

# REVISITING LATE NEOLITHIC SITES IN JORDAN, AUTUMN 2018

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## **Abstract**

The Late Neolithic is understudied in Jordan due to a research bias and poor visibility of the remains, especially in western (agricultural) parts of Jordan. Previous work in the Wādī Ziqlāb has shown that when sub-surface survey (test trenches), remote sensing and predictive modelling were combined, many more prehistoric sites could be identified; we aim to test if this approach also works in other parts of Jordan. We undertook an extensive literature review to identify potential Late Neolithic sites and visited a selection of these in the agricultural and steppic parts of south and central Jordan during the autumn of 2018. The aim of the site visits was to check, and if necessary correct, site location and gain more information about the archaeology at some of the sites; a second aim was to do a condition assessment. Twenty-two sites were visited and documented, 17 of which were Late Neolithic. Over half of these (ten Late Neolithic sites, 12 in total) have been affected by agriculture, and are under continued threat, while three of the sites are under threat of dam-building works and subsequent flooding.

## **Introduction**

The Late, or Pottery, Neolithic is an important, but still poorly understood, period in the history of Jordan. It is during this period (*ca* 6500-5000 cal. BC) that many of the developments in subsistence economy and society that commence in the Epipalaeolithic and Early, or Pre-Pottery, Neolithic finally coalesce into a combination of small-scale mixed farming communities and mobile pastoralists. The Late Neolithic is the culmination of this long period of ‘neolithisation’ when small (and occasionally

larger) communities, relying on domesticated crops and animals and increasingly their secondary products, for the first time created a recognisable farming landscape. The social and economic structures that were formed in the Late Neolithic underpin the subsequent development of complex urban societies.

The Late Neolithic is also of particular significance because of the large climatic fluctuations that took place, making it an extremely interesting case study regarding how past societies coped with climate change. Around 6250 cal. BC, or 8200BP, the so-called 8.2ka event occurred, the most cold and arid Holocene event recorded in the Greenland ice cores (Alley *et al.* 1997), for which evidence has been found in climate archives throughout the northern Hemisphere (Alley and Agustsdottir 2005). This 200-250 year ‘event’ probably led to increased aridification in the Middle East, and was likely superimposed on a more general aridification running between *ca* 6600 and 5800 cal. BC (Rohling and Pälike 2005). Surprisingly, these climatic changes did not have large-scale effects on the societies in the Middle East at the time, but relatively minor adaptations were made to cope with its effects (Flohr *et al.* 2016); more regional and site-based research is needed to better understand these coping and adaptation processes.

The Late Neolithic is known from a limited number of sites in Jordan, mostly in the northern part of the country, where a steady stream of information has been coming from the Wādī Ziqlāb and adjacent areas since the 1980s (Banning 1995, 1989; Banning *et al.* 2015; Kadowaki *et al.* 2008). Various other sites have been excavated in the north, such as ‘Ayn Rāhūb

(Kafafi 1989; Muheisen *et al.* 1988), Jabal Abū Thawwāb (Kafafi 2001, 1988), ‘Ayn Ghazāl (Kafafi 1990; Rollefson 1993), al-Hussayah (Bartl and Kafafi 2015; Kafafi *et al.* 1997), Tall Abū aṣ-Ṣuwwān (al-Nahar 2010) and Wādī Shu‘ayb (Simmons *et al.* 2001). In the Jordan valley the Late Neolithic is represented by Abū Hāmid (Dollfus and Kafafi 1993, 1986; Lovell *et al.* 2007) and is present at Tulaylāt al-Ghassūl (Bourke *et al.* 1995); both these sites appear to date to the very end of the Late Neolithic (second half of 6<sup>th</sup> millennium BC). In central and southern Jordan only the earlier Late Neolithic sites of WHS 524/DH 49 (Bossut and Kafafi 2005), adh-Dhirā‘ (Finlayson *et al.* 2003) and the later Late Neolithic sites of ‘Ayn Waydha’ (Kuijt and Chesson 2002), Tall Wādī Faynān (Najjar *et al.* 1990), and Baṣṭah (Gebel 2009) have been excavated. Sites in the eastern desert are better preserved and many prehistoric sites survive in this area, resulting in much recent and current research (for Late Neolithic sites see for example Richter 2014; Rollefson *et al.* 2012, 2013). Analysis of these known sites suggests that there is considerable variety in site type, in the forms and shapes of architecture, in material culture, and in local economic livelihoods across Jordan during the Late Neolithic (Kafafi 1998, 1993).

Despite the evident significance of the Late Neolithic, it remains understudied in Jordan. As is clear from the list above, only a small number of researchers are actively engaged in work on this period and the number of Late Neolithic sites excavated, frequently by only a few small trenches, remains low, especially when compared to other periods. The reason for the limited research is in part a research bias as the period is somewhat ignored in between extensive research on the earliest origins of farming of the Early Neolithic and research on the increasing social complexity of the Chalcolithic and Bronze Ages (where there is again more ‘origins’ research into the first cities and first states). To make the situation more difficult, within the agricultural zone - which is key to understanding this period - Late Neolithic sites generally have a low visibility (Banning 2015: 91). They are often small to start with, are frequently eroded or covered by colluvium, and often have no standing remains. Late Neolithic

pottery erodes easily, so that in many cases not much survives on the surface (Banning 2015). In addition, the material culture, including the chipped stone, is often not diagnostic and consequently hard to correctly identify by non-specialists (Banning 2015). There is also the possibility that as the Late Neolithic site distribution, based on an established agricultural economy, is probably echoed by the ‘modern’ settlement pattern, many sites may be buried below later sites [as at Pella (Bourke *et al.* 2003, 1998)]. Overall, this lack of visibility has an obvious effect on research and conclusions drawn from, for example, settlement patterns [*e.g.* the Late Neolithic has been understood as a period of decline after the florescence of large Late PPNB sites, which has in turn been linked to climate change and landscape over-exploitation in the Late PPNB (Köhler-Rollefson 1992; Rollefson 2011)]. The poor visibility of Late Neolithic sites equally has an impact on heritage management as sites cannot be protected (or documented before destruction) if their location is unknown.

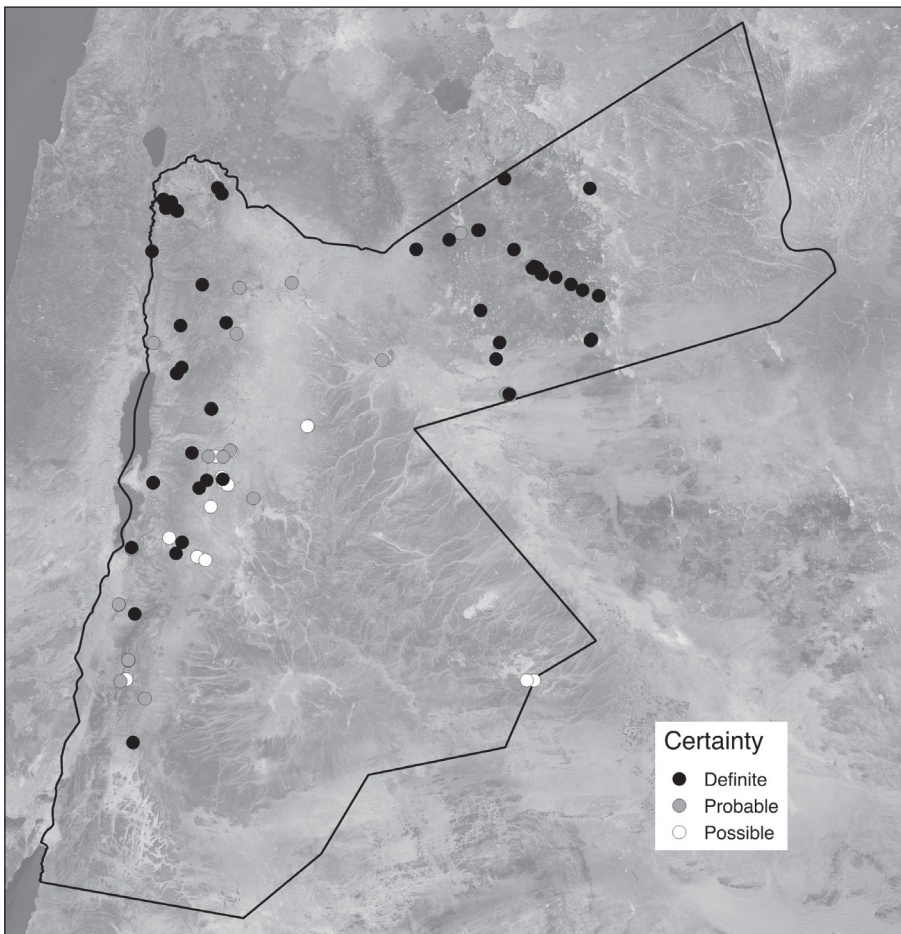
In this context, it is surprising that close inspection of the literature, guided by databases such as MEGA-Jordan and making a point to include basic survey and preliminary reports such as those published in this journal, reveals that many Late Neolithic sites have already been successfully identified (**Fig. 1**) (see Methods). While there is often very little information provided about these sites, it is clear that sites are preserved and can be found. When field research has been conducted to locate the Late Neolithic, in areas where no definite Neolithic sites could be found using traditional survey methods, targeted surveys using sub-surface survey (soundings) to locate sites that had been covered by colluvium had much better results (Banning 2015). This approach was further improved by specifically targeting probable prehistoric site locations, taking into account geomorphology and focusing on preserved parts of the prehistoric landscape, in combination with predictive modelling using Bayesian allocation algorithms for Neolithic site indicators such as the presence of springs and *wadi* junctions (Hitchings *et al.* 2016, 2013). This methodology provides a way forward to locate the Late Neolithic by specifically targeting preserved

aspects of landscape and areas with high probability of Neolithic sites, followed up by test excavation (Banning 2015: 94).

The success of Banning's methods indicates that this approach should be tried elsewhere within the agricultural zone and we plan to test if the method also works for central and southern Jordan. An initial step in this process, as a prerequisite for building predictive models, is to systematically identify site locations. This can often not be done from desk-based sources, even where surveys have been undertaken, as the nature of the information from survey and preliminary reports means the character of the sites and even site locations, especially when the work was conducted in the pre-GPS era, are often not clear. In some cases we have established that site positions may have been recorded over hundreds of metres or even several kilometres away from their actual locations. It was therefore necessary to undertake site visits to check (and where necessary correct) site-location data and to gain additional information about the remains present, especially from

surveys where only little has been reported. At the same time we assessed the condition of the sites, as in many cases the last documented condition might have been recorded as many as 30 years ago, since which time agricultural and urban expansion has been profound. The site visits presented here form a very initial step in our planned research.

This study into the location and preservation of Late Neolithic sites was conducted as part of the Endangered Archaeology in the Middle East and North Africa (*EAMENA*) project, funded by the Arcadia Fund. This project has its roots in the Aerial Archaeology in Jordan (*AAJ*) project (Kennedy and Bewley 2009) and aims to identify, understand and monitor the endangered archaeology of the MENA region ([www.eamena.arch.ox.ac.uk](http://www.eamena.arch.ox.ac.uk); Bewley *et al.* 2016). To this end it uses remote sensing, specifically freely available satellite imagery, and disseminates this information through a freely available online Arches database. In this *EAMENA* database, information on the archaeology, location and condition (damage and threats) of the



1. Map with Late Neolithic sites identified from the literature so far. Based on published survey and excavation data referenced in the text, *MEGA-Jordan* (also Mueller-Neuhof pers. comm. 2018). The map is not yet complete; in particular it is missing Sumio Fujii's sites in the Jafr basin and beyond, and sites in the rest of southeast Jordan.



sites is recorded. The use of remote sensing to study the region has led to the documentation of thousands of previously unrecorded archaeological sites by this project. The EAMENA database currently contains over 250,000 records in total (at the time of writing [May 2019]). The MENA region is especially suitable for this type of analysis, as many archaeological remains are still standing and are therefore clearly visible on the imagery. However, use of these data sources means that prehistoric sites - especially Palaeolithic and Neolithic sites, as well as later, more ephemeral site types (or site types otherwise less visible from the air, *e.g.* rock art) - are underrepresented in the database. To address this issue, the information in the database is supplemented by analysis of published records and this project served to address this bias by focusing on the Late Neolithic. The site visits, although in this case targeted at the Late Neolithic, are a standard process in the EAMENA project to check and supplement remote-sensing data acquisition.

## Methods

A literature search for Late Neolithic sites in Jordan was conducted. This included searches in the Department of Antiquities' MEGA-Jordan database ([www.megajordan.org](http://www.megajordan.org)), and study of available survey and excavation reports (Baird *et al.* 1992; Banning 1989; Betts *et al.* 1995; Betts 1998; Fiema *et al.* 2008; Garrard *et al.* 1994; MacDonald 1988; Mortensen *et al.* 2013; Parker 2006 [see introduction for excavated site references]). Most archaeological surveys in Jordan have been either general purpose, or focused on later periods. Relatively few surveys have included specialists in early prehistory, and attribution to specific periods was often uncertain. Nonetheless over 110 possible, probable or definitely Late Neolithic sites were found. To date, we have studied 96 of these (**Fig. 1**). For each site, the available information on the archaeology was entered in the EAMENA database. The location was checked using the information in the publications and satellite imagery (Google Earth; Bing). Even when coordinates were available, the topographic information provided in records was often extremely useful in locating the actual positions of sites. Subsequently, the satellite imagery was used

in combination with aerial photographs from the Aerial Archaeology in Jordan (AAJ) project (see the APAAME website) to undertake an initial condition assessment of all the Late Neolithic sites in the database.

Not all sites could be visited during the time available, so the focus was on central and south Jordan, from the *ghawr* and Wādī 'Arabah to the plateau/steppe edge. Within this area, sites were selected based on the need to verify their location, and the need to know more about the archaeology, their potential significance and their proximity (*i.e.* their location close to another site which met the earlier criteria). The site visits were conducted over three full and two half days between 30 September and 6 October 2018. [Two days of site visits to potential sites identified using remote sensing (satellite imagery) were also conducted as part of the EAMENA Cultural Protection Fund training, but these are not presented here]. The Late Neolithic sites were specifically targeted, but when sites of other periods were nearby they were documented, especially if they appeared to be under threat. As time was limited, some remote areas or areas with difficult access could not be reached. If a site was not found at or near its documented position it was not possible to conduct an intensive search over an area of several square kilometres within the time constraints of the project. Consequently, when sites were not found it is not clear if this was because they have been destroyed in the 30 or more years since they were described, or if they are simply in a very different location. When sites were successfully located, their positions were recorded by GPS and the site photographed, their locations and archaeological remains were described, and a rapid condition assessment was done using standardised forms. No material was collected, but surface material was (briefly) examined in the field to compare with the site record, to assess the date of the site, and to document site extent. All new information, including ground photographs, was entered in the EAMENA database.

Once an accurate location has been determined and the current condition assessed on the ground to provide baseline site-condition information, remote-sensing imagery can be used to monitor changes. Updated information

based on the site visits and results of the renewed imagery analyses was entered in the EAMENA database and is included in the site reports below.

## Site Visit Reports

### General Remarks

In this section and in **Table 1** we provide summary reports of each of the visited sites with their location (with location certainty in brackets), a brief site description, and the condition assessment based on field and remote sensing data. More detailed information and more images have been recorded in the EAMENA database, referenced by the EAMENA database number. The EAMENA database is freely available; access can be gained by registering at [www.eamenadatabase.arch.ox.ac.uk](http://www.eamenadatabase.arch.ox.ac.uk) (see [eamena.web.ox.ac.uk/database](http://eamena.web.ox.ac.uk/database) for more information).

### Dead Sea Area

#### 'Ayn Wayda'ah (EAMENA-0134424) – Late Neolithic Settlement Site

Name(s): 'Ayn Wayda'ah

MEGA-Jordan number: n/a

Location: 35.578646 E, 31.242430 N (Definite)

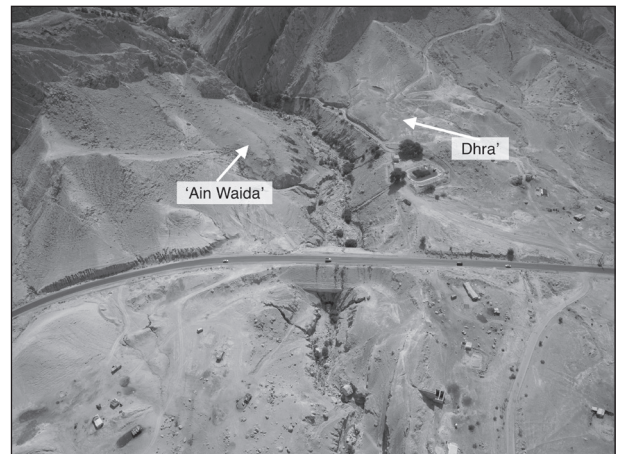
Location notes: *Wadi* terrace on the north side of the Wādī adh-Dhirā', where the steep mountains of the east side of the rift valley meet the Dead Sea plain (**Figs. 2-3**). Springs are located about 100m upstream. On the opposite, south side of the *wadi* is the Pre-Pottery Neolithic A (PPNA) and earlier Late Neolithic site of adh-Dhirā' (see below).



2. The site of 'Ayn Wayda'ah as seen from adh-Dhirā' on the opposite side of the *wadi*. Looking north (Photo: EAMENA/Pascal Flohr; 30 September 2018).

Description: 'Ayn Wayda'ah was first recognised during the survey linked to the site of adh-Dhirā', and was subsequently excavated in 1994 (Kuijt and Chesson 2002; Kuijt and Mahasneh 1995). The site covers about 6000 square meters of rectilinear architecture, with artefacts scattered beyond that, possibly over as much as 20000 square meters (Kuijt and Chesson 2002: 121; Kuijt and Mahasneh 1995). Three distinct architectural phases were distinguished, although the earliest (Phase A) was poorly defined. Based on material culture, considered as Qatifian by the excavators, and radiocarbon dating, phase B was identified as part of the later Late Neolithic/Early Chalcolithic, dating to the end of the sixth millennium BC. It is followed by a Chalcolithic phase. The site was interpreted as sedentary based on the architecture, scale of settlement and the multiple building phases (Kuijt and Chesson 2002: 120).

Condition: The site has likely been affected by erosion since the Neolithic/Chalcolithic (with significant downcutting of the *wadi* possibly commencing during the occupation of the site), but the terraces have remained intact with only minor surface erosion and colluviation (Finlayson *et al.* 2003: 4-5). While erosion remains a threat for any site near a *wadi*, the water flow in the *wadi* has decreased since canalization and the nearby hydrological station being built (Finlayson *et al.* 2003: 4-5). Indeed when comparing the photograph in the 2002 site report (Kuijt and Chesson 2002: Fig. 2) to those of 2018 (**Fig. 2**), the terrace appears to be in a stable condition.



3. Aerial photo showing the sites of adh-Dhirā' and 'Ayn Wayda'ah (Photo: Aerial Archaeology in Jordan/Matt Dalton, APAAME\_20181014\_MND-0786, 14 October 2018).

**Table 1:** Overview of visited sites, their EAMENA database reference number, coordinates (in decimal degrees), area, date of visit, with general and condition remarks. For each site it is indicated of disturbance by agriculture or by a road was identified.

Name	EAMENA number	Longitude (X, easting)	Latitude (Y, northing)	Area	Date of visit	General remarks	Condition remarks	Disturbances	
								Agri-culture	Road
<b>Late Neolithic:</b>									
<b>Ain Waida'</b>	EAME-NA-0134424	35.578646	31.242430	Dead Sea, South Jordan	30/09/2018	Excavated LN settlement	Eroded, but stable		
<b>Dhra'</b>	EAME-NA-0119703	35.577504	31.241374	Dead Sea, South Jordan	30/09/2018	Excavated PPNA and LN settlement	Military trenches, stable		
<b>SGNAS 92</b>	EAME-NA-0134445	35.461656	30.929588	Wādī 'Arabah, South Jordan	30/09/2018	Location could not be confirmed. Farm and fields.	Probably destroyed by agriculture	X	
<b>SGNAS 21</b>	EAME-NA-0134446	35.390661	30.670846	Wādī Fīdān, South Jordan	30/09/2018	Could not be reached because of dam works.	Possibly destroyed by bulldozing for dam, under threat of dam works and subsequent flooding.		
<b>SGNAS 29</b>	EAME-NA-0134588	35.390273	30.672255	Wādī Fīdān, South Jordan	30/09/2018	Scatter, caves.	Currently in fair condition, but likely to be destroyed by dam works and subsequent flooding.		
<b>Tell Wadi Feinan</b>	EAME-NA-0122093	35.477915	30.627119	Wādī Faynān, South Jordan	30/09/2018	Excavated LN settlement.	Ongoing erosion; agricultural fields.	X	
<b>WHS 524</b>	EAME-NA-0122649	35.703569	30.911805	Wādī al-Ḥasā, South Jordan	01/10/2018	LN settlement	Almost completely destroyed by road cut. Remainder is eroding heavily.		X
<b>WHS 307</b>	EAME-NA-0122431	35.736263	30.963617	Wādī al-Ḥasā, South Jordan	01/10/2018	LN settlement?	Partly destroyed by bulldozing, possibly affected by agriculture.	?	
<b>WHS 149 (Khirbet Hammam)</b>	EAME-NA-0122272	35.666088	30.984165	Wādī al-Ḥasā, South Jordan	01/10/2018	PPNB and probably LN settlement	Much affected by agriculture, ongoing but might be relatively stable now. Cut by road.	X	X
<b>LAS 188</b>	EAME-NA-0134416	35.870625	31.253203	al-Karak Plateau, Central Jordan	02/10/2018	Site itself could not be reached, photographed across wadi. Location uncertain.	Seems in stable condition.		
<b>Unnamed Site 1</b>	EAME-NA-0135554	35.874208	31.252654	al-Karak Plateau, Central Jordan	02/10/2018	Probably Neolithic clipped stone, scatter in field	Track, ploughing	X	

Unnamed Site 2	EAME-NA-0135555	35.877503	31.249257	al-Karak Plateau, Central Jordan	02/10/2018	Probably chipped stone in bulldozer cut	Neolithic	Bulldozing (agriculture, track)	X	X
'LAS 27'	EAME-NA-0133962	35.790018	31.381600	Mādabā, Central Jordan	05/10/2018	Might not be <i>in situ</i> , material could be brought in in relation to terrace wall building and/or field improvement		Natural erosion, ploughing	X	
Umm Meshrat	EAME-NA-0135621	35.895175	31.586354	Mādabā, Central Jordan	05/10/2018	LN settlement		Erosion, ploughing, continued occupation, some digging, road	X	X
MN 329	EAME-NA-0133882	35.708378	31.753868	Mādabā, Central Jordan	30/09/2018	LN settlement		Largely or completely destroyed by agricultural bulldozing	X	
MN 423	EAME-NA-0133883	35.707007	31.751373	Mādabā, Central Jordan	06/10/2018	Same LN settlement as MN 329 (?), location could not be confirmed		Largely or completely destroyed, if location correct	X	
MN 526	EAME-NA-013384	35.733737	31.778972	Mādabā, Central Jordan	06/10/2018	LN scatter, possibly low tell, location could not be confirmed		Largely or completely destroyed, if location correct (location very uncertain)	X	
<b>Other periods:</b>										
SGNAS 028	EAME-NA-0134589	35.390083	30.672277	Wādī Fīdān, South Jordan	30/09/2018	Classical (?) field system, next to SGNAS 29		Likely to be destroyed by dam works and subsequent flooding.		
WHS 427	EAME-NA-0122551	35.772500	30.955200	Wādī al-Ḥasā, South Jordan	01/10/2018	Water mill on south bank of Wādī Hasa		In danger of complete collapse.		
LAS 170 + 172	EAME-NA-0086180	35.82829	31.214444	al-Karak Plateau	02/10/2018	Large stone circles, cairns		Partly destroyed by agricultural development.	X	
Wadi Kanisah Roman/Classical site	EAME-NA-0135618	35.705517	31.751168	Mādabā, Central Jordan	06/10/2018	extra site recorded, near MN 423		Affected by agriculture and construction.	X	
Church/Monastery of Deacon Thomas	EAME-NA-0134597	35.735785	31.778426	Mādabā, Central Jordan	06/10/2018	next to MN 526		Conservation, looting, graffiti, vegetation. Protected.		



adh-Dhirā' (EAMENA-0119703) – Early and Late Neolithic Settlement Site

Name(s): adh-Dhirā'

MEGA-Jordan number: n/a

Location: 35.577504 E, 31.241374 N (Definite)

Location notes: *Wadi* terrace on the south side of the Wādī adh-Dhirā' opposite 'Ayn Wayda'ah, where the steep mountains of the east side of the rift valley meet the Dead Sea plain (**Fig. 3**). Springs are located *ca* 100m upstream.

Description: adh-Dhirā' was first described by Raikes while he was working on a road project, with test trenches being excavated by Crystal Bennett in 1979 (Bennett 1980). More test trenches were excavated in 1994 (Kuijt and Mahasneh 1998, 1995), and the site was more extensively excavated in the early 2000s (Finlayson *et al.* 2003). The site consists of *ca* 6500 square meters of Early Neolithic occupation with mud and stone structures, including probable residential buildings, food-processing areas and granaries (Finlayson *et al.* 2003; Kuijt and Finlayson 2009). This is overlain by an extensive Late Neolithic occupation consisting of rectilinear structures and large and small pit features (Finlayson *et al.* 2003). Check dams built to retain both soil and moisture in an adjacent *wadi* probably relate to this occupation and indicate the start of downcutting through the terrace (Kuijt *et al.* 2007). The Early Neolithic occupation is clearly dated to the PPNA by the material culture as well as radiocarbon dates; no radiocarbon dates are available for the Late Neolithic phase, but the pottery is of Jericho IX style (Finlayson *et al.* 2003).

Condition: The *wadi* to the north has likely incised since the Neolithic and an erosion gully is present to the south of the site, but the site's location between limestone barriers and a hard ridge has protected it, while surface erosion and colluviation appear to have been minimal (Finlayson *et al.* 2003: 4-5). The site has mainly been affected by military use during 1967, for which larger and smaller trenches were dug, some with small concrete and breezeblock revetments (Bennett 1980; Kuijt and Mahasneh 1998); only the large tank trench is still readily visible these days (**Fig. 4**). The western end of the site is cut by a modern water plant with reservoir (Finlayson *et al.* 2003) (**Fig. 3**). Towards

the *wadi*, on the north side of the site, a track has been bulldozed, while other bulldozed tracks approach the site from the southwest and southeast (already present in 1994 [Kuijt and Mahasneh 1998]). The site has been excavated but the excavation trenches have been backfilled; the military tank trench is still partially open and therefore more susceptible to erosion (**Fig. 4**).

SGNAS 92 (EAMENA-0134445) – Late Neolithic and/or Chalcolithic ScatterName(s): Southern *Ghawrs* and Northeast 'Arabah Archaeological Survey site 92 (SGNAS 92)

MEGA-Jordan number: 4075 (JADIS 1903.037)

Location: 35.461656 E, 30.929588 N (Low)

Location notes: Described by the SGNAS as located south of the Wādī Fīfā, just east of the main road, in a ploughed field (MacDonald 1992: 258). It is therefore likely located in the agricultural fields to the west rather than on the *wadi* banks and outcrops to the east. This location could not be confirmed during our site visit, but where the site is estimated to be (or have been) is on the edge of the Dead Sea plain farm land, where low hills start to rise up.

Description: Scatter of some (4) Late Neolithic, many (69) Late Neolithic/Chalcolithic, and 7 Chalcolithic sherds and small stone piles (MacDonald 1992: 258). Currently nothing is visible in the identified location (which may be incorrect) (**Fig. 5**).

Condition: The survey report states that the site could have been substantially damaged/partly destroyed by agriculture (ploughing) by the time of visit in 1985/86. It was not possible to visit the location for very long, but there were certainly no stone piles in the field which is the most likely candidate for the site, and no artefacts were seen. The field seems to have been landscaped and traces of bulldozing were visible; the area is currently in agricultural use (**Fig. 5**). If the site was indeed at this location, it is likely destroyed, unless occupation remains were present at a considerable depth.

Wādīs Fīdān and FaynānSGNAS 21 (EAMENA-0134446) – Multi-period Findspot, FieldsName(s): Southern *Ghawrs* and Northeast 'Arabah Archaeological Survey site 21 (SGNAS 21)

MEGA-Jordan number: 8561 (JADIS 1800.019)



Location: 35.390661 E, 30.67085 N (Low; site could not be reached so location not checked)

Location notes: The site was described as being on the south side of the Wādī Fīdān and partly in a side *wadi* (MacDonald 1992: 251).

Description: Agricultural fields with retaining and/or terrace walls, possible an aqueduct, and remains of dams in a side *wadi*, likely of later date (Early Bronze Age and Nabataean sherds were found), but with several Late Neolithic sherds (MacDonald 1992: 251).

Condition: This site could not be reached because of active dam construction works (**Fig. 6**). As the site is described as being along the south side of the *wadi* by MacDonald (1992: 251), it might have been completely destroyed by bulldozing and large-scale earth removal for the dam. However, it might be (partly) located in the area that was (at least at 14 October 2018) still preserved (**Fig. 6** [APAAME\_20181014\_MND-0671]). The Late Neolithic site may have



4. Eroded section of the 'tank trench' at *adh-Dhīrā*, originally twice as deep. Looking east (Photo: EAMENA/Pascal Flohr, 30 September 2018).



5. Possible location of SGNAS 92. Only a field is visible. Looking west (Photo: EAMENA/Pascal Flohr, 30 September 2018).

already been seriously damaged by later prehistoric and Nabatean activity. In either case, the area is severely threatened by the dam works and subsequent flooding.

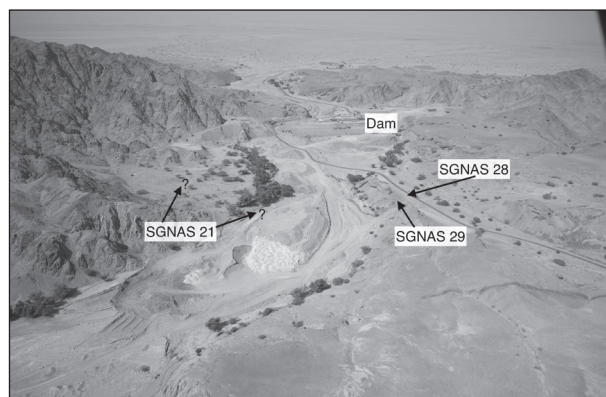
#### SGNAS 29 (EAMENA-0134588) – Late Neolithic + Chalcolithic Scatter and Caves

Name(s): Southern *Ghawrs* and Northeast 'Arabah Archaeological Survey site 29 (SGNAS29) MEGA-Jordan number: 8560 (JADIS 1800.017) Location: 35.390273 E, 30.672255 N (Definite)

Location notes: On an outcrop where a side *wadi* meets the Wādī Fīdān (**Fig. 6**).

Description: Identified by the SGNAS survey as a dense scatter on a steep slope, with probably robbed graves, and ash and bone on the slope (MacDonald 1992: 252). Identified as multi-period by the SGNAS team (Late Neolithic, Late Neolithic/Chalcolithic, Chalcolithic, Chalcolithic/EB, Iron Age, Late Byzantine and Islamic). This was confirmed by our site visit: there was definitely prehistoric chipped stone present, plus many later ceramics, probably (also) associated with SGNAS 28. There were caves on top of the steep slope, which might be where the graves mentioned by the SGNAS were located (**Fig. 7**).

Condition: The site is currently in a fair condition, although the caves upslope were not investigated. They were reported to have been robbed (MacDonald 1992: 252). The scatter is present on a steep slope, and presumably washed down (**Fig. 7**). The artefact scatter site is under severe threat of dam works and subsequent flooding, although the caves/tombs might remain above water.



6. Location of SGNAS 28 and 29 and possible locations of SGNAS 21, with recent dam works (Photo: Aerial Archaeology in Jordan/Matt Dalton, APAAME\_20181014\_MND-0671, 14 October 2018).



7. SGNAS 29. Steep slope with caves on top and dense scatter on the slopes, looking southwest (Photo: EAMENA/Pascal Flohr, 30 September 2018).

### SGNAS 28 (EAMENA-0134589) – Classical Period Field System

Names(s): Southern *Ghawrs* and North-east ‘Arabah Archaeological Survey site 28 (SGNAS 28), Raikes’ Site H

MEGA-Jordan number: 3909 (JADIS 1800.018)

Location: 35.390083 E, 30.672277 N (Definite)

Location notes: Adjacent to SGNAS 29, with their scatters overlapping. In the valley bed and banks, where a side *wadi* enters the Wādī Fīdān from the northeast (see **Fig. 6**).

Description: This is a later period (Iron Age and Nabatean/Early Roman pottery) site directly adjacent to SGNAS 29, consisting of agricultural fields (MacDonald 1992: 252). Although there is no Late Neolithic present as such, the site was visited because of its close proximity to SGNAS 29 and the severe threat of dam works. A terrace or retaining wall, presumably part of the field system, was clearly visible running roughly W-E, and has been partly uncovered by an archaeological excavation which appears to have been conducted relatively recently (**Fig. 8**). According to the SGNAS description there are multiple such walls present, but these were not obvious at the time of the visit (which was focused on the Late Neolithic, so did not look closely for the SGNAS 28 walls). A dense scatter of sherds is present; it is not clear where the scatter SGNAS 29 ends and the SGNAS 28 scatter starts.

Condition: The current condition of the site was fair, with the terrace/retaining wall still standing. However, it is under threat of the current dam works and subsequent flooding. The area has been disturbed already by a bulldozed

track and by a road through the *wadi* bed. This was further developed between our visit on 30 September and 14 October, probably in relation to the dam works (e.g. APAAME imagery of 14 October [**Fig. 6**]).

### Tall Wādī Faynān (EAMENA-0122093) – Late Neolithic Settlement Site

Name(s): Tall Wādī Faynān, WF25

MEGA-Jordan number: n/a

Location: 35.477915 E, 30.627119 N (Definite)

Location notes: Cut by the Wādī Faynān, close to the confluence with the Wādī Khālid (Najjar *et al.* 1990).

Description: This later Late Neolithic site was excavated in 1988 (Najjar *et al.* 1990). Up to 2.5m-deep deposits, 120m long in the *wadi* section (Najjar *et al.* 1990: 29). Three phases on top of virgin soil were revealed in a 5×5m trench (**Fig. 9**) and in the section: Late Neolithic, Chalcolithic and Roman-Byzantine agricultural. A rectilinear stone structure belongs to the Late Neolithic phase. Radiocarbon-dated on charcoal (so there could be old-wood effect), earliest dates available were during second half of 6<sup>th</sup> millennium BC.

Condition: In poor-fair condition. Deflated top in places, owing to erosion, and parts of the site have eroded into the *wadi* (Najjar *et al.* 1990). The site remains on the edge of the *wadi*, so erosion keeps being a threat. For example, the 1988 trench was set several meters back from the edge (Najjar *et al.* 1990: Fig. 2), but is now on the edge (**Fig. 9**). The site was not backfilled, so remains are visible but sensitive to erosion. The trench is on the edge of modern, intensively worked fields, and the site probably extends below these fields. Modern agriculture and irrigation (especially water ponds) represent active threats.

### Wādī al-Ḥasā

#### WHS 524 (EAMENA-0122649) – Late Neolithic Settlement Site

Name(s): Wādī al-Ḥasā Survey site 524 (WHS 524), Khirbat adh-Dharīḥ Survey Site 49 and 119 (DH 49 and 119), Khirbat adh-Dharīḥ II

MEGA-Jordan number: 9994 (JADIS 2013.200)

Location: 35.703569 E, 30.911805 N (location of trenches; Definite)

Location notes: The site overlooks the Wādī



al-La‘bān, a large side *wadi* of the Wādī al-Ḥasā. It is cut by the main road; what remains of the site is to the west of the road.

Description: This site was identified in the 1980s by both the Wādī al-Ḥasā Survey and the Khirbat adh-Dharīḥ Survey, who both concluded the site was a Pottery Neolithic A site (Bossut *et al.* 1988; MacDonald 1988). It was made visible by a road cut, and the exposed sections were studied and trenches dug. Ash layers, lithics, ceramics, bone, burnt stones and ground-stone tools were observed in the road-cut (MacDonald 1988: 129), and can still be seen in the section. Trenches excavated in 1993 confirmed an early Late Neolithic (PNA) date and yielded architectural remains (Bossut and Kafafi 2005). The site stretches for about 200m roughly N-S along the *wadi*, and is about 25m wide (Bossut and Kafafi 2005).

Condition: The site has been almost completely destroyed by the road (Fig. 10). It had already been severely damaged by the road at the time of the first visit in 1979, and was thought to have been possibly completely destroyed by road works by 1982 (MacDonald 1988). However, the adh-Dharīḥ Survey team found a presumably additional part of the site in 1987. Subsequent road widening damaged the site further, but parts of it were still intact in 1993 when archaeological rescue trenches were dug (Bossut *et al.* 1988; Bossut and Kafafi 2005). During the 2018 visit these trenches were still visible (Fig. 10), so the road appears not to have been substantially widened since 1993 in this place; however, we only observed remains over about 40 metres, while Bossut and Kafafi (2005) mention 200m (although probably not anymore continuous at that date). As remarked by Bossut and Kafafi, and confirmed by our site visit, the site is relatively narrow (about 25m [Bossut and Kafafi 2005]), and is in its east-west extent mostly destroyed by the road with only a narrow (few metres) strip preserved in some places in the west. The road section and trenches have been heavily eroded and are affected somewhat by vegetation. As it will be difficult to consolidate the section and there is a further risk of road widening, it would be best if the remainder of the site was to be excavated before the section collapses and/or the road is further widened.



8. SGNAS 28 (with 29 in background). The wall can be seen in the archaeological trench. A cave, possibly part of SGNAS 29, in the background. Looking south (Photo: EAMENA/Pascal Flohr, 30 September 2018).



9. Tall Wādī Faynān. 1988 excavation trench, now on the edge of the *wadi*. Looking east (Photo: EAMENA/Pascal Flohr, 30 September 2018).



10. WHS 524, almost completely destroyed by the road. Heavily eroded archaeological remains visible in the photo, from about where the tree is at the left (former excavation trench here) to where the hill is cut back (Photo EAMENA/Pascal Flohr, 1 October 2018).



WHS 307 (EAMENA-0122431) – Late Neolithic Settlement

Name(s): Wādī al-Ḥasā Survey site 307 (WHS 307), Rās as-Sīq

MEGA-Jordan number: 5511 (JADIS 2204.003)

Location: 35.736263 E, 30.963617 N (Definite)

Location notes: The site is located on the slopes directly south of the base of the Wādī al-Ḥasā, just west of the gate house for the modern at-Tannūr dam, above a pool in the *wadi*. MacDonald (1988) and Clark (1992) describe an upper part of the site on two knolls separated by a small *wadi*, and a lower part on the floodplain; we only observed remains on one knoll and none on the floodplain (**Fig. 11**), although we cannot rule out that we missed something during our brief site visit.

Description: The site was identified during the Wādī al-Ḥasā Survey of 1979-1983 with the main occupation being Late Neolithic, with Middle Palaeolithic, Nabataean, Roman and Byzantine material (Clark 1992; MacDonald 1988); we noted Neolithic and Classical period material during our visit. The survey team described the site as having remains of walls and a chipped-stone and pottery scatter (Clark 1992; MacDonald 1988), and we observed both the artefact scatter and a curvilinear wall in 2018. The Wādī al-Ḥasā Survey also observed a 90m linear feature of unshaped stone, possibly a wall, running from the slopes and over the lower segment of the site and they mention stone circles on the lower part; we did not observe these features.

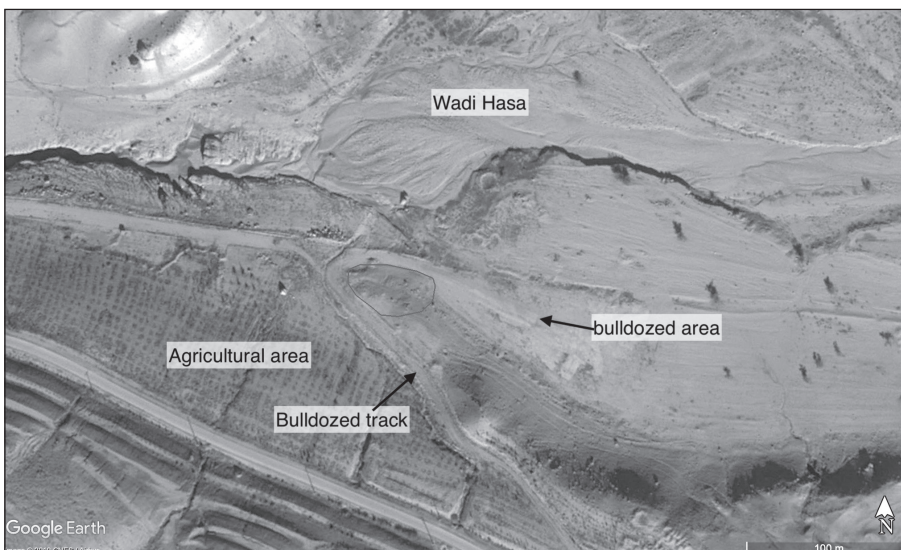
Condition: We did not observe remains on

the lower part of the site, where there has been recent bulldozing. During the site visit we assumed that the bulldozing had been restricted to the fringes of the site, but given that the Wādī al-Ḥasā Survey recorded remains in this area it is possible that this part has been destroyed since the 1980s. A longer site visit recording the whole area in more detail is needed, combined with sub-surface survey. The remaining portion of the site on the slopes is located between agricultural fields; we did not note a clear *wadi* in between the preserved remains, so it is possible that the second knoll described by the WHS has been affected too, but again this would need to be confirmed. On the agricultural fields surrounding the currently visible archaeological remains, landscaping appears to have taken place and vegetation planted; the flat area close to the *wadi* has been ploughed (e.g. Google Earth CNES / Airbus 10/8/2013). The lower portion of the site is probably occasionally affected by flooding (Google Earth CNES / Airbus 3/1/2017 might show post-flooding conditions [**Fig. 11**]). At the moment the situation appears stable, with no obvious change in condition or land use between 2013 and 2018 (Google Earth CNES / Airbus 10/8/2013 and DigitalGlobe 12/7/2018).

WHS 149 (EAMENA-0122272) – Neolithic Settlement

Name(s): Khirbat al-Ḥammām, Abū Ghurāb, Wādī al-Ḥasā Survey site 149 (WHS 149)

MEGA-Jordan number: 10036 (JADIS 2104.039)



11. Satellite image with the location of WHS 307. The blue shape indicates the area where we observed archaeological remains during the 2018 site visit; the original area was probably larger (Google Earth CNES / Airbus 3/1/2017).

Location: 35.666088 E, 30.984165 N (Definite)

Location: On a *wādī* terrace on the south side of the Wādī al-Ḥasā, near a junction with a relatively large *wādī* coming from the north. The area is rich in agricultural fields and is close to hot springs (Fig. 12).

Description: The site was located by the Wādī al-Ḥasā Survey, who collected eight Late Neolithic sherds, along with Epipalaeolithic and Early Neolithic lithics (MacDonald 1988). During excavations in 1999 only Pre-Pottery Neolithic B stratified remains were found in a 2×0.5-1.0m test trench (Petersen 2003), but this small-scale excavation does not exclude Late Neolithic occupation elsewhere on the site.

Condition: The Wādī al-Ḥasā Survey (1979-1983) reported that the site had been cut by the road and was farmed with erosion channels also visible (MacDonald 1988). Between a visit by Petersen in 1992 and the 1999 excavations, a large circular machine-dug depression had been

created, and irrigation reservoirs, a pump and bulldozed dirt tracks had appeared (Petersen 2003: 117). At the time of our site visit, the road was still there, with the road cut continuing to erode (Fig. 13). The site was also still under cultivation, with related disturbances such as trees, shrubs and crops (Fig. 13). Terracing is present (Fig. 13); it is unknown when this was created, but based on the imagery it has been present since at least 2010 (Google Earth Digital Globe 8/9/2010). A shack is present on top of the site; this was built between 2013 (Google Earth CNES / Airbus 10/8/2013) and 2016 (Google Earth CNES / Airbus 29/10/2016). It probably does not do much damage. While the farming and associated activities will continue to damage the site, the farmer insists he will not be undertaking any further major work and the site appears relatively stable with no extensive excavation having occurred recently, but the possibility remains a threat to the archaeology.



12. View from WHS149 (Khirbat al-Ḥammām), with estimated site extent in blue, showing the area is agriculturally rich (Photo: EAMENA/Pascal Flohr; 1 October 2018).



13. WHS 149 on a satellite image, showing the disturbance by the road and especially agriculture (terraces; reservoirs; crops) (Google Earth, DigitalGlobe 29/10/2016).

WHS 427 (EAMENA-0122551) - Mill

Name(s): Wādī al-Ḥasā Survey site 427 (WHS 427)

MEGA-Jordan number: 10950 (JADIS 2204.029)

Location: 35.772632 E, 30.955294 N (Definite)

Location: Southern banks of Wādī al-Ḥasā close to the main road where it crosses the *wādī*.

Description: This is not a Neolithic site but as it appears about to collapse we decided to document its current state while we were present. It is a penstock shaft mill, with the sluice and mill tower partially intact, but the mill building is reduced to rubble (Fig. 14). Part of

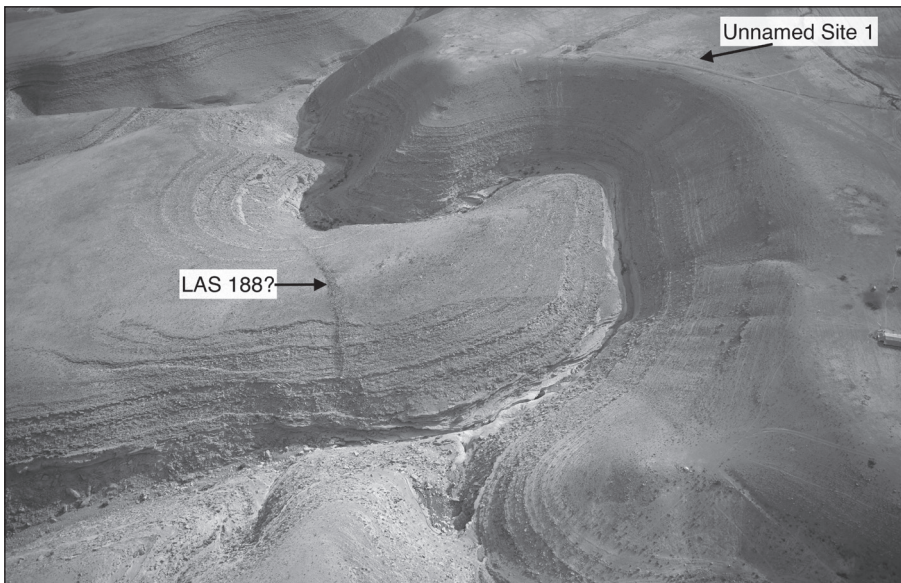


the conduit is still present. The mill was one of twelve watermills recorded by the Wādī al-Ḥasā Survey (MacDonald 1988: 286-288). The dating of the mills remained uncertain, but they were thought to be possibly Roman-Byzantine, as - among other things - implied by associated pottery at some of the sites (MacDonald 1988: 288). On the other hand, such mills continue to be used and built until they were replaced by diesel mills in the 20<sup>th</sup> century (Gardiner and McQuitty 1987).

Condition: The site is very unstable; it is undercut, possibly by water action, and a large crack is present in the shaft (**Fig. 14**), which is likely to collapse soon. The stones have eroded and it appears structural robbing has taken place. Smaller disturbances are caused by burning (presumably picnic fires), while a tree is growing through the conduit, its roots likely causing damage.



14. WHS 427, penstock mill with shaft still standing but mill building reduced to rubble (Photo: EAMENA/Pascal Flohr, 1 October 2018).



15. Possible location of LAS 188 and location of the new findspot (Unnamed Site 1) (Photo: Aerial Archaeology in Jordan/Matt Dalton, APAAME\_20181014\_MND-0146, 14 October 2018).

*al-Karak Plateau*

LAS 188 (EAMENA-0134416) – Late Neolithic Settlement

Name (s): Limes Arabicus Survey site 188 (LAS 188), LAS Field #529

MEGA-Jordan number: 6490 (JADIS 2307.057)

Location: 35.870625 E, 31.253203 N (Low)

Location notes: At the end of a ridge above a deeply incised *wadi*. The site is described as being located above a meander bend of the Wādī abū Shā'ir, with many rock shelters beneath the site and a wall closing off the site to the north (Clark *et al.* 2006: 73). On the imagery it was difficult to identify the location of this site with certainty; an area cut off by a wall or natural linear feature can clearly be seen, but no internal features could be distinguished. Unfortunately the site could not be reached within the time available, and we only visited the other side of the very steep and deeply incised *wadi*. This did not solve the issue of location confirmation, as the same could be seen as on the imagery: that a wall (or wall-like feature) closed off the knoll, but no internal features as described in the survey report could be seen. This was further confirmed by APAAME imagery taken in the weeks after our site visit (**Fig. 15** [and other APAAME images taken that day]).

Description: The site was identified by the Limes Arabicus Survey team (Clark *et al.* 2006; Parker 2006), who described the site as a Late Neolithic village site with stone-constructed circular structures, albeit with a shallow occupation-debris depth, closed off by a wall (Clark



*et al.* 2006: 73). As many as 40 Late Neolithic lithics were found, but no ceramics. From our position at the other side of the *wadi* we could see a feature which could be the wall isolating the promontory, although without visiting the actual site we cannot be certain it is not natural. No other clear structural remains could be observed from our point, or on the satellite and aerial imagery (**Fig. 15**).

Condition: If the site is indeed in this location, it appears to be in a stable condition (Google Earth CNES / Airbus 31/12/2004 to Digital-Globe 14/3/2018, APAAME imagery 2007 and 2018, field visit 2018). There may have been erosion into the deeply incised *wadi*, depending on how close to the edge the site reaches. It is possible that the structures described by the LAS have been destroyed by human or natural factors since the survey team recorded the site in 1985, but this needs to be confirmed on the ground.

#### Unnamed Site 1 (EAMENA-0135554) – Neolithic Findspot

Name(s): n/a

MEGA-Jordan number: n/a

Location: 35.874208 E, 31.252654 N (Definite)

Location notes: Opposite (south) side of *wadi* from the potential location of LAS 188, near an electrical sub-station and the track leading to this (**Fig. 15**). On the edge of the now deeply incised *wadi*.

Description: Interestingly, chipped stone was found in the area of our vantage point when observing LAS 188. This was probably Neolithic in date (not PPNB but not otherwise diagnostic), although based on field observations only.

Condition: The newly found scatter is on the side of the *wadi* with more modern activity, as the area appears frequently used by seasonal agriculturalists and/or pastoralists. The scatter is mainly affected by the track going through or very near it and is in a ploughed field.

#### Unnamed Site 2 (EAMENA-0135555) – Neolithic Findspot

Name(s): n/a

MEGA-Jordan number: n/a

Location: 35.877503 E, 31.249257 N (Definite for findspot)

Location notes and description: About 450m

southeast of the unnamed site 1, and about 750m southeast of the suspected location of LAS188, on the track, chipped stone of probably Neolithic age was found in a bulldozer cut (**Fig. 16**). No traces of architecture or even of a substantial chipped-stone concentration were found, but the remains appear more or less *in situ*.

Condition: A possible site might have been destroyed by bulldozing, or there were always only a few occasional pieces present. Bulldozing was related to the field.

#### LAS 170 and 172 (EAMENA-0134833 and EAMENA-0086180)

Name(s): Limes Arabicus Survey sites 170 and 172, LAS Field #800A and B, ASKP Site 225

MEGA-Jordan number: 5554, 11006 (also 12222?)

Location: 35.828290 E, 31.214444 N (GPS point in large circle on top of hill; cairns and scatter continue north to and across *wadi*)

Location notes: While trying (unsuccessfully) to locate site LAS 164, we came across a concentration of stone circles and cairns. These are most likely sites LAS 170 and 172, with LAS 171 just to the west (Clark *et al.* 2006). On a basalt outcrop just north of the al-Qaṭrānah-al-Karak road, overlooking the *wadi* to the north and west (*wadi* meander). A large modern farm is present just to the east, partially on top of the site. The concentration of circles is present on top of the outcrop, with cairns spread over the slopes towards the *wadi* and on the *wadi* terraces. Near the *wadi* base some more sherd and chipped-stone scatters are present, including a sparse scatter near a cave across the *wadi*.



16. Location of Neolithic findspot (Unnamed Site 2) in bulldozer earth. Looking west (Photo: EAMENA/Pascal Flohr, 2 October 2018).

Description: cluster of stone structures (circles/sub-circles) (**Fig. 17**), as well as many cairns which are probably graves from various periods; this is LAS 170. Site LAS 172 is a long north-south wall, which appears to end at the edge of the *wadi* and extends almost 2km to the south (based on satellite imagery; now only partially preserved).

Condition: Most of LAS 170 appears preserved, although the area is cut by agricultural fields and a reservoir to the east (**Fig. 17**). LAS 172 (the wall) and some cairns have been damaged by this development, especially by bulldozing to create a modern field boundary. Based on imagery the reservoir was dug between 2013 and 2015 (Google Earth CNES / Airbus 15/6/2012 and 13/3/2015), while the clearance bulldozing of the wall appears to have been done between 2013 (Google Earth CNES / Airbus 18/3/2013) and 2017 (Google Earth



17. Large stone circle, probably part of LAS 170. Farm to the east (left in photo), road and factory to the south (Photo: EAMENA/Pascal Flohr, 2 October 2018).



18. Area where we thought LAS 27 was located and where another scatter and terrace walls and check dams were present. Looking northwest over the wadi junction with terrace walls all around (Photo: EAMENA/Pascal Flohr, 5 October 2018).

CNES / Airbus 1/12/2017). Farm development including bulldozing for landscaping, excavation for reservoir, and building of farmhouse and tracks to reach fields, all between 2012 and 2015, with additional clearance between 2015 and 2017. The farm landscaping and construction work appears finished for now, but it cannot be excluded that the fields will be extended at some point.

‘LAS27’ (EAMENA-0133962) – Scatter, Terrace Walls, Check Dams

Name(s): wrongly identified as Limes Arabicus Survey site 27 (LAS 27)

MEGA-Jordan number: 5616 (JADIS 2208.004)

Location: 35.790018 E, 31.381600 (Definite)

Location notes: The location we had for LAS 27 was based on the one given in MEGA-Jordan. When studying the LAS maps (Parker 2006) more closely afterwards, it appeared that this location is not in fact LAS 27, which is situated much further east. The currently described site (so not LAS 27) is located in rolling fields south of Mādabā and south of Wādī al-Mūjib in a field north of a minor west-east road and southwest of a *wadi* junction. The field is sloping northeast towards this junction and has a shallow SW-NE gully (**Fig. 18**).

Description: Two scatters, very restricted in size. The main (eastern) scatter is present at the head of a shallow NE-facing gully (as in the description of the real LAS 27 (Clark *et al.* 2006: 57), but in contrast to LAS 27 it contains both pottery and lithics from a variety of periods. It includes a probably Late Neolithic retouched flint tool and later pottery. The scatters are in close association with currently maintained terrace walls containing redeployed architectural stone; worked masonry is present. At least 0.5m of soil is retained by these terrace walls. There are also badly eroded check dams in the gully which are not currently maintained. It is possible the chipped stone and pottery come from rubble taken from elsewhere to fill the gully and might therefore not be *in situ*. What appear to be old terrace walls are visible across the *wadis* to the north and east (**Fig. 18**).

Condition: The terrace walls and check dams are affected by water action and continued use (maintenance; structural alteration). The scatter is also affected by the water running through



the gully, but more so by ploughing. The artefacts were potentially brought in from elsewhere as there is some evidence that material has been dumped. In the northwest of the field some modern excavation has been undertaken, possibly to dig or maintain a well, but this probably did not affect the main scatter.

### **Between Mādabā and the Dead Sea (Mount Nebo Area)**

#### *Wādī Kanīṣah*

The Wādī Kanīṣah was surveyed by Peder Mortensen and his team as part of the Mount Nebo survey in the 1990s. Only the Palaeolithic and Neolithic periods of the Mount Nebo survey have been published so far (Mortensen *et al.* 2013), but from this, in combination with APAAME photos and MEGA-Jordan, it is clear that the area is archaeologically very rich. The Neolithic sites are concentrated in the middle part of the *wadi*, where the monastery of Theokotos is present (APAAME flight of 14/4/2013; EAMENA-0135616). One Early Neolithic and two Late Neolithic settlement sites were reported, although the two Late Neolithic ‘sites’ were probably part of a single habitation site or site cluster (Mortensen *et al.* 2013). Sherds with incised herringbone pattern are present, so the site(s) seems early Late Neolithic (Yarmoukian). In addition there were multiple Early Neolithic scatters and findspots.

#### MN 329 (EAMENA-0133882) – Late Neolithic Settlement

Name(s): Mount Nebo survey site 329 (MN329)

MEGA-Jordan number: n/a

Location: 35.708378 E, 31.753868 N (Definite)

Location notes: Directly north of the local road, north of the *wadi* on a terrace (now a series of agricultural terraces).

Description: A small (30×40m), low (*ca* 1m high) *tall* was found during the Mount Nebo survey in 1993 (Mortensen *et al.* 2013: 120–121). An ashy layer was seen, and a considerable concentration of chipped stone and pottery dating to the Late Neolithic period found. The material included sherds with incised herringbone pattern, indicating a presence during the earlier part of the Late Neolithic. During the 2018 site visit we observed chipped stone, including many flakes, which is in agreement

with a Late Neolithic date, although by themselves not diagnostic. Interestingly there was also chipped stone that could be PPNA in date. No ceramics were observed in 2018. The farmers living on the upper terraces found a piece of plaster.

Condition: The site appears to have been recently destroyed by bulldozing for agricultural purposes (**Fig. 19**). In September 1993 the site appeared largely intact and undisturbed (Mortensen *et al.* 2013: Fig. 91). Probably by December 2004 (Google Earth CNES / Airbus 31/12/2004) but certainly by March 2006 (Google Earth DigitalGlobe 21/3/2006) the site was demarcated by a stone wall and prickly-pear fence (Mortensen *et al.* 2013: Fig. 91 [this photo dates to 2008]). It might have been around this time that the site was terraced. By 2008 at the latest, mature trees were present on the lower terrace and younger trees had been planted on the upper terraces (Google Earth DigitalGlobe 24/5/2008). The area continued to be used in the same way until at least 2013 (Google Earth CNES / Airbus 24/05/2013 and APAAME 14/04/2013 [e.g. APAAME\_20130414\_MND-0400]). However, by March 2018 the trees and fence had been removed (Google Earth DigitalGlobe 14/3/2018), probably by bulldozing, resulting in the bulldozed fields and likely completely removal of the site, as observed during the field visit at 30/9/2018. The backslopes of the terraces have been cut by *ca* 1m, with most of the archaeological artefacts found at the front of the terraces, presumably moved there by the bulldozing.



19. MN 329, (almost) completely destroyed by agricultural bulldozing (Photo: EAMENA/Pascal Flohr, 30 September 2018).



MN 423 (EAMENA-0133883) – Late Neolithic Settlement

Name(s): Mount Nebo survey site 423 (MN423)

MEGA-Jordan number: n/a

Location: 35.707007 E, 31.751373 N (Low)

Location notes: This site is present south of the *wadi*, on a plateau near the *wadi* bed, opposite MN 329; it was thought to be part of the same habitation cluster (Mortensen *et al.* 2013: 117, 121). In contrast to MN 329, this site could not be unequivocally found in 2018. The location we visited was based on the original photograph (Mortensen *et al.* 2013: Fig. 95), although the site might be lower down towards the *wadi* (this location could not be reached). Above this location, just south of the road, undiagnostic chipped stone was found in an agricultural field, which is therefore the most likely candidate (**Fig. 20**) (it is a plateau; however this was not overgrown in the photo in Mortensen's report, while the text states the site was).

Description: The Mount Nebo survey team found a collection of Late Neolithic pottery and chipped stone on what is probably a small (*ca* 50×50m) low *tall*, contemporary with MN 329 material (Mortensen *et al.* 2013).

Condition: If the site is indeed in the location near the current road, it appears to have been destroyed by agricultural activity. The slope was already terraced in September 1994 (Mortensen *et al.* 2013: Fig. 95), and it is clear from remote-sensing imagery that it continued to be used for agriculture. Towards the west it was further affected by bulldozing between 2006 and 2008 (see below; this mostly affects another site). The field where the chipped



20. MN 423 seen from across wadi, looking south. The location where chipped stone was found in the field adjacent to the road is indicated (Photo: EAMENA/Pascal Flohr, 6 October 2018).

stone was found during our visit was certainly used for agriculture by 2006, and definitely by 2008, with evidence for ploughing and crops on the imagery (*e.g.* Google Earth DigitalGlobe 24/5/2008). The site might also have been cut by the road, which existed as a bulldozed track in 1994 (Mortensen *et al.* 2013: Fig. 95). The road was widened after 2006 (Google Earth DigitalGlobe 21/3/2006, compared to CNES / Airbus 24/5/2013) and asphalted between 2013 and 2018 (Google Earth CNES / Airbus 24/5/2013 and DigitalGlobe 14/3/2018).

MN Unknown Number (EAMENA-0135618) – Classical Site

Name(s): Unknown

MEGA-Jordan number: n/a

Location: 35.705517 E, 31.751168 N (Definite)

Location notes: Near the probable location of MN 423, just west along the road, north of the road and likely cut by it.

Description: A dense scatter of what appears to be Roman, or at least Classical, pottery was found. There appears to be a low '*tall*', slightly cut by the road. This has probably been recorded by the Mount Nebo survey. We quickly recorded this site because of its close proximity to MN 423; it is most likely another site, but until we know for sure where MN 423 is exactly it cannot be excluded that these two are the same.

Condition: The site is in a poor condition. What is probably its southern edge has been cut by the road. A small building is present on top, and there has been extensive digging on the top and side of the '*tall*', probably in relation to agriculture. Satellite imagery shows that the area directly northeast was landscaped (bulldozed) for agriculture between 2006 and 2008 (DigitalGlobe 14/6/2006 and DigitalGlobe 24/05/2008).

MN 526 (EAMENA-0133884) – Late Neolithic scatter

Name(s): Mount Nebo survey site 526 (MN 526)

MEGA-Jordan number: n/a

Location: 35.733737 E, 31.778972 N (Low certainty for MN 526; definite location of observed scatter)

Location notes: In 'Uyūn Mūsā. Described by Mortensen *et al.* (2013: 121) as next to the

Church of Kayanos. We did not know where this church is exactly; it is sometimes described as close to the Church of Deacon Thomas, which is clearly present *ca* 160m southeast of the currently identified site. We looked throughout the agricultural area here (mainly olive groves). Older (20<sup>th</sup>-century, Ottoman?) farms are present, with frequent remains of apparently Classical period, such as occasional sherds and architectural remains. Near a low hill, which could be the low *tall* described by Mortensen *et al.*, a concentration of sherds and prehistoric chipped stone was found on and near the track to the south of it (Fig. 22).

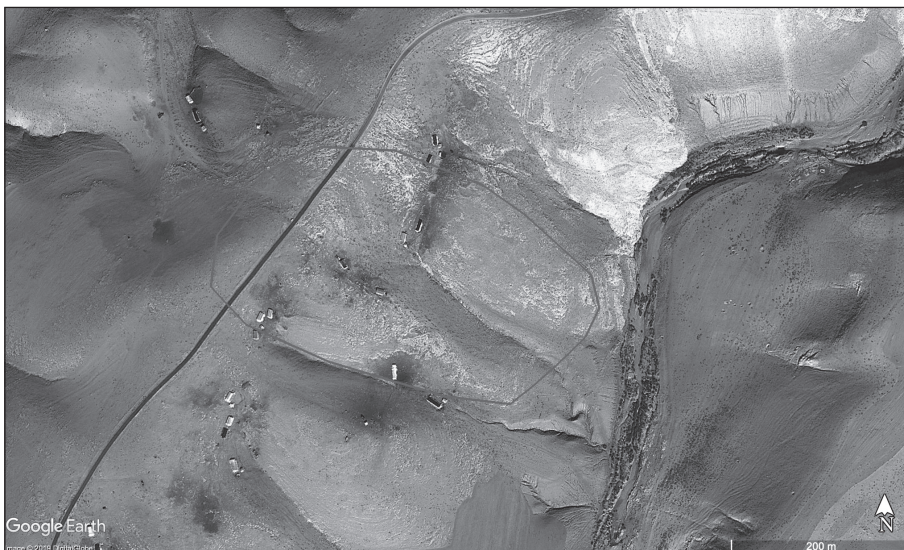
Description: Mortensen *et al.* (2013: 121) describe a low *tall* with a scatter of sherds and flint of Late Neolithic date. During our visit, we did not find clearly Late Neolithic material, but a scatter of prehistoric chipped stone was present together with later pottery, certainly including Byzantine, and probably also Roman,



21. 'Uyūn Mūsā, with the possible *tall*, possibly MN 526. Taken from the Dayr of Deacon Thomas, looking west (Photo: EAMENA/Pascal Flohr; 6 October 2018).

material. This was present next to what could be a *tall*, but perhaps only a natural hill, which could only partially be accessed owing to modern fencing (Fig. 21). On this hill/*tall*, there are (recent) terrace walls which include ashlar masonry.

Condition: The site was described by Mortensen *et al.* (2013: 121) as having been destroyed by ploughing and other agricultural activities at the time of the survey in the 1990s. Indeed the entirety of the 'Uyūn Mūsā groves are heavily affected by agriculture, with olive trees widespread, and (bulldozed) tracks running through. On the low hill which might be the location of MN 526 there has been a lot of agricultural activity: terrace rebuilding; bulldozing; road construction (tracks, and tarmacking of these); olive and vine planting and growing; ploughing; an irrigation system; construction of buildings (Fig. 21). These were observed on imagery as well as in the field and are ongoing. Based on imagery, these appear to have increased substantially after 2006. The area inside the fence could not be visited, but it appears an older (roofless) building was present here until 2014 (Google Earth DigitalGlobe 19/7/2014), but has been destroyed since (Google Earth DigitalGlobe 14/3/2018). The modern construction on top of the hill/*tall* has been there since before 2006 (Google Earth DigitalGlobe 21/3/2006). Notwithstanding the extensive disturbances, if the site is indeed a low *tall*, the lower layers might be preserved, although they would be disturbed by the tree roots.



22. Umm Mashraṭ satellite image (Google Earth, DigitalGlobe 23/12/2012), showing the estimated area of Neolithic remains at Umm Mashraṭ with eroded gullies/wadis, the road and modern seasonal occupation.



Church of Deacon Thomas (EAMENA-0134597) – Byzantine Church

Visited because close by MN 526.

Name(s): the Church/Monastery (*Dayr* or *Deir*) of Deacon Thomas

MEGA-Jordan number: 58774

Location: 35.735785 E, 31.778426 N (High [coordinates from Google Earth])

Description: Building standing (or reconstructed) to about 2 metres high, clearly associated with Byzantine pottery, and identifiable as the *Dayr* of Deacon Thomas (MEGA-Jordan). The northern room contains the church; there are two rooms to the south of this. No other buildings or rooms are standing.

Condition: The site is registered in MEGA-Jordan and well known. Conservation work has taken place. The site has been researched and mosaics (and presumably other finds) have been taken to the museum. The site, or at least the main, standing building, is not affected by agricultural activities or the road. There is graffiti on the walls, some rubbish has been dumped by visitors and looting pits are present. Some plants are growing in the building and in the walls. Nonetheless, the condition of the site is probably relatively stable, although the threat of looting, more graffiti and ongoing effect of vegetation continues.

Near MādabāUmm Mashrat (EAMENA-0135621) – Late Neolithic Settlement

See also EAMENA-0134425 to EAMENA-0134428

Name(s): Umm Mashrat/Meshrat (I and II), Wādī ath-Thamad Regional Survey Site/Wādī ath-Thamad Survey Site 40, 95, 96, 97, 104 and 105 (WT-40, WT-95, WT-96, WT-97, WT-104, WT-105)

MEGA-Jordan number: 11556, 11557, 5945

Location: 35.895175 E, 31.586354 N (Definite)

Location notes: Stretching from a ridge where a modern tarmac road is present over relatively steep slopes towards the *wadi* (Fig. 22). The slopes are separated by a deep gully. The area is within a depression forming a catchment area (Foley and Foley 2008).

Description: Group of six or more ‘sites’ identified by the Wādī ath-Thamad survey, all noted to be Late Neolithic, and probably

forming a single Neolithic occupation area (Foley and Foley 2008). The area was identified by the Wādī ath-Thamad Project survey in 1998 and 2001; surface recording was conducted and small probes and trenches were excavated in 2001 and 2004 (Cropper *et al.* 2003; Foley and Foley 2008). A considerable number of sub-circular and circular structures and linear wall lines are present in different areas of the site (28 identified on the surface of Umm Mashrat II), in combination with parts of mud-plaster floors, at least one hearth, and cupholes (Cropper *et al.* 2003; Foley and Foley 2008). A burial was found under a mud surface (Foley and Foley 2008). Sherds include examples characteristic of Yarmoukian as well as Jericho IX type (Cropper *et al.* 2003). The lithics are predominantly flakes, with many burins present (Foley and Foley 2008; also our field observations). Interestingly, none to very few sickle blades, axes, adzes or ground-stone tools were found, indicating limited cereal processing. With the many ovicaprid bones and lack of game (Foley and Foley 2008), the site’s inhabitants appear to have focused on pastoralism.

Condition: the site(s) appear to be in a fair condition. The area, especially the slopes, have been much affected by erosion and a substantial gully runs through the site (Fig. 22). Erosion has also affected the excavation trenches and other pits dug at the site. Agricultural activity did not seem to be a major factor during the 2018 site visit, but ploughing was reported to have substantially affected the northern knoll (Umm Mashrat I) between 1998 and 2004, leading to the 2004 rescue excavations (Foley and Foley 2008). On the imagery, fields are visible on the ridge directly west of or potentially on the site (Google Earth DigitalGlobe 23/12/2012). A road passes through the upper parts of the site. It has been there since at least 2004 (Google Earth CNES / Airbus 31/12/2004) and has been tarmacked and widened since before 2012 (Google Earth DigitalGlobe 23/12/2012). At the time of the site visit part of the area was occupied by Bedouin with their herds, and on the satellite imagery it is clear that this is a regular occurrence. There is, however, no permanent construction and only a small part of the site is occupied, so the impact is relatively low. There might be trampling impact, especially on the



open trenches, and the animals will eat vegetation – on the one hand vegetation could damage the archaeology, on the other it would reduce erosion. There has been some excavation, in part probably former archaeological trenches, but also other digging, potentially looting (not large scale), with more on other side of *wadi* (e.g. Google Earth DigitalGlobe 23/12/2012 [Fig. 22]).

### **Discussion and conclusions**

The site visits have helped us to determine the actual location of sites found in existing databases and reports, so that it is now possible to analyse and monitor them using remote sensing and to use them in developing a predictive model. The site visits also allowed us to make detailed condition assessments on the ground, checking remote-sensing condition analyses.

The analysis of Late Neolithic site location is ongoing. Part of this process is to determine the nature of each site. Some, based on the presence of architecture, or substantial and dense artefact scatters, are interpreted as likely settlement sites, while others are assumed to represent more temporary or ephemeral uses of the landscape. We note that even within the agricultural zone, it is likely that locations regularly associated with activities routinely performed away from settlements, such as herd management, will have been present. It is clear, but also not surprising, that all the probable settlement sites are very close to *wadis* and in, or very near to, areas highly suitable for agriculture, such as alluvial fans (see also Hitchings *et al.* 2016). These locations are now often covered by irrigated and ploughed fields, or by modern orchards. Water availability would have been important not only for agricultural sites, but also for herd management of semi-obligate drinkers such as sheep. Umm Mashraṭ in the Wādī ath-Thamad is an interesting example because it seems more like a pastoralist site, with an absence of sickle blades and low numbers of ground-stone tools (Foley and Foley 2008). Most excavated sites (except of course those in the desert) are more typically small hamlets with mixed agriculture, but most of these excavated sites are in the current agricultural zone. It would be interesting to study more sites located in the steppe zone. Simple proximity to a *wadi*

is not precise enough to help develop a predictive model, but it appears that location near *wadi* junctions may be a more significant factor: the Wādī Ziqlāb project found settlements were often located near *wadi* junctions (Hitchings *et al.* 2016). This appears to hold true for settlements in other areas, like al-Ḥusayyah, Khirbat al-Ḥammām (Fig. 12) and Tall Wādī Faynān, although it is not entirely consistent. The presence of *wadi* terraces suitable for farming may also be an important factor. Identifying such terraces through a combination of slope and soil data will be an important step in developing a predictive model, which is likely to be an iterative process as we investigate which parameters are most useful.

As the locations of most Late Neolithic sites are favourable for agriculture in past and present, sites have been - and continue to be - disturbed by farming activity (Table 1). Ten out of the 17 visited Late Neolithic sites or areas were affected by agricultural development, with four sites almost or completely destroyed by it. This is a higher percentage than for all the sites in the EAMENA database that have been analysed so far, where 19% of the sites in the whole MENA region, and 16% of the sites in Jordan, have been affected by agricultural or pastoral activities (analysis done in May 2019). The lower total affected can be partly explained by the inclusion of desert areas, contrasted to our focus on agricultural areas during our site visits, but it may also reflect the location preference of Late Neolithic sites in areas with good agricultural potential. There are other development damages and threats, including roads and other infrastructure, such as the dam works in Wādī Fīdān (see Fig. 6). The latter is threatening three of the visited sites, and others too. Looting, however, is often restricted or even absent, presumably partly because of low visibility of the sites on the surface but also probably because the material from Late Neolithic occupation has less commercial value.

It is evident that sites further into the steppe tend to be less disturbed, with the Wisād Pools sites in the eastern desert being a good example (Rollefson *et al.* 2013, 2018). This was obvious when making condition assessments based on remote sensing, as there is less agricultural, settlement or infrastructure development

(although bulldozing often takes place, possibly linked to prospection). This effect does, however, skew our understanding of Late Neolithic settlement patterns, which are biased towards the zone of preservation. However, in all probability Late Neolithic settlement was concentrated in the agricultural zone, possibly with major sites often subsequently buried under later settlements. Pella, where Late Neolithic layers were found at the lowest levels (Bourke *et al.* 2003), is a rare example of a large later settlement that has been fully excavated to the base of its stratigraphic sequence; there may be other such examples.

The work reported here is only a first step in ongoing research. We intend to visit more of the sites identified by the desk-based research and to use the corrected locations and data about these sites to undertake more GIS descriptive analyses. Precise landscape positions will be used to set up a model to try to predict Late Neolithic site location. In addition to the information gathered in this project, information from the long-term work in the Wādī Ziqlāb will also be used to support the model's development. The work conducted there by Banning and colleagues has been both long term and intensive, while at present the study reported here is in its infancy and extensive over a large area. The next phase of research will become more geographically focused and intensive, using and testing the predictive model in a target area on the al-Karak plateau. The work will start by using remote-sensing imagery to identify areas where the Neolithic landscape may survive, considering the local geomorphology to assess likely areas of burial and erosion (*cf.* Banning 2015). Site visits and small-scale survey will be conducted, with the intention of expanding the project to target other locales. Ultimately, this work will be followed up by excavation of selected sites, with preference given to those suffering greatest attrition.

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