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Reconsidering 'Rab Land': A Geophysical Survey of Newton Enslaved Burial Ground in Barbados

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Abstract:

The objective of this project was to investigate a known enslaved burial ground located at the former Newton plantation in Barbados, by using geophysical methods to identify, map and count unmarked burials there. The Newton site was excavated in the 1970s and 1990s by archaeologists who discovered well over 100 individuals interred there. Ground penetrating radar (GPR) and electromagnetic induction (EM) datasets were collected in accessible areas of the site using high-precision GNSS/GPS instruments to record locations. Eleven rectangular grids of data were collected. In the interpretation of data, GPR proved most useful. Standard data-processing procedures were used to permit visual identification of potential graves and a well-established, logical framework was used for interpretation, being primarily based on a map-view analysis of GPR energy-return patterns at regular depths below the subsurface up to as much as two meters.

GPR signals recorded varied from excellent clarity with deep penetration obtained atop areas where limestone was at (or very close to) the surface, to very poor depth of penetration and clarity of signal from zones with clay-rich, thicker soil profiles. This extreme contrast in GPR results was challenging because the great majority of cemeteries in the author's experience are underlain with much more homogenous soil. The variable GPR returns were due to areas of thick, clay-rich soil located immediately adjacent to ground with thin or no soil that was underlain by limestone.

Site conditions resulted in higher than normal uncertainty associated with interpretations here. The number of potential graves that could be interpreted in map-view GPR depth slices, with selected cross-validation using GPR profile cross-sections was 570. Inferred burials were found in all eleven grids surveyed, and two methods of estimating the density of graves both indicate that the middle of the site and mid-slope holds the greatest concentration. It does not appear that GPR was able to exactly relocate remains that were found during past archaeological excavations; this was likely due to ground disturbance and/or the remains being removed from the site as part of prior excavations.

Evidence presented here strongly suggests that not only was soft, thicker soil used for burials but limestone rock was evidently dug out for burials. The small size of the ground available for enslaved people to make their burials, combined with demographic considerations, mean that using the limestone was likely a necessity, not a choice.

This work places constraints on the minimum number of individuals interred at Newton, as well as a minimum size and extent of the burial ground. Both of these are expected to increase with further work at the site. Sites such as Newton that would be termed 'rab' (unproductive, worthless) land in Barbados vernacular may instead be thought of as having great significance to the lives, experience and memories of the enslaved and their descendants.

Keywords: GPR, geophysics, archaeology, unmarked graves, cemeteries, enslaved, Barbados, Christ Church parish, Newton plantation, rab land, African diaspora

Background, Objectives and Site Overview

Historic Overview

Soon after the establishment of Barbados in 1627 as an English colony, tobacco became for a time the dominant cash crop. Beginning by the 1650s, this was replaced in the space of about 20 years by sugar. In what has been termed the 'Sugar Revolution' as summarized in Higman (227-32), the crop became the dominant force in the

Barbadian economy, its landscape and more. The labour needs of sugar agriculture were great, and quickly outstripped resources made available by indenture and mandatory transport of people from the British Isles, especially Ireland, during the Cromwell-era Interregnum (e.g., Bean 409-11; Beckles and Downes 1-2; Donoghue 24-28; Galenson 491-2). Starting in the late 1620s and accelerating thereafter, enslaved people from Africa began to be forcibly removed from their homelands and brought to Barbados, either to work or to be shipped onward to other British colonies. According to figures presented by Watson, in the 41-year period between 1643 and 1684, the percentage of Barbados population who were Black grew from 14% to 66%. Estimates of the total number of people who were enslaved and forcibly brought from Africa to Barbados in the approximately 200 years beginning in the early 1600s are variable, ranging from 380,000 (Watson) to almost 500,000 (Slave Voyages Steering Committee). A large number of these people were shipped onward from Barbados to other colonies and countries where slavery was practiced, but it is clear that by the early to mid-18th Century, the enslaved population of Barbados was large and formed a significant majority. For example, census figures for 1762 indicate 70,000 enslaved, who constituted 79.2% of the population at that time (Molen 289). As will be discussed below, despite these very large numbers, finding written or physical evidence that permits better understanding of the lives and cultures of these enslaved people is an ongoing challenge to researchers.

Slavery in Barbados and its Record

It is hoped that the above summary will serve adequately to frame the overall historic framework of slavery in Barbados for the purposes of this article. Many academic texts and papers on the subject of slavery and its impacts exist, although it is important to note that there is still much to learn and understand. In particular, recent and current research has increasingly turned to understanding the bioarchaeology, origins, lives, culture, history, experience and heritage of enslaved people. The lives and experiences of the enslaved have also been at the centre of a number of recent works of historically based fiction.

Given the great numbers of enslaved people residing in Barbados, one would expect there to be evidence that can be investigated today.

In particular, it would seem that written archival records as well as physical traces should exist, especially in areas where enslaved people lived and where they buried their dead. However, as discussed further below, research is hampered by several factors, including the nearly 200 years elapsed since Emancipation, lack of plantation-owner focus on anything beyond the economics of ownership, the ephemeral nature of enslaved habitations and agricultural practices (Delle and Clay; Handler and Lange 58-102).

Archaeological efforts to better understand the enslaved people of Barbados have focused on their settlements and burial spaces. A perusal of the literature shows that physical evidence of enslaved villages and cemeteries has proven elusive on Barbados, with one apparent enslaved village (Armstrong 478) and one certain enslaved burial ground, at Newton Plantation (Handler and Lange 103-170). The location of the Newton plantation enslaved village can be approximately deduced, but to date no compelling physical evidence has been found for its specific location, likely due in large part to deep ploughing of the suspected site (Handler and Lange 60). The author has provided geophysical-survey assistance in the evident discovery of a second enslaved burial ground in Barbados, located at Holy Cross Church (formerly Society Chapel), in Saint John (Reilly, et al.).

'Rab Land'

According to Handler and Lange (53-54), the Newton burial site was never under agricultural cultivation. Ground in Barbados that is unsuitable for agriculture is known in the vernacular as 'rab land'. As summarized in Otto (25-30), rab land may hold special significance to some descendants of enslaved people because it is ground that was never formally part of the enslaving plantation system. Moreover, rab land is known in oral traditions to potentially hold the remains of enslaved ancestors, and some rab land in secluded or remote areas may have sheltered escapees from plantation slavery (Otto 25). Finally, rab land was often the only ground made available to formerly enslaved people for their living quarters after Emancipation, and probably also before. As recently as 1955, Maynard (3) reported that rab land was the typical location of plantation workers' chattel houses, which could be disassembled, moved, and reassembled elsewhere at the whim of plantation owners. In the author's understanding of the vernacular, Newton enslaved burial ground meets the definition of 'rab land'. Implications of this will be discussed below.

Objectives of this Study

From the above it can be understood that despite increasing attention to the human dimensions of slavery, especially through research in plantation archaeology, fundamental questions remain in regard to physical aspects of enslaved villages and of burial spaces of the enslaved in Barbados. The latter is the primary focus of this contribution. In particular, some relevant considerations include: Where are enslaved burial grounds located? How big are they? Why were they placed where they were? How many enslaved (or formerly enslaved) burials are in them? What were the burial practices there? The present study set out to address these questions in the particular case of Newton enslaved burial ground. Details of the site and of the methods used follow.

Previous Work at Newton Burial Ground

Newton enslaved burial ground, located near Oistins in Christ Church Parish, Barbados (Figs. 1 and 2) is reportedly the largest intact burial ground of enslaved people in the New World to be discovered so far. The burial ground was associated with Newton plantation, which was one of the larger plantations in Barbados and which moreover, has fairly extensive and continuous written records. Examination of these records by Handler and Lange (67) indicates that enslaved people lived and died at Newton for approximately 175 years, with an enslaved population ranging from the mid-200s to over 300 after 1825. An enslaved burial space would have been associated with Newton plantation, presumably close to the associated settlement. Despite extensive archival searches, the village location was not discovered, nor was any clear evidence discovered by field walking (52, 59). There were vague references to a burial ground at Newton, but again, specifics were even more elusive (102-104). After having no success in locating physical evidence of the former enslaved village, the researchers finally learned of the location of the burial ground at Newton from an elderly informant employed at the site (104). This accidental discovery led to periodic excavations and archaeological investigations of the Newton burial ground site in the 1970s and again in the 1990s (i.e., Corruccini, et al. 443-458; Handler, *An African-Type Healer/Diviner and His Grave Goods*; Handler, *A Prone Burial from a Plantation Slave Cemetery in Barbados, West Indies*; Handler, and Lange; Shuler et al.).

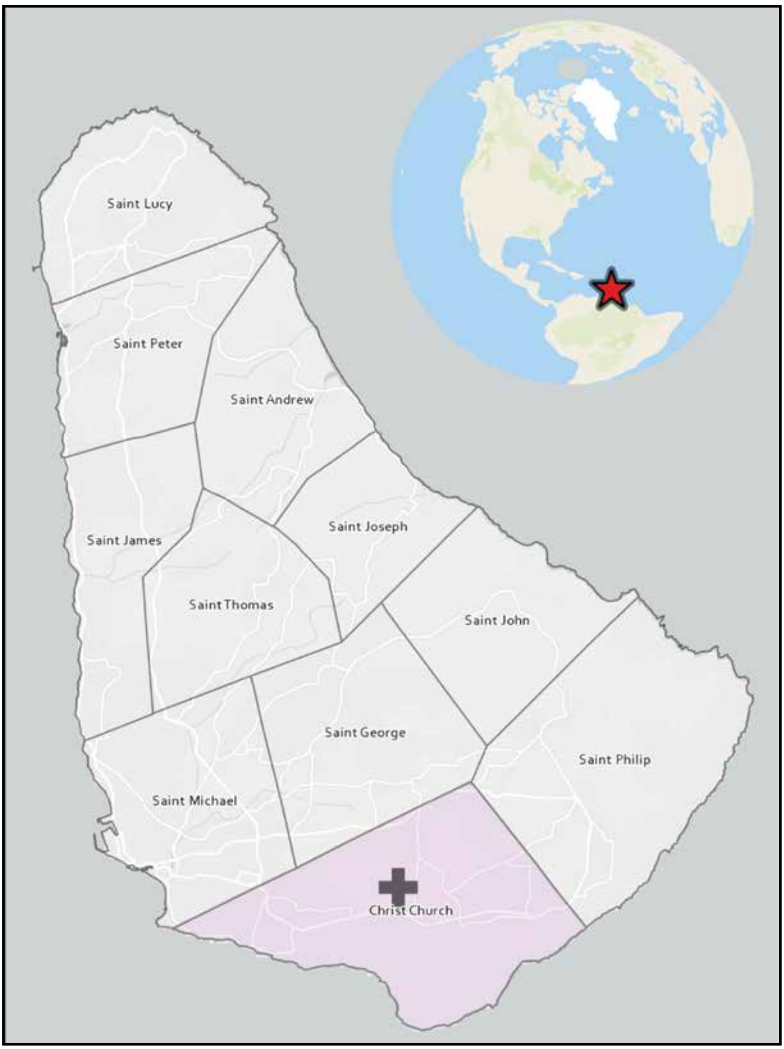

Fig. 1 Location of Newton burial ground within Barbados and the region.

Fig. 2 Study-area site boundary (outlined in red) within the context of the former Newton plantation (centre of map).

Site Topography and Conditions

The overall site of Newton enslaved burial ground (Fig. 2) is approximately 8,000 m² (roughly 2 acres) and consists of an estimated 25% flat ground, located in the south portion of the site (Fig. 3) and roughly 65% hillslope (Fig. 4), as well as around 10% flatter hilltop area. The lower-elevation, flatter ground appears to be underlain by thicker soil than the sloping ground, which consists of limestone close to the surface and only thin soil, with loose chunks of weathered limestone (Fig. 5). Surficial material observed onsite consisted of approximately 0-50 cm of organic- and clay-rich soil atop an uplifted limestone formation originally deposited during the Pleistocene geologic epoch, between 2.6 million and 12,000 years ago (Jones and Banner 7). The area surveyed within the site was divided into multiple survey grids (Fig. 3), which encompassed approximately 5,900 m² (1.46 acres), and were bounded to the south and east by dirt roads/tracks, by a line of explanatory markers to the north and by woods to the west.

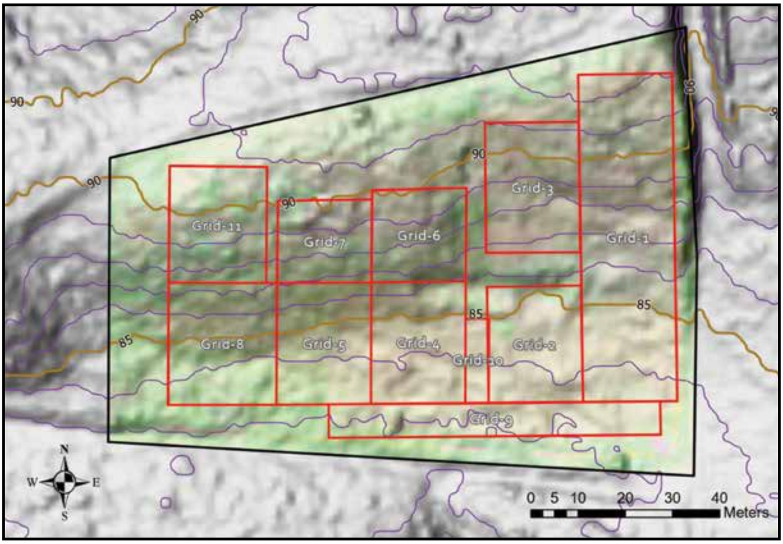

Fig. 3 Topography of the Newton site, derived from LiDAR data supplied by the Government of Barbados. Contour interval is 1 m. Survey-grid locations are also shown.

Fig. 4 Site overview with GPR survey underway in background, looking to the NW. Signage for the burial ground is in the left foreground and the RTK GPS/GNSS based station is located in the middle ground to the right.

At the time of the survey (29 August–3 September 2022; Fig. 5), wet-season conditions prevailed, with grass covering most of the site (Fig. 4). Rain on a daily basis gave rise to wet soil. Earlier, low trees and shrubs has been cleared at the direction of BMHS; the extent of clearing is best seen in Figure 5, below. The ground was generally suitable for survey coverage, with some rocks and obstructions due to scattered trees and shrubs.

Methods

Geophysics for Unmarked Graves

Geophysics as applied to archaeology can best be described as a form of remote sensing, in which physical and/or electromagnetic properties within the subsurface are used to attempt to infer the presence and nature of human-related evidence. Geophysics is often

Fig. 5 Drone-derived, photogrammetric digital surface model of the site at time of survey. Note survey vehicle in SW corner of image. The photo in Figure 4, above, was taken from a vantage point NE of the vehicle, looking to the NW.

used to detect archaeological features, which are defined as the non-portable elements of an archaeological site. Examples of archaeological features might include buried foundations, walls, hearths, kilns, ditches, pits, demolition rubble, burials and graves. The ability of geophysics to detect an archaeological feature depends upon the feature having some sort of contrast with its surrounding context(s) or stratigraphic setting. Material contrasts detectable by geophysical methods can be due to composition, water content, burned vs. non-burned, soil compaction and more.

Two methods were used in this investigation: Ground Penetrating Radar (GPR) and Electromagnetic Induction (EM or EMI). GPR is a well-established method for inferring the presence of unmarked graves and burials. Among the many examples in the literature are: Bevan, Conyers, Davis, et al., Goodman and Piro, Martindale, et al., and Miller. As the technology has improved and awareness within the archaeological, historical and forensics communities has grown, the past several years have seen a dramatic increase in the use of GPR and other geophysical methods for detecting unmarked graves in a variety of settings. Rather famously, since 2020, geophysical methods have been employed throughout Canada in the Indigenous-led search for burials associated with Indian residential schools (e.g., Whiting). Successful use of GPR for archaeological prospection in Barbados dates to 1999 (Whiting, et al.). It is important to stress that for technical reasons having to do with resolution and material contrast, no geophysical method is a 'bone detector'; instead, geophysical interpretation of graves and burials relies on indirect evidence such as disrupted soil layers, reflections from any grave goods or casket fragments, soil compaction or moisture contrasts, etc. More detailed explanation of geophysical methods for archaeology, and especially GPR, are contained in the above references. The interested reader may find the info contained in Conyers to be accessible and helpful as a starting point.

Survey Design

GPR provides cross sectional (vertical profile) views of the subsurface, based on the propagation and reflection of radar waves in the ground. Usable GPR depth penetration for archaeological purposes typically ranges between 1-5 m. For grave detection, GPR profiles are usually collected in closely spaced, parallel lines arranged into grids. Data are later processed in the office and combined into three-dimensional volumes that can be presented in useful map views or 'depth slices' (e.g., Conyers and Goodman; Goodman) at selected subsurface depths. The more closely spaced the profiles, the greater the resolution of the GPR results; expensive and bulky multi-channel instruments can collect multiple profiles at once, with profile spacing of 8 cm or less; such instruments are often used where large amounts of ground need to be covered relatively quickly but with high resolution (Whiting).

The GPR instrument employed here was a single-channel, relatively small ImpulseRadar[1] CO4080 GPR (shown in Fig. 4 above), a machine that is dragged across the surface, permitting the transmitting and receiving antennas to stay in contact with the ground. The CO4080 uses two frequencies, of 400 and 800 MHz; the dual-frequency design allows simultaneous collection of two datasets per pass. The higher, 800 MHz frequency is able to resolve smaller features in the subsurface but does not penetrate as deeply as the lower frequency, which in turn cannot resolve features in as fine detail but penetrates more deeply. Survey-grid corners on site were collected and GPR instrument position was continuously tracked using GPS/GNSS real-time kinematic (RTK) systems (seen in Fig. 4) with nominal accuracy of at least 10-15 cm. GPR profiles were collected in a north-south direction within each grid (Figs. 3 and 5), with 33 cm spacing between adjacent profiles. This profile spacing is somewhat greater than the 25 cm typical for a single-channel GPR survey for unmarked burials, but was deemed necessary due to the large amount of ground to cover in a finite amount of time, which was also reduced by rain.

The EM method collects discrete measurements of near-surface conductivity and 'in-phase' (IP), which is closely related to magnetic susceptibility. Conductivity measurements are generally most useful, especially in areas where GPR doesn't work well due to high ground conductivity, although the IP dataset can be used to infer the presence of buried ferrous metallic objects or features, burned areas and to map differences in soil and geologic changes. In this project, the best dataset for interpretation was derived from GPR, so in the interest

1 https://impulseradargpr.com/

of space and of minimizing technical detail, the details of EM survey design and results have been omitted.

Aerial images of the site were collected with a drone-based, unmanned aerial system (UAS), a DJI Phantom 4, courtesy of Mr. Andre Clarke, Land Surveyor, who also helped with survey datum coordinates. Aerial photographs were processed to generate a geometrically corrected, geographically referenced base map (orthophoto) of the site detailing ground features at the time of the survey and providing a high resolution (2.5 cm/pixel) visual reference frame for interpretation. In addition, a detailed digital surface model (DSM) was photogrammetrically generated; this was used to produce a shaded-relief map of topographic variations, including vegetation (Fig. 5). This can provide valuable information for unmarked graves as they can often be identified by mounds or depressions in the ground surface.

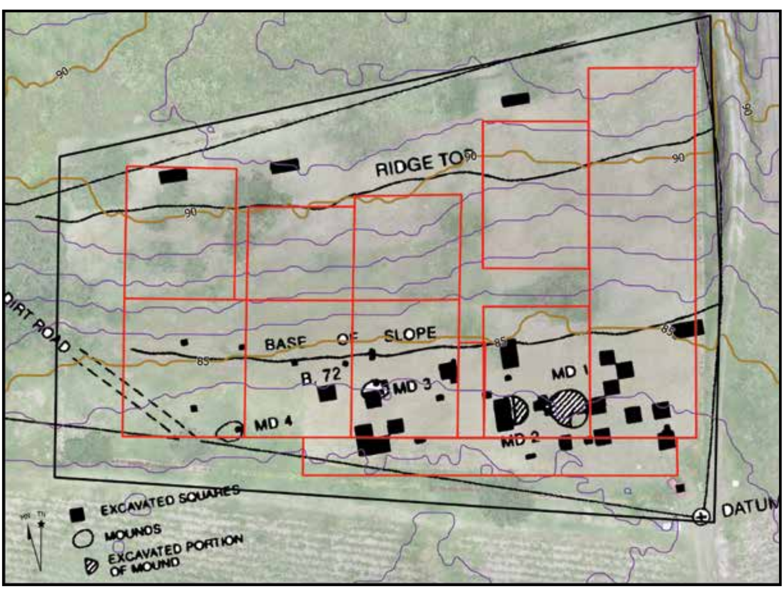

Fig. 6 **Excavation map from (Handler, and Lange), which was made using a local coordinate system at the time and thus not tied to real-world coordinates such as latitudes and longitudes. This map was scanned, overlaid and georeferenced using ESRI ArcGIS Pro software to the site-derived colour orthophoto, as well as to the greyscale hill-shaded LiDAR topography used in Figure 5, above.**

The above-outlined considerations of survey design were driven by published reports of excavation results from Newton, specifically those contained in Handler and Lange (43) and Shuler et al. According to these sources, single interment was generally practiced at Newton. However, excavations also identified several mounds containing multiple and/or stacked burials, with one mound found to contain approximately 45 individuals of different ages. Mounded burials appear to be concentrated on the lower, flatter portions of the site (Figs. 5 and 6), where soil was observed to be thickest. The vast majority of excavated burials were found to be oriented east-west, with only one oriented in the north-south direction. Most excavated graves (~60% or more) displayed evidence that a coffin had been used. Graves were evidently sometimes carved into the dominant limestone rock, which lies everywhere beneath the soil overburden. This overburden was observed to be no more than 0.9 m thick (typically much less), measured from the surface, which may also explain the shallow depth (no more than 0.8-0.9 m) of the investigated graves. A mixture of imported and local soil, or excavated limestone rubble, appears to have been used as backfill for many of the graves, and especially the mounded burials (Handler and Lange 231). The remains of well over one hundred individuals were unearthed during the various field seasons reported by the two sources above.

Data Processing

Collected datasets were processed using commercial and proprietary software packages to perform quality-control, improve information content, filter out unwanted system and other noise, make geometric corrections, and compile data within each grid into 3D volumes for depth-slicing. Processed GPR grids were visualized and interpreted primarily in depth-slice views, with some cross-checking in profile view (2D or cross-sectional visualization). Processed GPR (and EM) data were imported to geographic information systems (GIS) software (ESRI ArcGIS Pro)[2] for mapping and interpretation of features, as discussed below.

2 https://www.esri.com/en-us/arcgis/products/arcgis-pro/overview

Results

Interpretation Strategy

The N-S direction of survey lines was designed to cross the dominant E-W trend of burials reported in Handler and Lange (196) and in Shuler et al. (297). As noted, prior indications are that a majority of the deceased were interred in coffins. A burial shaft for a coffin would necessarily be rectangular, so the presence of rectangular, roughly E-W oriented features in depth-sliced, processed geophysical results was taken as primary evidence of a grave. Based on the documented exhumations, some burials appear to have been created by carving out niches into the native limestone rock.

Another factor considered in interpretations was the history of rather extensive archaeological excavation and testing conducted at the site by Handler and colleagues (e.g., Handler and Lange; Shuler) and shown in Figure 6. Most of these excavations were square and considerably larger than the expected size of a grave. During interpretation we were vigilant for evidence of both documented burial mounds and of previous excavations and marked these distinctively in GIS.

GPR-based interpretation of graves was based on four primary criteria (Fig. 7 below), as well as on the many considerations contained in Martindale, et al, a manuscript that the author collaborated on. In map or depth-slice view, possible evidence of an adult burial may be found in GPR patterns that are of an appropriate size (roughly 1.85 x 0.6 m) and compass orientation, which here was expected to be generally east-west. In profile view, possible indications of a grave are breaks or interruptions in soil, sediment or rock layers, which are indicative of a burial shaft. Within a potential grave shaft, there may be evidence of collapse or slumping associated with decomposition or soil settling, as well as possibly reflections indicative of undecayed coffin parts or perhaps grave goods buried with the deceased.

Initial Observations Overview

It became evident soon after data collection began that GPR energy returns were laterally highly variable; often within 10 cm or so GPR energy returns would change from high/strong returns to low/weak returns. It became clear that areas of the site underlain by limestone,

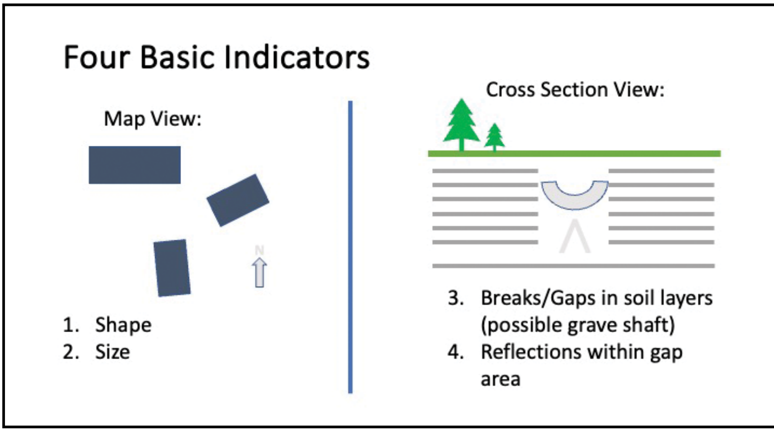

Fig. 7 **Schematic view of four main criteria applied to inferring the presence of unmarked graves in GPR data. Geophysical data never provides certainty, but if a suspected grave meets all four criteria it is assigned a higher confidence level than a feature meeting fewer. Surface indications such as mounds, depressions and possible grave markings are also taken into account; these may be discerned and mapped at survey time or seen in high-resolution digital surface models such as Figure 5, above.**

with no or only very thin soil, were where GPR energy penetrated well below the expected depth of burials (at most 2 m) with clarity, while portions of the site with thicker soil profiles (especially in the lower-elevation, flatter areas; Figs. 3 and 5) showed very poor GPR depth penetration. Based on past experience, knowledge of the geology of the site, as well as on the physics of GPR wave propagation, this variability is likely due to clay-mineral content within the thicker soil areas. Specifically, clay minerals in Barbados are known to be rich in kaolinite and smectite, minerals derived from the weathering of wind-blown dust from Africa and of volcanic ash from nearby Caribbean islands (Muhs et al. 612-615). These clay minerals are known to be very poor for GPR energy returns, while limestone is excellent for transmitting GPR energy. In addition, limestone is typically much better drained than clay-rich soil, and saturated materials are worse for GPR than those that are unsaturated. GPR signal penetration varied significantly across the majority of the site, reaching over 3 m depth below ground surface (BGS) in limestone areas to as little as 15 – 20 cm BGS in

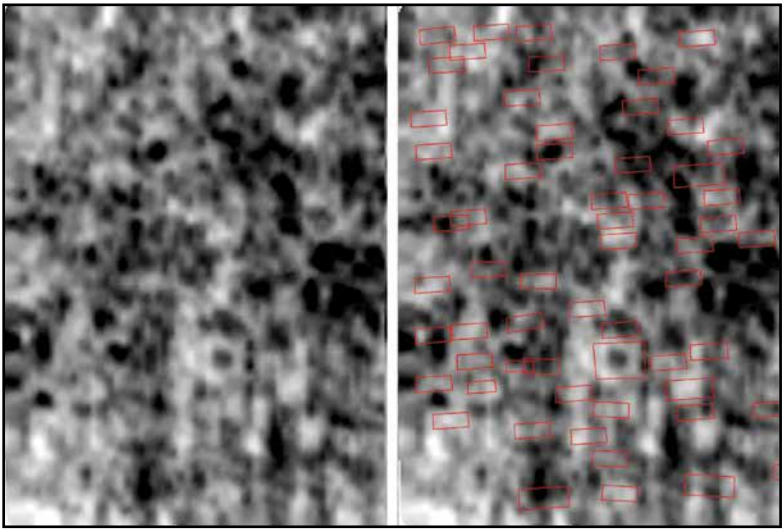

Fig. 8 Example of a map-view depth slice of total GPR energy returns from the subsurface from approximately 0.9 – 1.0 m depth. Uninterpreted (left) and interpreted (right) GPR views of the depth slice are shown. North is to the top.

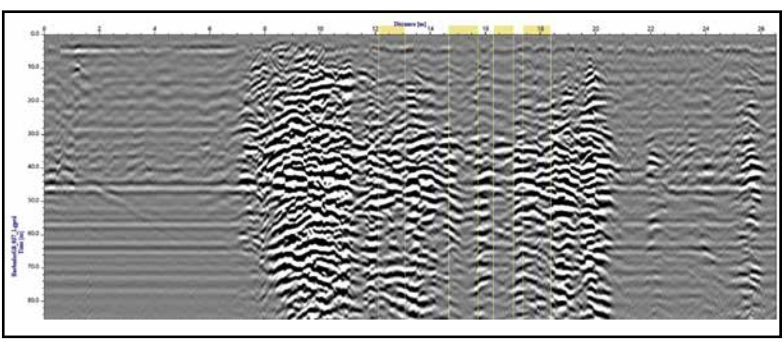

Fig. 9 Example GPR cross-sectional profile showing the vertical geophysical signature of potential grave-features (in yellow) identified in map view as in Figure 8. The cross-section review focused on finding potential grave shafts as well as disruptions in soil layers (c.f. Fig. 7, above). As noted in the text, cross-sectional views were used to validate interpretations made in map view. In this figure, high-energy GPR returns (middle of figure) are interspersed with much lower energy returns more solid dark greys). It is worth noting that at about x=11 m, x=16 and x=18 along profile there are other 'quiet' zones that were evidently missed in map-view interpretation; these may well be other burials. In this validation process, we observed that the widths of the low-energy/quiet features and disruptions in stratigraphy are consistent with burials. Maximum depth shown here is approximately 85 cm.

areas with thicker, presumably clay-rich, soil profiles. It is reasonable to presume that on steeper-sloping portions of the site, any accumulated soil has had a tendency to wash downslope and accumulate at the base of the slope, leading to greater soil thickness downslope. As noted above and seen in Figure 6, these areas of thicker soil are where the majority of prior archaeological excavations took place.

Interpretations

After GPR data processing was complete and the data were imported into GIS, the approach to data interpretation flowed from the above considerations around prior excavations, topography, site geology/ mineralogy and initial site observations. The interpretation process began with review in GIS of GPR map-view depth slices every 10 cm down to at least 1m depth. Using the criteria outlined above allowed for interpretation of potential graves. Understanding that GPR might also be able to detect prior excavations as well as mounded burials (Fig. 6), provision for these in the interpretation rubric was included, as was the possibility of natural subsurface features such as tree roots, large rocks, etc.

An example of interpreted GPR depth-slice data is shown below in Figure 8.[3] The 'mottled' appearance of GPR data seen there is due to the above-referenced, extreme lateral variations in GPR energy returns. All eleven grids appeared to contain graves, and there was also some evidence of the prior archaeological excavations, as well as possible signs of the mounded burials that had been previously excavated.

Selected GPR profile cross-sections were used to cross-check the depth-slice-based interpretations (Fig. 9). Cross-sections confirmed that areas of near-surface limestone, with excellent GPR penetration, are found immediately adjacent to zones of extremely poor GPR penetration, presumably due to accumulations of clay-mineral-rich soil.

Discussion and Analysis

In most published studies documenting the use of GPR for unmarked burials e.g. (Bevan; Conyers; Goodman and Piro;

3 Due to the potential sensitivity of the site, the author has chosen to omit full, specific maps of all interpretations and considers this privileged information residing with BMHS, descendent communities and Government.

Martindale et al.; Miller; Schultz; Whiting) the subsurface medium is relatively homogenous. In particular, formal cemeteries are normally chosen as such because they are underlain by soil that is consistent and fairly easy to dig. In contrast, the ground at Newton is 'rab land', which by definition has thin, poor or no soil. Much of the Newton site is nearly soil-free, with limestone at or very close to the surface. As noted, this makes for highly variable GPR response and complex interpretation. Therefore, nothing approaching certainty is possible with regard to these results. The author and his team normally assign probability levels to interpretations based on how many criteria are met from Figure 7. In this project, most interpreted burials were assigned low or medium probability, and none were assigned a high confidence level.

Extent of the Site and Number of Burials

Given the above caveats, how are inferred burials distributed at Newton, how many are there, and what are the boundaries of the burial ground? Two approaches to the first question are shown below in Figures 10 and 11. These figures show the percent of graves by area within each grid (area of graves divided by area of grid x 100; Fig. 10) and the number of graves per square meter (total number of graves per grid divided by area of the grid; Fig. 11). In both of these approaches, the greatest density of graves is near the middle of the site and mid-slope. While this is a different view of grave density than that presented by discoveries from archaeological excavation (Fig. 6), it is likely that many burials discovered by excavation were not observed by GPR, due to the disturbed nature of the excavated ground and/or the fact that remains were removed.

As to the extent of burials at Newton (i.e., the size and boundaries of the burial ground), this remains an open question. The boundaries of the entire study area were not reached by the GPR survey. This was in part due to time and weather constraints and also due to vegetation and topographic obstructions on site (Fig. 5). Correlating excavation locations of Handler, and Lange to the present survey grids is a bit challenging due to the lack of precise coordinates in the former, but it does appear that burials were previously discovered to the N and to the NW of the present GPR grids (Fig. 6).

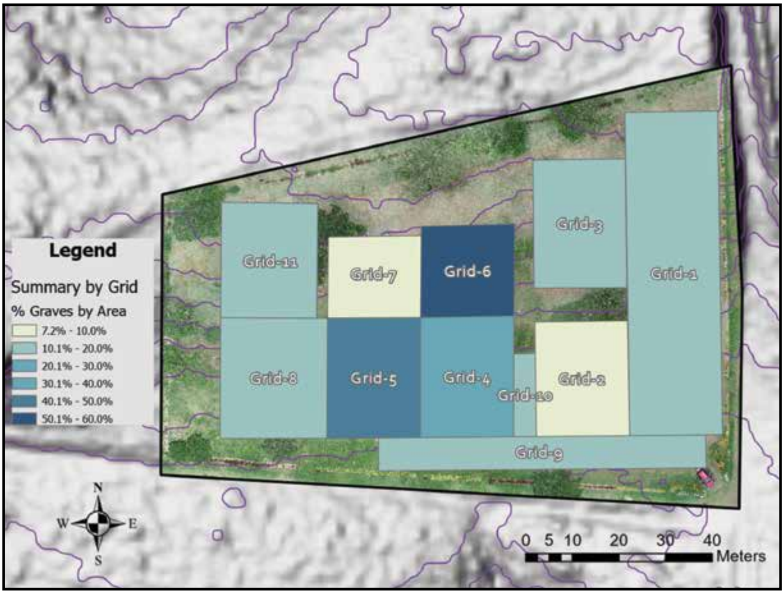

Fig. 10 One way to assess the distribution and density of burials at Newton, explained in the text.

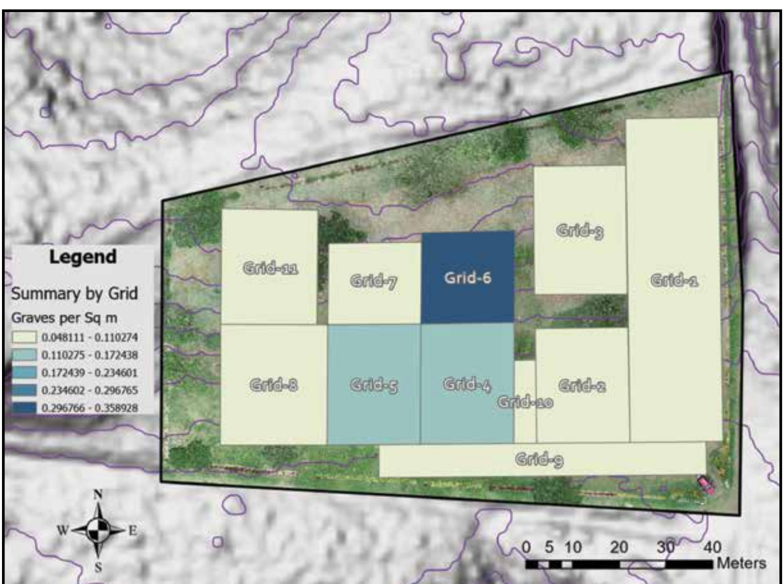

Fig. 11 Another way to assess the distribution and density of burials at Newton, also explained in the text.

In the eleven grids surveyed, the author counted a total 570 burials from GPR data interpretations in map (depth-slice) view. These were of a size and orientation consistent with adult burials; there was no attempt to interpret child- or infant-sized burials. Due to the challenging interpretation environment, combined with the undeniably large number of evident burials, a different geophysicist might well have counted a different number. However, the author's approach was conservative, informed by a logical framework, and was cross-checked by a team member who looked at cross sections.

The 570-burial figure almost certainly represents a minimum. For one thing, a finer-grained survey, with closer profile spacing would likely have revealed more suspected graves. In addition, the full boundaries of the burial site have not been reached. Also, in a more typical unmarked-graves project (e.g., Whiting) there would normally be a complete analysis of every GPR cross section in each grid. However, due to the great numbers of suspected burials here, only about 10% of the map-based interpretations were able to be cross-checked with cross-section data. Further discussion of the constraints on total burial numbers will be found below.

'Rab Land' Considerations

Evidence from Newton and elsewhere suggests that the reason this ground was made available for burials is that it had very thin soil and as such was unsuitable for growing crops; as noted, this is 'rab land' in the Barbadian vernacular. It appears to have been common to give over this type of unproductive land for enslaved burials. In fact, a similar piece of ground elsewhere in Barbados has recently been surveyed by the author, is documented as a burial ground in written archives and is the subject of a full manuscript in review with an academic journal (Reilly, et al.).

Another critical aspect of attempting to understand the Newton site as a burial space is the location of burials with regard to the location's appropriateness as a cemetery. In other words, it is well-established that a typical cemetery is located in easily dug soils—does this mean that at Newton graves were only located in such soil? Previous archaeological excavations (Fig. 6) were largely dug in the lower, flatter portions of the site, where there is thicker soil.[4] However, there are exceptions to this, which can be seen in Figure 6. Considering that the enslaved people at Newton were allowed use of this rab land to bury their dead, that the site is not a named field and that there is no information to indicate that the site was ever cultivated, is it reasonable to believe that people would have confined their burials to only those portions of the site with thicker soil? Moreover, was there even space for all the graves that would be required over the course of 175 years of slavery with an average enslaved population of 200 at any given time?[5] Geophysical evidence presented here, along with the sheer numbers of graves required and the relatively small size of Newton burial ground all suggest that graves were dug into limestone. This is consistent with oral tradition, archival evidence and with geophysical results that have recently emerged at Holy Cross church in Saint John, Barbados (Reilly et al.), where indications are that rab land immediately underlain by limestone was the site of burials.

Conclusions and Further Questions

Despite a complex and challenging site for interpretation, overall conclusions and implications are as follows:

1. There appear to be at least 570 burials at the site. For a variety of reasons, the true number is expected to be at least two to three times higher and will likely never be known with full certainty.
2. Indications from GPR are that both hard-rock (limestone) and soft soil were used for burials. This was probably by necessity, with only a limited area of thick soil profile.
3. The full extent of the burial ground is not yet known. It is probably confined to roughly the site boundaries shown in

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4 In this regard, the greater prevalence of archaeological excavations and discovered burials in thicker soil may reflect a sampling bias; i.e., digging for archaeologists is easier in thicker soil, just as it is for those digging graves to begin with.

5 A full analysis of birth and mortality rates is beyond the scope of this paper, but if we assume 200 enslaved people lived at Newton plantation on average each year over the course of 175 years of slavery, with a 10% per year adult mortality rate, then approximately 3,500 deaths would have taken place. A 5% mortality rate reduces that figure by half but seems rather low given the brutal conditions of slavery. These are just the author's back-of-envelope, non-expert calculations. Mr. John Knox (personal communication) has provided a rough estimate of at least 2,000 deaths that is based on more detailed analysis of Barbados census figures and death rates.

above and does not cross into named fields, although prior excavation results (Fig. 6) indicate burials up to or perhaps slightly beyond, the extent of the defined study area shown in the figures above.

4. It is interesting and ironic to note that geochemical analysis of the clay-mineral content of Barbados soil indicates that much of it was derived from weathering of wind-blown dust from Africa (Muhs, et al. 612-615). Therefore, enslaved Africans and Afro-Barbadians were burying their dead in soil that ultimately derived from their homeland.

The vernacular usage in Barbados of the term 'rab land' implies worthless, unproductive ground. The work presented here is consistent with an emergent re-evaluation of the term 'rab land' to be more inclusive of the experience of the enslaved. The author's collaborative work with others in discovering a new enslaved burial ground in Barbados (at Holy Cross church in Saint John parish) indicates that that new site may also be termed rab land. Because so few enslaved burial grounds are known in Barbados (exactly two, to the author's knowledge), rab land may in fact be prime ground in the search for further burial spaces of the enslaved. Moreover, as summarized above, rab land was generally the type of ground used at least until 1955 by plantation workers for their chattel houses; doubtless the great majority of these workers were descended from enslaved people. Therefore, the clear implication is that rab land may in fact be far from worthless in regard to the lives, experiences and memories of the enslaved and their descendants. Rab land in Barbados would in turn be highly meaningful and deeply significant to descendent communities, and in this light deserves to be worthy of greater respect and further investigation in the future.

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