

# Documentation and Conditions Assessment of Munden's Battery Hill, St. Helena (CHC-2020-01-02)

Report prepared for the British Napoleonic Bicentenary  
Trust and St. Helena Government

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# Introduction

Architectural documentation and preliminary conditions assessment were undertaken by Principal Investigator Brent R. Fortenberry, Associate Director of the Center for Heritage Conservation at Texas A&M University. Post-documentation conditions assessments were completed by Ashburn. Fortenberry spent one of the seven days of the field research period at Munden. He was led to the upper portions of Munden's Battery by the local guide but not to the later portions lower on the cliffs which include the Bahrainian Prince's Prison. Two areas were investigated the small areas of bastion remains on the south battery and the building on the north side of the ridge.

This was due to the brief which focused only the Napoleonic-era heritage resources. The overall survey was completed over seven days between 18–25 January 2020.

## Objectives

1. Undertake comprehensive digital documentation of Munden's as a part of ongoing heritage conservation management.
2. Complete a preliminary conservation conditions assessment of Munden's in preparation for conservation costing from an architectural conservator and historic building structural engineer.

## Assessment Methodology

Munden's was visited four days during the research trip. A combination of documentation and assessment methodology was undertaken.

### *Photogrammetry*

In addition to the laser scan data, the exterior of the fort was captured using 350 aerial photographs from a DJI Mavic Air Drone. These photographs were processed in Capturing Reality software to create 3D textured mesh models that were then combined with laser scan files to create the completed model.

### *Photography*

Fortenberry also captured ground photos using a Sony a7 camera for detailed conditions photography.

Conditions assessments and recommendations were made by in-person visual inspect as well as a digital inspection of the 3D models.

### *Full Dataset Access*

A full copy of the dataset can be view and downloaded using this Google Drive Link. Note that for the 3D and photogrammetric models, one needs a program specialized software. Static images and site report components, however, are easily viewed.

<https://drive.google.com/drive/folders/1fTmmB5f-1zGEOO2cM1oZjyKwgyGBaa3l?usp=sharing>

# Munden's History

The area known as Munden's Hill Sector comprises Munden's Battery, Chubb's Lower, Middle, and Upper Batteries, and Munden's Hill East and West Batteries. As early as 1673 guns were placed on the area known as Munden's point (Denholm 2006: 19). In 1708 another period of building took place on the lower reaches of the area overlooking Jamestown harbour (Denholm 2006: 20). In the period culminating with the arrival of Napoleon on the island both lower and upper areas of the cliffside were fortified and defended. Today the lower reaches (which were not investigated as a part of this survey), were overhauled during the Victorian period, while several elements on Munden's Hill East and West retain their Napoleonic-era material fabric.

On Munden's Hill the Mellis list indicates there were guns stationed to support Rupert's Battery of fortification. These batteries show up again on the Palmer Map of 1850 before being replaced by the later duo of identical batteries in 1886 that are brick masonry skim-coated in cementitious finish (Denholm 2006: 24). These were again rebuilt between 1914 and 1918 by the Garrison of Royal Marines stationed on the island (Denholm 2006: 24).

## Reference:

Denholm, Ken. 2006. "South Atlantic Fortress". Jamestown: St. Helena National Trust

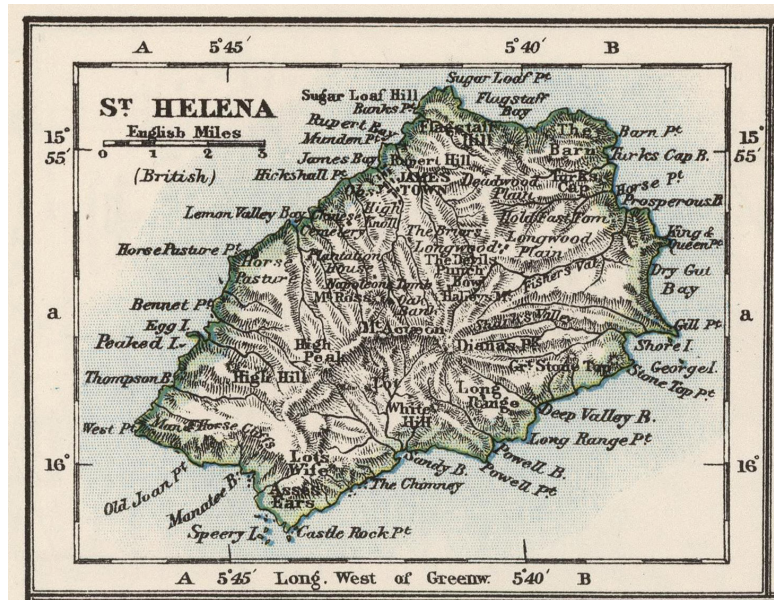


Figure 1 (Right): Late 19th-century Fortification map of St. Helena.

Figure 2 (Below): 19th-century barracks building on the eastern terminus of the ridge (Image: B. Fortenberry).



# Location

Munden's Sector sits at a height of 1,916 feet and commands a rocky peak and is approximately one mile to the south and east of Jamestown.



Figure 3: Google Earth imagery of Munden's Battery highlighted lower right, and Jamestown, highlighted lower center (Image: Google Earth).



Figure 4: Google Earth imagery of Munden's Battery, survey area highlighted (Image: Google Earth).

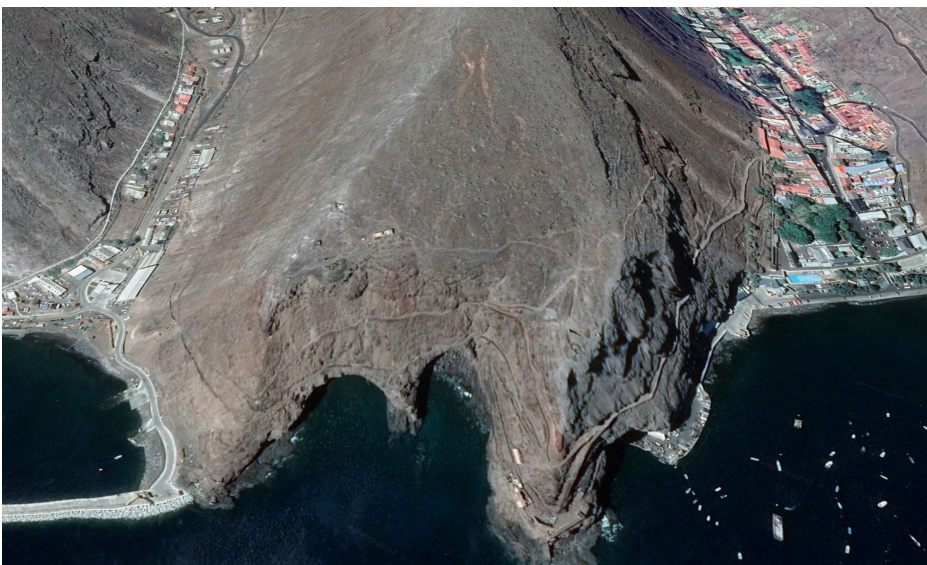


Figure 5: Oblique 3D Google Earth Imagery of Munden's (Image: Google Earth)

# Digital Documentation

The following images represent the combined aerial- and ground-based photogrammetric data. Combined, the 3D model comprised over 250 million triangular mesh components, textured using the embedded photographic data, with an accuracy of 4 mm.

Raw digital data and completed digital models in various formats are available through the Google Drive link above. This combined model can also be programmed as a part of physical and digital exhibitions of the fort and other heritage sites. Digital models themselves can additionally be annotated with heritage building information and history.

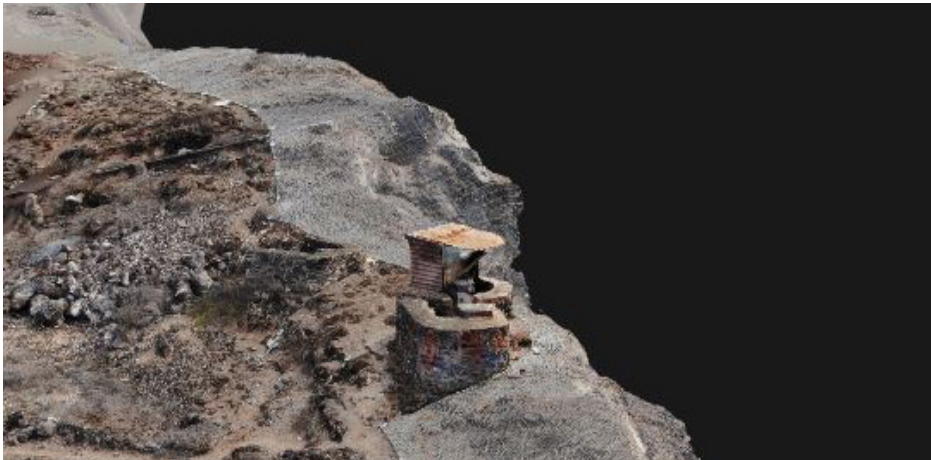


Figure 6:  
Photogrammetric model,  
looking east toward  
surviving fabric at East  
Munden's Hill (Model: B.  
Fortenberry)



Figure 7:  
Photogrammetric model,  
looking southeast toward  
surviving fabric at East  
Munden's Hill (Model: B.  
Fortenberry).

# Digital Documentation

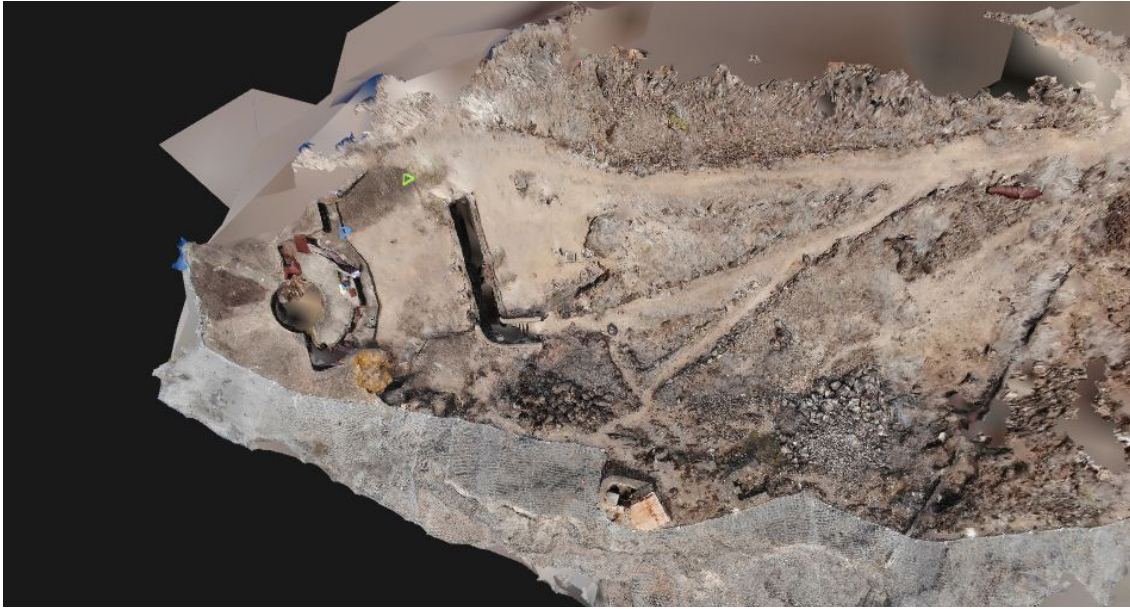


Figure 8:  
Photogrammetric  
model, nadir view of East  
Munden's Hill (Model: B.  
Fortenberry).

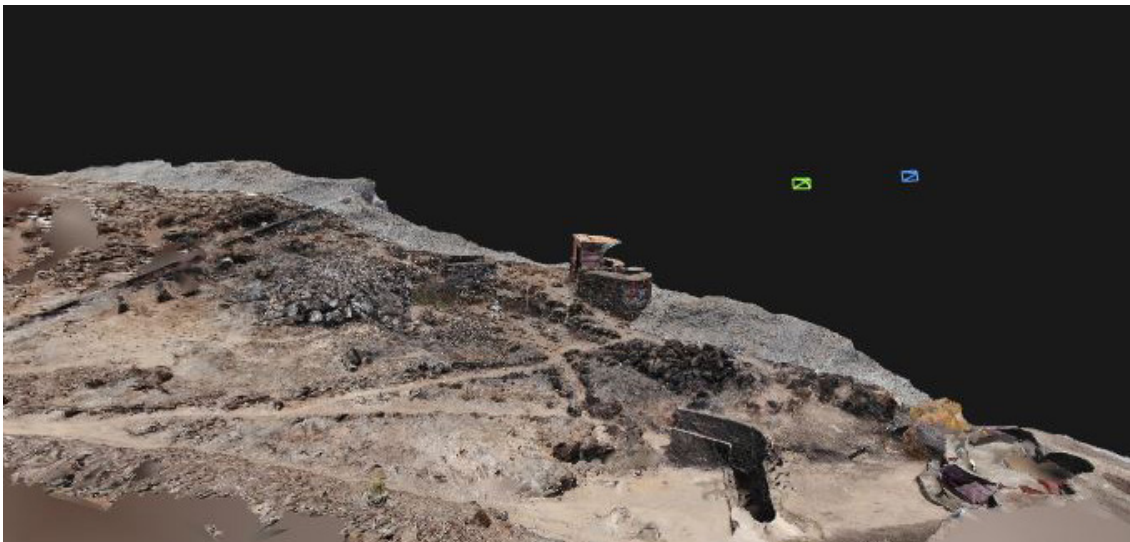


Figure 9:  
Photogrammetric model,  
looking south toward  
surviving fabric at East  
Munden's Hill (Model: B.  
Fortenberry).

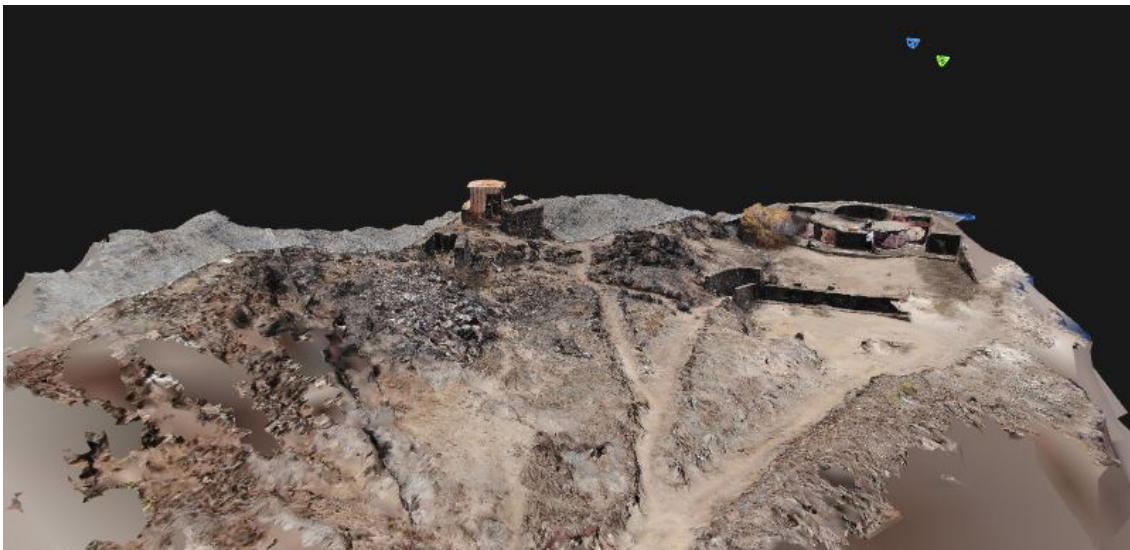


Figure 10:  
Photogrammetric model,  
looking west toward  
surviving fabric at East  
Munden's Hill (Model: B.  
Fortenberry).

# Introduction to Conditions

The following conditions were observed through on-site visual inspection and digital model analysis by Fortenberry and Ashburn. There are several instances in the following recommendations where additional expertise is required. Several experts have been recommended to the charity.

Where possible, it is recommended that local experts be consulted. While all recommendations are important, at the end of the report is a triaged list of conservation conditions provided. The triaged list are structural in nature and critical to ensuring the integrity of the site.



Figure 11: Oblique aerial view of ruined structure at West Munden's Hill (Image: B. Fortenberry).

# East Munden's Hill Battery–Monitoring

Only a small bastion remains from the early 19th-century component of Munden's Hill Battery. It currently stands as a low stonewall that has been re-pointed with a cementitious mortar, likely sometime in the 20th century. The remaining elements of this battery are now nothing more than piles of stones that have been moved throughout the late 19th and early 20th centuries. Little bricks and mortar conservation needs to be undertaken here as little fabric survives.

The lower firing platform is late Victorian and early 20th century and so was not in the purview of this investigation.

The primary condition observed was graffiti present on the firing position. A slight failure of stone the stone wall was also present on the west side.



Figure 12: Oblique aerial view of surviving fabric at East Munden's Hill (Image: B. Fortenberry).



# East Munden's Hill Battery–Monitoring



Figure 13: Detail of surviving fabric at East Munden's Hill (Image: B. Fortenberry).



Figure 14: Detail view of surviving fabric at East Munden's Hill (Image: B. Fortenberry).

# East Munden's Hill Battery–Monitoring



Figure 15: Surviving firing position at East Munden's Hill (Model: B. Fortenberry).



Figure 16: Detail view of surviving firing position at East Munden's Hill (Image: B. Fortenberry).

# East Munden's Hill Battery–Monitoring



Figure 17: Aerial image of surviving fabric at East Munden's Hill looking southwest (Model: B. Fortenberry).



Figure 18: Aerial image of surviving fabric at East Munden's Hill looking northwest (Image: B. Fortenberry).

# East Munden's Hill Battery–Monitoring Recommendations

1. Monitor the state of the surviving walls and consult an architectural conservator and preservation engineer to stabilize and rehabilitate any failures.
2. Removing the graffiti might be too invasive given the slight nature of the surviving Napoleonic remains. Unless further vandalism takes place it is best to not attempt to remove the existing paint.

# West Munden's Hill–Structural Collapse

On the north side of Munden's Hill a small mid-19th-century building stands partially collapsed. The structure is rectangular in form and a single story. It has character-defining buttresses on the east and west walls with a slight shed addition on the east. The building is roughly fifteen feet east to west and ten feet north to south. The walls comprise stones of various colors with a lime mortar present. The structure is earlier than the barracks building to the south which in construction appears to be late 19th and potentially early 20th century.

While much of the surviving lime mortar is still in place, however there are section of standing walls with inappropriate cementitious mortars.



Figure 19: Oblique aerial view of ruined structure at West Munden's Hill looking southwest (Image: B. Fortenberry).

# West Munden's Hill–Structural Collapse



Figure 20: Oblique aerial view of ruined structure at West Munden's Hill looking south (Model: B. Fortenberry).



Figure 21: Oblique aerial view of ruined structure at West Munden's Hill looking north (Image: B. Fortenberry).

# West Munden's Hill–Structural Collapse



Figure 22: Oblique aerial view of ruined structure at West Munden's Hill looking northwest (Image: B. Fortenberry).



Figure 23: Oblique aerial view of ruined structure at West Munden's Hill looking northwest (Image: B. Fortenberry).

# West Munden's Hill–Structural Collapse



Figure 24: Oblique aerial view of ruined structure at West Munden's Hill looking west (Model: B. Fortenberry).



Figure 25: Oblique aerial view of ruined structure at West Munden's Hill looking south (Image: B. Fortenberry).



# West Munden's Hill–Structural Collapse



Figure 26: Oblique aerial view of ruined structure at West Munden's Hill looking west (Model: B. Fortenberry).



Figure 27: Oblique aerial view of ruined structure at West Munden's Hill looking east (Image: B. Fortenberry).

# West Munden's Hill–Structural Collapse

## Recommendations

1. The wall collapse is the most pressing condition that needs to be addressed at North Munden's Hill and a structural engineer specializing in historic buildings should be consulted prior to any conservation work taking place. The engineer should examine the photographs, drone images, 3D models, and drawings to make preliminary determinations of the scope of rehabilitation and repair. An on-site visit is preferable for detailed inspection.
2. Concurrent with the engineer's inspection, all surviving wall fragments from the collapse should be recorded and documented in situ, and recovered from being used a part of the reconstruction of the wall.
3. Identify and test in-context, identified historic mortars. Samples should be taken from the south and north exterior walls and tested through aggregate analysis and acid digestion to identify appropriate historic composition. This should be done by an architectural conservator.
4. Do not remove inappropriate mortars without oversight from an architectural conservator. Monitor these areas for mortar failure and repair with historically appropriate mortar composition derived from mortar analysis (Recommendation 1). Mortar replacement should be completed in consultation with an architectural conservator.
5. Immediate action should be taken to segregate this area from the public areas of the site. At present, there is no barrier, permitting individuals potential access to hazardous areas in and around the collapse. The area needs to be marked using health and safety guidelines.

# Triage

## Recommendations

1. **IMMEDIATE:** Isolate the collapsed building on North Munden's Hill from the general public and erect health and safety signage.
2. **SHORT TERM:** Consult an architectural engineer for wall rehabilitation of the structural collapse on the North side of the Munden's Hill.
3. **MEDIUM TERM:** The lower areas of the Munden's complex (including Chubb's Hill) should be documented and assessed as a part of the heritage trail and general heritage conservation. These areas are accessible and would be relatively easily reached by heritage tourists.



Figure 28: Ground image looking east towards ruined structure at Munden's Hill West looking east (Image: B. Fortenberry).