recorded (KNS067).

The next ridge in the south-westerly direction also yielded very few artefacts in its ploughed fields (KNS057, KNS058, KNS061) (**Fig. 9**). Two single cairns are present (KNS060, KNS062). At the end of the ridge, overlooking a junction of *wadis*, is a group of apparent cairns, KNS064. It consists of one large cairn/cairn agglomerate at its highest point with several smaller cairns nearby. In between these cairns are ploughed areas and there is evidence of clearance by bulldozing. It does not appear that these cairns are merely clearance piles, but this cannot be excluded. The chipped stone found in this area was not very informative, with no diagnostic pieces, and may just

represent a background scatter more preserved, or bulldozed into, the stone pile parts. A small bladelet core might indicate an early Neolithic or Chalcolithic date. Of the pottery sherds, preliminary analysis indicates that one is Iron Age, one of possibly Classical date.

A third investigated area again only yielded an at most extremely low-density background scatter (KNS077-079), with the chipped stone indicative of mixed periods including the Palaeolithic (2× Levallois core, 1× Levallois flake, from a bulldozed hole). In terms of visibility and obtrusiveness, it is interesting that, as in many areas in our survey area, much less material was spotted in ploughed field areas, with almost all of it present on harder, deflated to bedrock surfaces.

A few mostly single structures / cairns nearby in similar areas were documented by the ASKP and LAS projects, generally on or close to tops of hills and rises, but none of these are indicative of settlement or habitation sites, insofar as this can be determined based on ground survey. On what appears to be the highest point around a complex structure is present, KNS080 (see **Fig. 8**), already documented as ASKP site 111 (Miller 1991: 67). It consists of two adjoining sub-circular structures and one separate sub-circular structure of which only a semi-circle remains with the inside ploughed. Additional straight wall lines are also visible.



9. The northern part of the mid area with the KNS survey units. Note change of north direction. The triangle indicates the location of a converse truncation burin. 60, 62, and 66 are single cairns; 64 is a group of (possible cairns); 67 is a dam. No LAS or ASKP sites are located within the map frame. Background Google Earth.



These might be part of the 8×8m structure described by Miller (1991), which we, however, did not observe as such, and which we may have simply missed or the wall lines may have been ploughed out or damaged by the tracks in the intervening forty years. Miller found Nabataean, Early Roman and Late Byzantine sherds (Miller 1991: 67); our preliminary analysis confirms these dates with 9 Roman and 5 Byzantine sherds. We also collected 50 pieces of chipped stone and were interested to see if there was therefore also a prehistoric component to the site, but unfortunately none of the pieces was diagnostic. KNS082 contains a scatter which is probably related to KNS080, but due to time limits we did not collect material here.

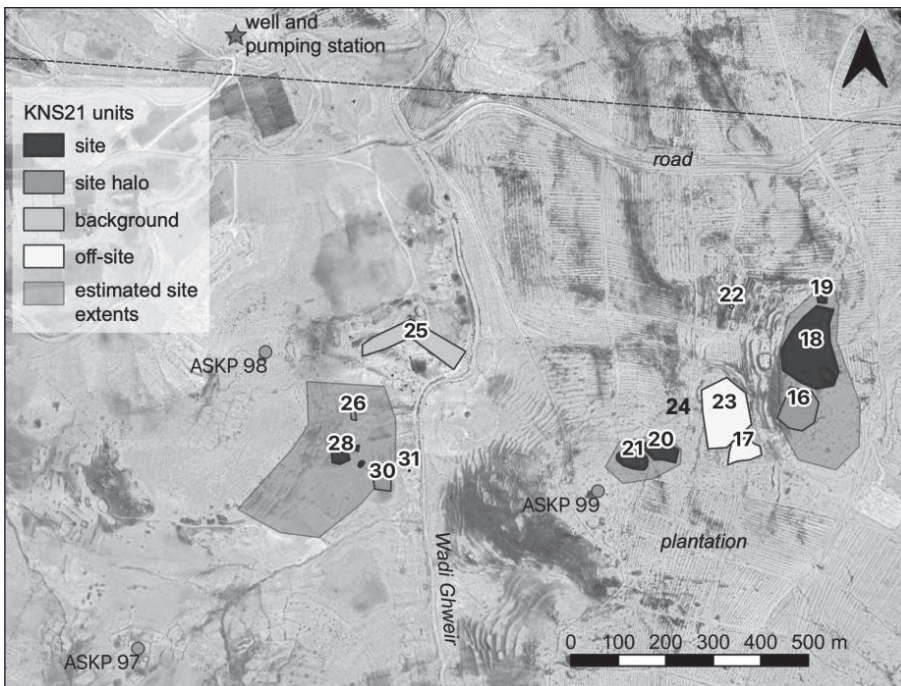
### Northeast of the Study Area

#### *The Plantation / KHirbat Al Makhārīm / Wādī Al GHuwayr east Side*

We explored several areas inside the modern plantation in the north-eastern part of our study area (Fig. 10). This area overlooks the Wādī Al Qunaytirah (or *Qneitrah*) or Wādī Al GHuwayr (according to Miller, *Qneitrah* is the name for the general area rather than the specific *wadi*) to the west and is currently heavily terraced on the slopes and cultivated for trees. There are several areas, however, which remain 'intact', presumably because many

stones are present. When Miller surveyed here in 1979 the area was not yet agricultural. He reported stone heaps with occasional wall lines, with a pronounced *rujm* at the south end of the site, which he called KHirbat Al Makhārīm after Musil (Miller 1991: 63, site 99). It appears he did not visit the area where our units KNS016, 018, and 019 are, as clear structures are present here, but our areas KNS020 and KNS021 likely belong to Miller's ASKP site 099. We found that these latter two areas contain stone cairns and circular features, with a very low density of chipped stone. One feature of particular interest is a stone arc revetted into the slope. We did not find pottery in these specific areas. In a gully downslope two bifaces were found, which corresponds to Miller's observation of Lower or early Middle Palaeolithic handaxes (Miller 1991: 63).

Units KNS017 and 023 yielded very little material and appear to be 'off-site' with stone piles interpreted (by us) as clearance cairns. East/northeast of this, though, an area with clear larger and smaller circular structures as well as cairns is present (KNS016, 018, 019). A standing stone is located on -roughly- the highest point. Several structures composed of a circular structure with a 'flimsier' larger circular structure attached were observed, one of which was recorded as KNS018 (Fig. 11). Next to the 'house' a grinding stone platform with a circular



10. Northeast of the study area with the 2021 survey units, their interpretation, and estimated site extents in grey. ASKP site 99 is Al Makhārīm (Miller 1991). KNS24 is the find spot (in a gully) of two bifaces. A well and pumping station is mentioned by Miller and the location was derived from Google Earth imagery, but not yet checked on the ground.

depression, plus grinder, was present. There is also a possible cistern nearby. It seems this is a ‘later’ (non-prehistoric) village extending over the knoll, likely in a location with an earlier presence, if not occupation.

The chipped stone from the wider ‘Al Makhārīm’ area (including all of the units KNS016-24) was very heavily flake based (all units <10% blades, and one unit, KNS020, < 3%). The material from KNS016, 018, and 019, around the structures, was notably very fresh, suggesting it may be eroding from *in situ* contexts. KNS016 and 017 each included one concave truncation burin, suggesting a Late Neolithic component, but there were few diagnostic elements present, with most of the units dominated by miscellaneous retouched pieces, fragments, and used pieces, which generally made up more than 60% of the assemblages and in unit KNS018 was at 79%. KNS022 showed a Palaeolithic presence, with one Levallois core and a Levallois flake with a truncated faceted butt. 024 was the find spot for two bifaces, one ovate and one lanceolate with a missing tip. The ovate biface was particularly well made.

Pottery was found in units KNS016, 018, and 019 only. Preliminary analysis indicates an Iron Age to Byzantine date, but numbers for each are low. This corresponds to Miller’s ceramics, which date to Classical periods (Nabataean to Byzantine), which seem to have come from parts of the site more to the southwest (Miller 1991: 63).

In sum, it appears that Al Makhārīm is an area extending over the larger east slopes of the Wādī Al GHuwayr and includes multi-period activity, including the Palaeolithic and Classical periods with most likely occupation in between, but it is hard to pin down a more specific period for the latter. This is a promising area which merits further research.

*Wādī Al GHuwayr (West Side)*

Due to modern occupation, the part just south of the road, a tentatively ‘high probability area’, could not be explored. Further south, downhill from ASKP site 98, an Iron Age *rujm* (Miller 1991: 63), a terrace system and at least one structure were found (KNS026, 027, 028, 029, 030) (Fig. 12). KNS027 is a generally

rectangular structure (12.85×6.40m; inner part 8×6.40m), with either two rooms or an inner and outer area, and a possibly later circular feature on top (*ca.* 4m diameter). Another possible rectangular building is present upslope, but this may be part of the terrace wall system. Almost no lithics were found. Pottery was much more abundant and during preliminary analysis was assigned to the Late Bronze Age (n=2), LBA/Early Iron Age (14), general Iron Age (1), Iron II (1), and the later Abbasid (1) and Ayyubid/Mamluk (15) periods. The structure KNS027 only yielded LB/Early Iron pottery, and it is tempting, but completely preliminary, to assign the structure to the LBA/Early Iron Age, and the terrace system to the later periods.

The site might be associated with ASKP site 098 uphill, which yielded a rectangular building and Iron Age, Nabataean and Late Islamic sherds (Miller 1991). The Ayyubid/Mamluk component (possibly the field system?) might be connected to the village site of KHirbat Muḥaysin about 600m to the southwest, which



11. KNS018 circular structure with its ‘courtyard’ just visible to the left. Looking west with the modern villages of *Humūd* and *As Samākiyyah* visible in the background.



12. The terraced structure within the terrace system on the west bank of the Wādī Al GHuwayr, *Al Qunaytirah* (KNS027).



yielded multi-period evidence from Middle Bronze Age, Nabataean, Byzantine, Umayyad, Late Islamic, and Late Ottoman periods, also including five Ayyubid/Mamluk sherds (Miller 1991: 62).

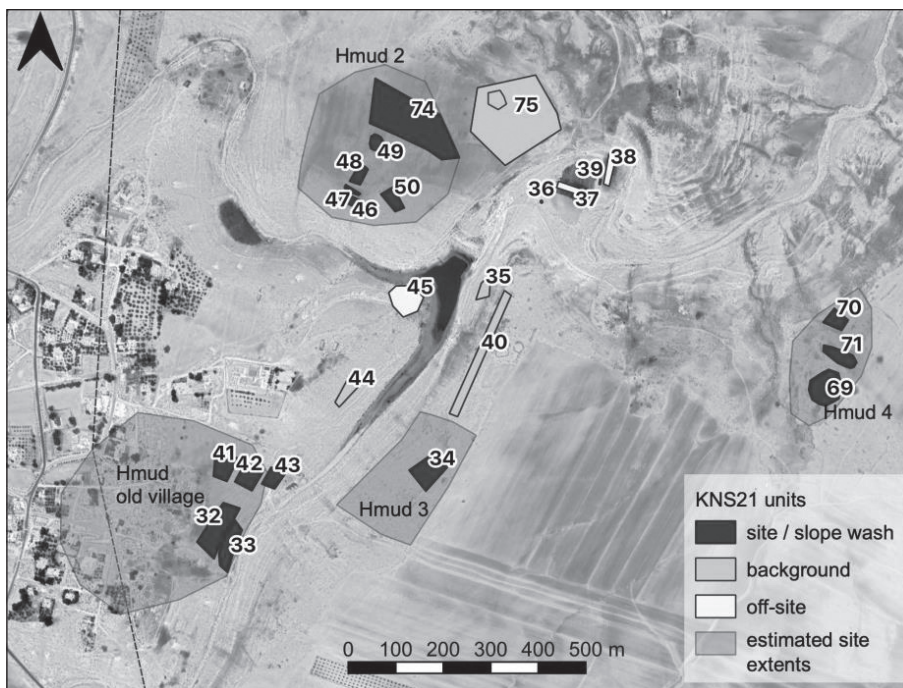
### Humūd

Around 2km WSW of the LBA/IA and Ayyubid/Mamluk site in the Wādī Al GHuwayr lies one of the three villages of the study area, Humūd, on one of the more prominent *wadis*. We term this *wadi* here the Wādī Humūd, but we are not sure of its actual name. The area is very rich archaeologically and certainly merits more research. In our 2021 season we investigated only the part from the western edge of the survey area, where the modern as well as old village of Humūd is located, to about 1.5km upstream as the crow flies (or 2km following the *wadi* course) (Fig. 13). We had high expectations of the area, considering the presence, attested by Miller, of the old village, going back to at least Classical times, the presence of a *wadi* confluence with meandering bend with modern fields, and the visibility of many remains as well as modern Bedouin camps in the area, together indicating a water source and conditions suitable for at least opportunistic agriculture (Fig. 13; but note the small lake on the imagery is created by a modern dam).

### Humūd Village

This site, ASKP site 100 and MEGA-Jordan 11051 is an old (*i.e.* Late Ottoman-20<sup>th</sup> century) village on top of earlier remains. When visited by Glueck (1934, in Miller 1991: 63) it was a “small inhabited site”, while by the time of Miller’s survey it has been “largely deserted” (Miller 1991: 63). There is now a new village built adjacent to the old village, while the old, ruined structures themselves are also occupied. While probably located on a natural hill or knoll, with the *wadi* on its southeast side, this also appears to be a *tell*. Miller found sherds dating from Nabataean to modern times. To investigate if there was an earlier element too, we collected material on the uninhabited southeast slopes between the old village and the *wadi*, where material is washing down as well as potentially eroding out (KNS032, 033, 041, 042, 043).

The majority of the collected material is pottery, but chipped stone was recovered too. While the pottery needs to be studied into more depth, the preliminary analysis is already very interesting, as clear pre-Nabataean sherds were found, dating to the Early Bronze Age (n=1), Late Bronze Age (3), LBA/early Iron (5), Iron I (16), Iron I/II (15), Iron II (4), as well as the Classical and Ayyubid/Mamluk periods mentioned by Miller. It is therefore clear that occupation goes much further back than originally thought.



13. Humūd and surrounding area. The dashed line indicates the edge of the survey project area. The estimated site extents include non-surveyed areas.

However, the expected Neolithic site does not appear to be clearly present (or the material is simply not present on the slope, which might well be the case). The chipped stone from the survey units at Humūd is highly variable. KNS041 appears to contain a significant Palaeolithic element, visible in faceted flake platforms, hard hammer thick cortical flakes, and some heavy bifacial fragments, with some significant rounding on the material. KNS042 is similar, including Levallois flakes with faceted butts and much evidence for rolling of the material, with some pieces retouched after rolling. KNS032 is again similar, and includes a Levallois flake core, but in addition has one microlith present, suggesting an Epipalaeolithic presence. KNS033 had no specifically diagnostic material. KNS043 has no obvious Palaeolithic material and very little evidence for rolling of the material. The angled and corner scrapers present are probably Late Neolithic or Chalcolithic.

#### Humūd 2 / Tall Ar Ramādī

Two knolls to the north from Humūd Old Village, we found a clearly Neolithic site (KNS046-50, KNS074) (**Fig. 13-14**). This was not reported by Miller, and also does not appear in MEGA-Jordan. There were relatively few pottery sherds, with the two diagnostic ones dating to later periods, but a (medium dense) scatter of chipped stone which stood out for its 'nice' tools. The chipped stone is in general Late Neolithic in character, although the single Amuq point from KNS047 indicates a PPNB presence. This is confirmed by the presence of a bidirectional blade core fragment from



14. Part of the Humūd 4 area with a few of the terrace walls, looking across the wadi, with Humūd 2 to the left (the grey hill) and As Samākiyyah in the distance.

KNS074. Unusually for the wider project survey area, there is little evidence for any Palaeolithic presence. The material is not technologically uniform, visible in the variable proportion of blades, 14% and 13% in units KNS046 and KNS050, respectively, and over 20% in all other units, running as high as 38% in KNS047 (44% in KNS074, but within a very small, biased collection). These very high blade proportions may be a further indication of an earlier Neolithic presence.

It is not clear how deep the deposits go. The scatter washes off into the *wadi* on the south side and runs out where the fields start on the northeast side. It is not clear if any material might be present under the fields. On the knoll, which commands good views to all sides and especially over the *wadi*, some large, possibly natural basalt blocks were found, which appear to be bulldozed off the top. There are possible stone structures and/or mounds on the top of the hill, which are incorporated into the soil matrix and therefore do not appear to be the result of field clearance.

#### *Wadi Banks*

On the lower terraces closer to the *wadi* very little material was found, and what was found were mixed, generally undiagnostic material, as ever including some Palaeolithic material (units KNS037-39, 045). Future geological analysis and/or test pits will hopefully indicate whether the surfaces have been eroded or covered by colluvium or neither. A looted cairn or cistern (KNS036) yielded more material, essentially serving as test pit of sorts, but unfortunately the general picture was the same.

#### **South Side of the *Wadi***

##### Humūd 3

Almost opposite Humūd old village, on top of the now steep east *wadi* bank on the sloping upper terrace, there are elements of terracing, cairns, and a structure, apparently an enclosure of some sort which appears to be mostly buried under modern slope wash. There is a medium-density scatter. Within a wider area that we call Humūd 3, we walked transect KNS034. In this unit, 175 pieces of chipped stone were collected, including, however, very few formal tools. Four of these are angled scrapers and



there is a concave truncation, possibly a blank for a concave truncation burin, suggesting a late prehistoric date. North of this area the scatter becomes sparser.

#### *Humūd 4*

Further north along the *wadi*'s east bank, beyond the bend, on a sort of premonitory on the sloping edge before the slope becomes steeper, lies an area with many basalt boulders and cobbles, including cairns, field boundaries, terrace wall features, enclosures (Figs. 13, 14). The area is disturbed by ploughing. Three areas were chosen for collection; it seems that the area continues further north (although on satellite imagery it appears to change). The area is of interest because it was the only area in our pilot season where potentially Neolithic pottery was found, possibly preserved by their location near structural remains (/or recently ploughed up?). It concerns 5 Neolithic/Chalcolithic/Early Bronze Age sherds, which are most likely Neolithic or Early Chalcolithic. In addition, 7 Iron Age, 1 Hellenistic, 5 Roman, 2 Byzantine, and 16 Ayyubid/Mamluk sherds were collected (as well as undiagnostic ones). There is little chronologically diagnostic chipped stone material, although the concave truncation burin and denticulate from KNS069 may suggest a Late Neolithic date. KNS070, although a very small collection, includes one Palaeolithic Levallois core, but a poor example made on poor quality flint, and one epsilon blade, typical of PPNB naviform technology. In sum, the area seems to be a multi-period area used at least at some point for field systems and perhaps also for keeping animals, and perhaps prior to that for (burial?) cairns.

#### **As Samākiyyah**

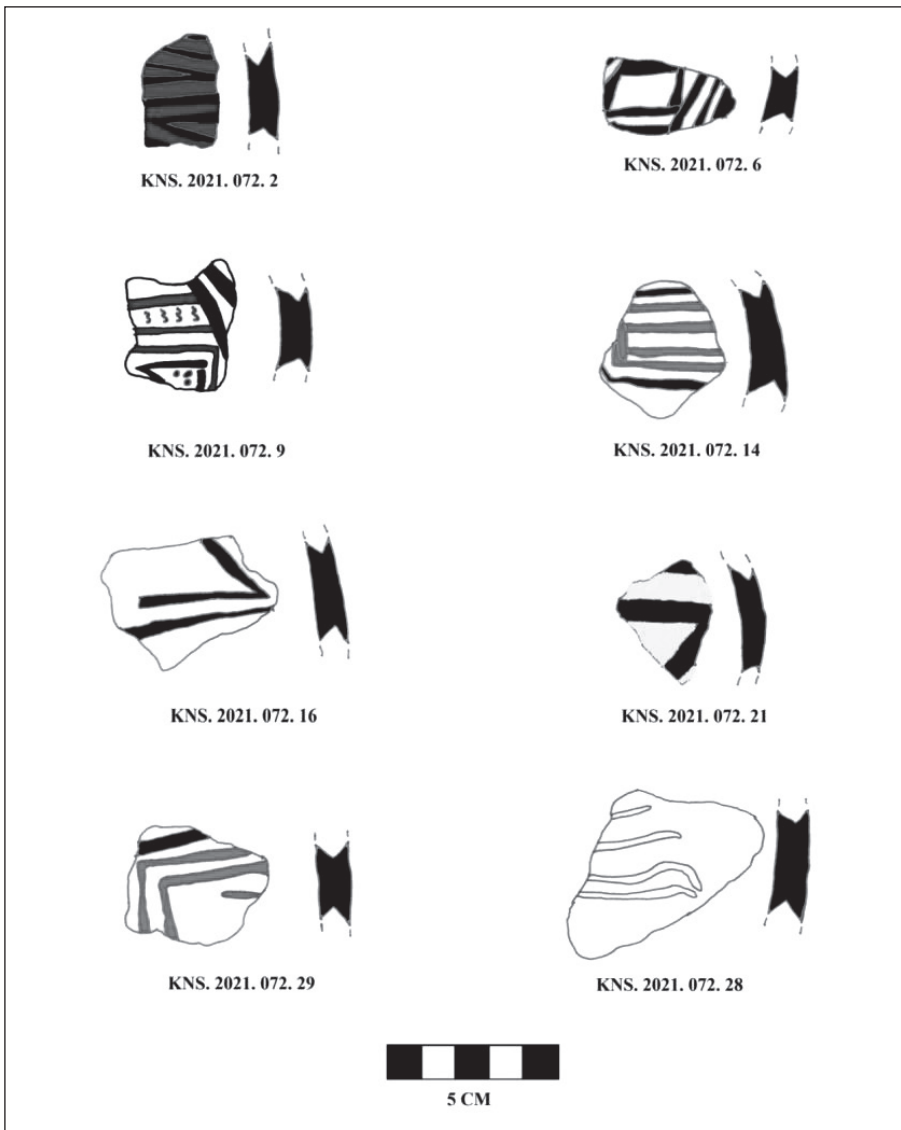
The northwest end of the survey area is this modern village, which lies directly west of the old village. This old village is ASKP site 94. Apparently it was unoccupied around 1900 AD and resettled by the 1930s (Miller 1991 after Musil and Glueck). Miller's sherds indicate the earlier village dated from the Iron Age to Late Islamic periods (Miller 1991: 62). Our aim was to find out if there is also an earlier component, but with the non-built slopes occupied by Bedouin winter camps and no clear

exposed section, this was not possible, and it might require a test trench. The few recovered chipped stone pieces included a small single platform bladelet core and three angled scrapers, possibly Late Neolithic or Chalcolithic. However, given the general background scatter numbers that are present throughout the region, a prehistoric component of As Samākiyyah is not demonstrated by this. Pottery was abundant, and is in line with Miller's findings, with Iron Age, Roman, and Ayyubid/Mamluk sherds present. Moreover, it contains the most exciting pottery finds of the season: for the first time on the Karak Plateau a handful of Midianite pottery sherds were collected (Fig. 15). These are different in type of the painted decorations and ware than those encountered at KHirbat An Nuḥās, Wādī Faynān dated to the Iron Age (Smith and Levy 2008), but parallel to the so-called *Hijazi* Midianite Pottery of the Late Bronze Age tradition (Marta Luciani personal communication 2022).

#### **Imra' / Amra' / Mra' = MEGA-Jordan 10212**

Outside the study area, one single site was included because we observed Late Neolithic material in a *wadi*/bulldozer cut in 2019 (Flohr and Finlayson 2020). This site is ASKP site 15, at which Miller found sherds dating from the EBII-III onwards (Miller 1991: 33). The site lies at the head of the Wādī Imra' (and presumably contains, or contained, a spring) (Fig. 16). We re-investigated and collected material from the south-eastern edges of the site (KNS051 and 052), where the site is cut by the *wadi*, bulldozing and the road. In contrast to our 2019 impression, relatively few chipped stone was present and it mainly came from an animal burrow in KNS051. This might indicate the earlier layers at the site are present below the current surface, but if these are substantial layers indicating a village, or rather occasional use would need to be confirmed by excavation.

Most of the chipped stone is poorly chronologically diagnostic. The principle exception is a Nizzanim point derived from this animal burrow, which is probably Late Neolithic, possibly early Chalcolithic (see image in Flohr and Finlayson 2020). An intensive pick up from the surface of the bulldozer cut (KNS51) failed to find any other artefacts as



15. Pottery sherds collected from the surface of As Samākiyyah, containing several sherds of the Hijazi Midianite type. Drawings by Laith Alshboul.

diagnostic, although nothing was found that would contradict this date either. Collecting from the adjacent section (KNS52) and KNS55 produced only a low number of flints, but this material is eroding from above the layer of the bulldozer cut. Nearby plots KNS53 and KNS54, across the *wadi*, also produced only low-density scatters. One fragment found in KNS54 may be from a concave truncation burin, also suggesting a Late Neolithic date. The assortment of thick scrapers generally supports such a date.

Abundant pottery was found, with, interestingly, one potential Late Neolithic / Chalcolithic piece from the same unit as the Late Neolithic chipped stone. Otherwise the pottery is as expected dating to the EBA and further mainly to the Iron Age (see **Table 1**).

### Concluding Remarks

#### *Finding the Late Neolithic*

The Karak Neolithic Survey 2021 pilot season was successful in identifying areas with greater and lower archaeological probabilities, information which will feed into a Bayesian allocation model. It is important to note that we focused on areas where Neolithic (or, in general, prehistoric) remains are likely to be found. This is intended to help to address existing biases against such sites (Banning *et al.* 2013). However, the overall picture of the archaeological landscape through time will remain biased, as sites in areas that have been eroded or buried since the Neolithic, as well as areas where visibility is low for other reasons (*e.g.* our ‘sterile’ agricultural area), will not likely be located, and the Neolithic will therefore



16. The modern and old villages of Imra' with the KNS units surveyed in 2021.

remain underrepresented. Nonetheless, finding some Neolithic sites is better than none.

We have already documented in this first exploratory season a 'new' Neolithic site in the Wādī Humūd and have moved back the date of occupation at several other sites (notably at Imra'), simply by intensive walking survey, collecting, and studying chipped stone. It is also worth noting that simply repeating visits and collection, in this case four decades after the last survey, has yielded new results, like the much older date we have tentatively established for Humūd based on the pottery.

The presence of a prehistoric pottery specialist further ensured that we did find the few possibly Neolithic pottery pieces, emphasizing

the importance of specialists and training of the team (Banning 2015). This holds, by the way, also for other periods: if we had had a focus solely on the Neolithic, the Midianite sherds would perhaps not even have been picked up in the field. Considering the unconscious biases that exist, our team was, although small, nicely balanced between chipped stone and pottery specialists, and amongst these between different periods. We are confident this will have gone some way to mitigate against biased collection, but one of the many reasons for adopting the reiterative survey method of Banning and team is exactly because such biases always exist.

In terms of site location, one of the main criteria is, of course, the presence of water, and then ideally a permanent source. Indeed, most (non-specialist, or habitation) sites identified in the survey area by us and previously by Miller and Parker are present along *wadis* with at least seasonal streams. In contrast, features like (burial) cairns are, again unsurprisingly, located in more visible places along ridges, indicating that for these visibility was more important than water. Our survey results so far confirm the idea (Banning *et al.* 2013) that for Late Neolithic sites the presence of springs and naturally wetter areas like *wadi* junctions are important. However, it is still too early to be sure how representative our Neolithic sites are as, with exception of Imra', the sites were found on deflated surfaces with limited contextual information. The absence of evidence for



17. Palaeolithic finds.



structures at most of our Neolithic sites means it is not yet clear whether these are habitation locales.

Our hypothesis that many Late Neolithic sites are present under later occupation, essentially forming the start of a new settlement system that would persist throughout the millennia after, appears to be supported by the Late Neolithic / Early Chalcolithic arrowhead and pottery sherd at Imra'. However, further work would be needed to identify the nature of the occupation there, given the limited evidence. Elsewhere, we did not find clear evidence of Neolithic occupation at the other multi-period sites, although the dating of the occupation at Humūd is now pushed back, perhaps by millennia, and the wider area has a clear Neolithic presence. Examining the origins of the later settlement pattern hypothesis continues to be a useful line of enquiry though, to be explored further perhaps by test-pitting. In the rare cases that very low levels at large tell sites in Jordan have been reached, a Late Neolithic presence has been attested, as at Pella (Bourke *et al.* 1998, 2003) and Abū Sunaysilah (Lehmann *et al.* 1991; Kerner 2016).

### **Beyond the Neolithic: The Survey Area Through Time**

While not our primary focus, interesting results were identified other than for the Neolithic. The Palaeolithic, for example, was present in almost every chipped stone assemblage (**Fig. 17**). While an extremely long period, this is nonetheless interesting, especially since there are clearly locales where there is more than just a 'background' palimpsest scatter. An example is the Wādī Abū Ash SHa'r south bank with units KNS011 and KNS012, but also for example the Al Makhārīm area. A frequent presence of Palaeolithic chipped stone was also found by the Limes Arabicus Survey, but appearing less omnipresent, at 28.7% of their sites (Clark *et al.* 2006: 35). Our research interests and expertise does not lie within this period, but we would be very keen to hear of other researchers that would like to be involved.

Of interest, but almost entirely absent, are the subsequent Epipalaeolithic and PPNA periods. They may be absent in part because of the small size of tools for the (later) Epipalaeolithic, or

because we were not targeting site locations for both, but also perhaps because of other visibility and obtrusiveness issues. Our results echo other surveys (with the exception of those in areas with better visibility). The Limes Arabicus Survey, for example, found Epipalaeolithic chipped stone in only 8% of their assemblages (Clark *et al.* 2006: 35). However, while they only found 8% of Neolithic sites too, we identified a much larger Neolithic presence. This of course was the focus of our work.

A near absence of the Chalcolithic and a low presence of the Early Bronze Age in our survey assemblages is striking (at least in terms of specifically diagnostic Chalcolithic or Chalcolithic/EBA tools and pottery), since this period was well-represented in the Limes Arabicus Survey, where 51.6% of their sites yielded Chalcolithic/Early Bronze Age material, although it was not possible to refine this chronology (Clark *et al.* 2006: 36). Miller (1991) also only found few specifically Chalcolithic sherds, but plenty of Early Bronze Age ones. This discrepancy with our survey, at least so far, may be a matter of definition (*i.e.* our 'later prehistoric' term), or perhaps of focus of area. Many of the LAS sites dating to this period, for example, were stone rings, often present on ridges, and also often found east of our area, within the drier zone (Clark *et al.* 2006: 37). This absence will be monitored closely in coming seasons.

We found no diagnostic Middle Bronze Age sherds, but the Late Bronze Age, Late Bronze Age/Early Iron Age and the Iron Age are present especially in the north of the area. As usual the Classical periods are also well represented, for example at Al Makhārīm. Iron Age sherds were also found by the LAS at, for example, Al Judayyidah. An absence of these periods in our survey in the southeast may simply be caused by the near absence of pottery in our prehistorically-focused survey units there. The find of likely Hijazi Midianite pottery at As Samākiyyah is especially interesting, as this pushes the boundary of its material spread much further north than previously thought. The presence of limited Middle Bronze Age material, but more from the Late Bronze Age, and a substantial Iron Age and Classical presence is in agreement with the LAS findings



(Clark *et al.* 2006: 38).

The apparently abundant 13<sup>th</sup>-15/17<sup>th</sup> century presence in the north of our survey area, both at the village sites of Humūd and As Samākiyyah (and with limited evidence at Al Judayyidah), but also in the landscape, is also interesting. Terraces are notoriously difficult to date and were likely used over multiple periods, but the consistent finds of Ayyubid/Mamluk sherds here in the *wadis* Humūd and Al GHuwayr are interesting. This is probably for a large part a function of the high diagnostic value of “Ayyubid/Mamluk” type sherds (handmade decorated wares), which are commonly recognized in surveys. It is likely that this therefore does not reflect an actual large increase in population, but rather an increased visibility, in combination with the relative invisibility of preceding periods (Johns 1994; Walmsley 2008). Nonetheless, it has also been argued that this was a relatively calm period, an age of reconstruction after the Crusader period (Walmsley 2008), and our results tie in with a pattern of many small, rural village sites. It is also interesting to note that Brown (1992, cited in Walmsley 2008 and Johns 1994) argued, based on the ceramics from Miller’s survey, that there was a shift from the arable plains in the centre of the Karak Plateau to the area further south and south-west, *i.e.* potentially including our survey area, at some point during this period. The ‘new’ area would have been less suitable to rain-fed agriculture, and more to intensive, spring-centred agriculture focused on irrigated fields and orchards. It appears that, now or in future, our survey could contribute to answering such questions; certainly, the building of terraces would argue for more intensive agriculture, perhaps tree-based, but at the same time the terraces on these steep slopes appear rain-fed rather than irrigated. In this respect it is also interesting that the LAS project, focused on drier areas generally, identified Ayyubid/Mamluk and/or Late Islamic sherds at only 8.8% of their sites (Clark *et al.* 2006: 51).

We aim to continue the survey on the Karak Plateau, eventually also using test pits or small-scale excavation to get to know more about the nature of the Late Neolithic sites. First, though, our objective is to set up a Bayesian allocation model and apply this in our survey

area, in combination with standardizing artefact collection further following recommendations by Banning *et al.* (2011) in terms of recordings parameters like the participants’ walking speed, the search time also for transects, etc, in order to get a better sense of artefact density.

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Pascal Flohr (Corresponding Author)  
Institute of Pre- and Proto-History  
and Excellence Cluster ROOTS  
Christian Albrechts University of Kiel  
Johanna-Mestorf-Strasse 2-6  
24118 Kiel, Germany  
[pflohr@roots.uni-kiel.de](mailto:pflohr@roots.uni-kiel.de)

Bill Finlayson  
EAMENA project  
School of Archaeology  
University of Oxford  
1-2 South Parks Road  
Oxford OX1 3TG, United Kingdom  
[bill.finlayson@arch.ox.ac.uk](mailto:bill.finlayson@arch.ox.ac.uk)

Zeidan Kafafi  
Emeritus Professor of Archaeology  
Yarmouk University  
Irbid, Jordan

Elizabeth Gibbon  
Department of Anthropology  
University of Toronto  
Toronto, Canada

Laith Alshboul  
Yarmouk University  
Irbid, Jordan

Lily Graham-Stewart  
London, United Kingdom

Mohammad Tarawneh  
Al Karak Office

Department of Antiquities  
Al Karak, Jordan

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