

1.0 Assignment 2: Archaeological Database/Dataset

- 1.0.1 A metadata statement and associated documentation is provided in Section 2.0 and Section 3.0 for a dataset containing information on the guns that are currently present on the seabed at the Bronze Bell wreck site. The wreck is located c.500m off the coast of Talybont, near Barmouth and comprises a pile of 42 blocks of Carrera Marble totalling c.65 tonnes surrounded by 27 guns, three anchors and other features (Coflein, 2012). The vessel is believed to have originated from Genoa and sunk in 1709 after having run aground on the nearby Sarn Badrig (Coflein, 2012). The site is designated under the Protection of Wrecks Act 1973.
- 1.0.2 The information within this dataset was collected as part of a wider project by MSDS Marine to “inspect, survey, investigate, record, and monitor” the Bronze Bell wreck site, funded by the Climate, Heritage and Environments of Reefs, Islands, and Headlands (CHERISH) project (MSDS Marine, 2021).
- 1.0.3 The format of the dataset provided is an ESRI shapefile. A shapefile defined as “a simple, nontopological format for storing the geometric location and attribute information of geographic features” (ESRI, 2016). The shapefile consists of a number of file types that are each a vital constituent part of the end product as they store feature geometry, attribute information, coordinate system, and spatial index of the features. Without the full set of these file types, the information contained within the dataset would be incomplete and the shapefile may not function properly. The shapefile format was chosen for this dataset as it provides more information than an image or table, it is editable, and it can be used in conjunction with other shapefiles and GIS products to produce a comprehensive site plan for the wreck site. The shapefile contains information relating to the size, type, level of concretion, location, orientation, and material of the guns, as well as their spatial relationships and stratigraphy in a structured and easy to use way.
- 1.0.4 The information within the dataset was created using multibeam bathymetry and diver reconnaissance. High resolution multibeam bathymetry was collected in 2020 by CHERISH and was supplied to MSDS Marine prior to a fieldwork campaign that took place in September 2021. The bathymetry data was input into an ArcGIS project the symbology settings were adjusted so that the site topography could be easily interpreted. This was used to identify seabed features relating to the site e.g., guns, anchors, and marble blocks. Due to the distinct shape of guns and anchors, these could be identified in the bathymetry data with ease (see Figure 1). A polygon template of the simplified outline of a standard gun was created in ArcGIS, and then copies of this polygon were overlain on the guns identified in the multibeam to match the apparent size and orientation where this could be determined. The resultant product was a shapefile containing 27 polygons of guns (see Figure 2). The position, orientation, and stratigraphy of the guns was then ground-truthed by divers during fieldwork and the polygons and associated attribute table were updated in real time via through-water comms carried by the divers. The condition of all of the guns was recorded, and measurements were taken on 17 of the guns. Time constraints did not allow for the remaining 10 guns to be measured.
- 1.0.5 The attached gun dataset (see Table 1 and Figure 2) was structured in order to include substantive, unambiguous, and objective data about the guns present on the site. The data was collected following set standards in order for the dataset to be easily interpretable and the data

within to be comparable. For example, all measurements were collected in millimetres and orientation was recorded as a bearing in degrees indicating the direction the muzzle of each gun. The data collected was verifiable and meaningful beyond the context of the site, with the exception of the 'level of concretion' attribute, as this could only be reported on relative to the other guns and features on the site, and to the divers experiences. The divers on the site have had different experiences with a wide range of archaeological features and so comments made on the concretion level of the guns were subjective. Even so, the terminology used to describe level of concretion was standardised and the guns were recorded as lightly, moderately, or heavily concreted in order to ensure that the data was as comparable and useful as possible. Where specific features were heavily concreted, or items were concreted to the guns this was noted in the attribute column. The guns were allocated zones north, east, south, and west for fieldwork purposes, specifically to liaise with divers on the seabed. While this information is not strictly meaningful beyond the context of the fieldwork as the geographic location of the guns has been recorded, it was included in the attribute table for completeness. Similarly, the centroid of each polygon was included for completeness. As a result of these inclusions, the information within the attribute table can be used to reconstruct the site plan should any geographic parts of the shapefile become corrupted.

- 1.0.6 The data produced can be considered new data. Although it represents an update to previous investigation campaigns on the Bronze Bell site, the information collected in 2021 is significantly different to the pre-existing data; gun location, orientation, position, and stratigraphy are reported erroneously in these previous datasets. Therefore, the contents of the dataset constitute new data that contributes greatly to the archaeological record of the site.
- 1.0.7 The data was collected, and the attached dataset created, in order to construct an accurate 2D site plan for the Bronze Bell wreck site. This dataset was combined with others for the anchors, marble, and other items within the site to create this plan. All data collected as part of this project will be submitted to Claire Lancaster of the CHERISH project who will submit it to the RCAHMW and Cadw, the historic environment service of the Welsh Government. All copies of the data will then be removed from the MSDS Marine archive.
- 1.0.8 The site plan will be used for the ongoing management of the site which relies on accurate information about its form on the seabed. The site is difficult to access by merit of it being submerged and so the infrequent surveys of the site are invaluable to the site curators, the Royal Commission on the Ancient and Historical Monuments of Wales (RCAHMW). The gun dataset discussed in this assessment contributed to the wider site plan produced as part of the project. This site plan will enable the RCAHMW to identify any changes to the site, specifically changes related to the illegal removal of artefacts. The Bronze Bell site, like many other protected wreck sites, are at risk of illegal salvage due to the presence of high value artefacts and the impracticalities of physical protection that can be afforded to protected terrestrial sites. While the site plan produced as part of this project cannot inhibit artefacts being removed, its accuracy allows the RCAHMW, and licenced divers on the site, to easily identify change and thus take swift action to report and recover missing items.

2.0 Bronze Bell Guns Shapefile Metadata Statement

File name(s) (each filename should be added as a new row)	Project Title	Description	Creator (if more than one individual/organisation, add on a new row)			Copyright Holder (if more than one individual/organisation, add on a new row)			Period of Creation	
			First Name	Last Name	Organisation	First Name	Last Name	Organisation	Start Date	End date
BronzeBell_2021_Guns.cpg	Bronze Bell 2021 Investigation-Gun Recording	The shapefile is a 2D plan of the guns present on the site of the Bronze Bell wreck in North Wales. The shapefile records details about the guns within the attribute table, as well as the physical stratigraphy of the guns on the seabed.	Phoebe	Wild	MSDS Marine	Claire	Lancaster	CHERISH	06.09.2021	12.11.2021
BronzeBell_2021_Guns.dbf										
BronzeBell_2021_Guns.prj										
BronzeBell_2021_Guns.sbn										
BronzeBell_2021_Guns.sbx										
BronzeBell_2021_Guns.shp										
BronzeBell_2021_Guns.shp (XML)										
BronzeBell_2021_Guns.shx										

Location (each locational term should be added on a new row)		Locational Coordinates/Extent			Scale of Data Capture	Scale of Data Storage	Assessment of Data Quality	Method of Data Capture	Purpose of Data Creation	Coordinate Grid System
Type	Term	Coord Type	Easting Coord	Northing Coord						
Place	Offshore Talybont	LL	-4.127473	52.7791	1:200	1:200	Good. Low risk of spatial displacement due to scale of data capture	Analysis of multibeam bathymetry to identify guns using ArcGIS, ground-truthed by divers.	To produce a plan of the guns at the Bronze Bell wreck site, part of a wider project to create an accurate site plan of the wreck.	WGS-84
Parish	Barmouth									
Community	Dyffryn Ardudwy									
County	Gwynedd									
British Isles Country	Wales									

Data Type	Source	Hardware/Operating System	Language	Software	Software Version	Table Attribute (each new attribute/notation should be added as a new row)		Supporting documentation file name (this should be enclosed separately and include an abbreviations, codes or notations used)
						Code	Description	
Polygon	Multibeam Bathymetry	PC- Microsoft Windows 10	English	ESRI ArcGIS	2.8.2	MSDS ID	A unique identifier assigned to each feature within the site by MSDS Marine	Bronze_Bell_documentation.pdf
	Diver recording					Zone	The site is divided into four arbitrary zones relating to geographic location in order to more easily navigate the site	
						Gun Type	The type of gun	
						Material	The construction material of the gun	
						Orientation	Orientation of muzzle in degrees	
						Level of concretion	The relative level of concretion on each gun. Either light, moderate, or heavy.	
						Muzzle to Base	Measurement between muzzle and base in millimetres	
						Trunnion to Base	Measurement between trunnion and base in millimetres	
						Base to Button	Measurement between base and button in millimetres	
						Diameter of Base	Measurement of diameter of the base in millimetres	
						Trunnion to Trunnion	Measurement of gun from the outermost edge of one trunnion to the outermost edge of the other trunnion in millimetres	
						Diameter of muzzle	Measurement of diameter of the muzzle in millimetres	
						Width of Trunnion	Measurement of the width of one of the trunnions in millimetres	
						Length of Trunnion	Measurement of the length of one of the trunnions in millimetres	
						Bore	Measurement of the diameter of the bore in millimetres	
						Diameter of Tiller	Measurement of the diameter of the tiller in millimetres	
						Centroid X	The X value for the centre point of the polygon in decimal degrees	
						Centroid Y	The Y value for the centre point of the polygon in decimal degrees	

3.0 Bronze_Bell_documentation.pdf

3.1 Definitions

Item	Definition
Cannon	A type of ordnance (note that the cannon on the Bronze Bell site are of an unknown calibre)
Swivel Gun	A type of ordnance. Usually smaller calibre than a cannon, typically mounted on a pivoting stand allowing a wide range of movement.
Concretion	A hard cement-like coating on an object produced when iron corrodes.
Cast Iron	A hard, tough, ductile ferrous material with a high carbon content
Wrought Iron	A soft, ductile, fibrous ferrous material with a low carbon content
Muzzle	Gun component- the forward, discharging barrel of a gun
Base	Gun component- at the opposite end to the muzzle of the gun, excluding the button
Trunnion	Gun component- two cylindrical features on each side of the gun, perpendicular to the bore used to mount the gun onto a carriage
Button	Gun component- a knob on the end of the gun to attach arresting ropes that deal with recoil
Bore	Gun component- the hollow cylinder in the centre of a gun down which shot is packed
Tiller	Gun component- a lever on the end of a swivel gun used for guiding the direction of the muzzle
Centroid	The centre point of a polygon

3.2 Abbreviations

Abbreviation	Meaning
NR	Not Recorded
NA	Not Applicable

4.0 References

Archaeological Data Service (2009) Section 1. Introduction to the GIS Guide. Available at:

https://guides.archaeologydataservice.ac.uk/g2gp/Gis_1-2. Accessed 15.11.2021

Archaeological Data Service (2018) Explanation of metadata terms for Geographical Information Systems files deposited with the ADS. Available at:

https://www.archaeologydataservice.ac.uk/attach/ADS_gis_metadata_example.pdf. Accessed 15.11.2021

Archaeological Data Service (2020) GIS (General): Metadata Template Download (Microsoft Excel).

Available at: https://www.archaeologydataservice.ac.uk/attach/ADS_gis_metadata_template.xlsx.

Accessed 15.11.2021

Coflein (2012) Tal-y-bont Wreck; Bronze Bell Wreck. Available at: <https://coflein.gov.uk/en/site/1015>

Accessed 12.11.2021

ESRI (2016) What is a shapefile? Available at: <https://desktop.arcgis.com/en/arcmap/10.3/manage-data/shapefiles/what-is-a-shapefile.htm>. Accessed 12.11.2021

MSDS Marine (2021) CHERISH Archaeological Dive Contract 2021: Written Scheme of Investigation. Report for CHERISH.

5.0 Appendix

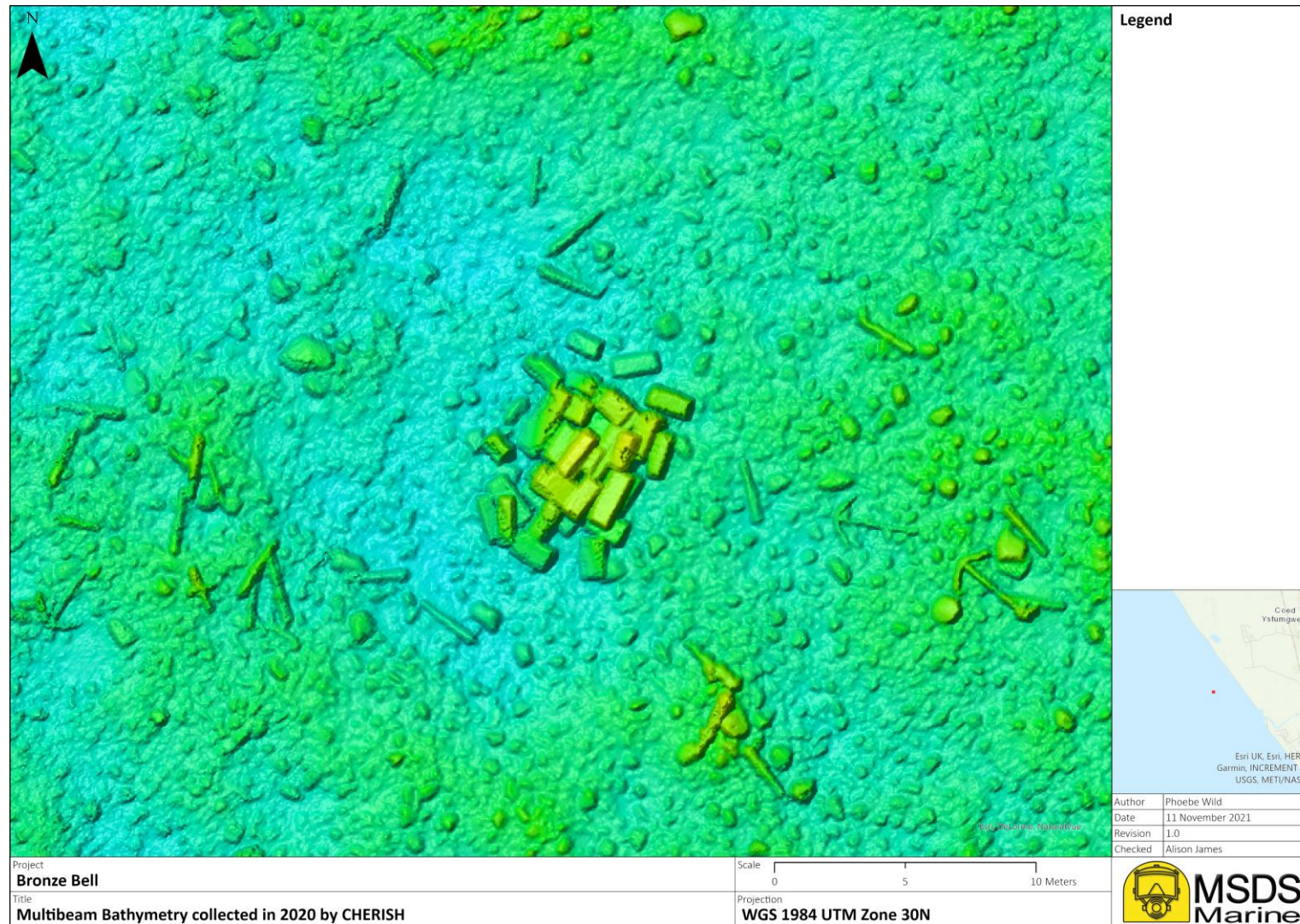


Figure 1 Multibeam collected by CHERISH in 2020

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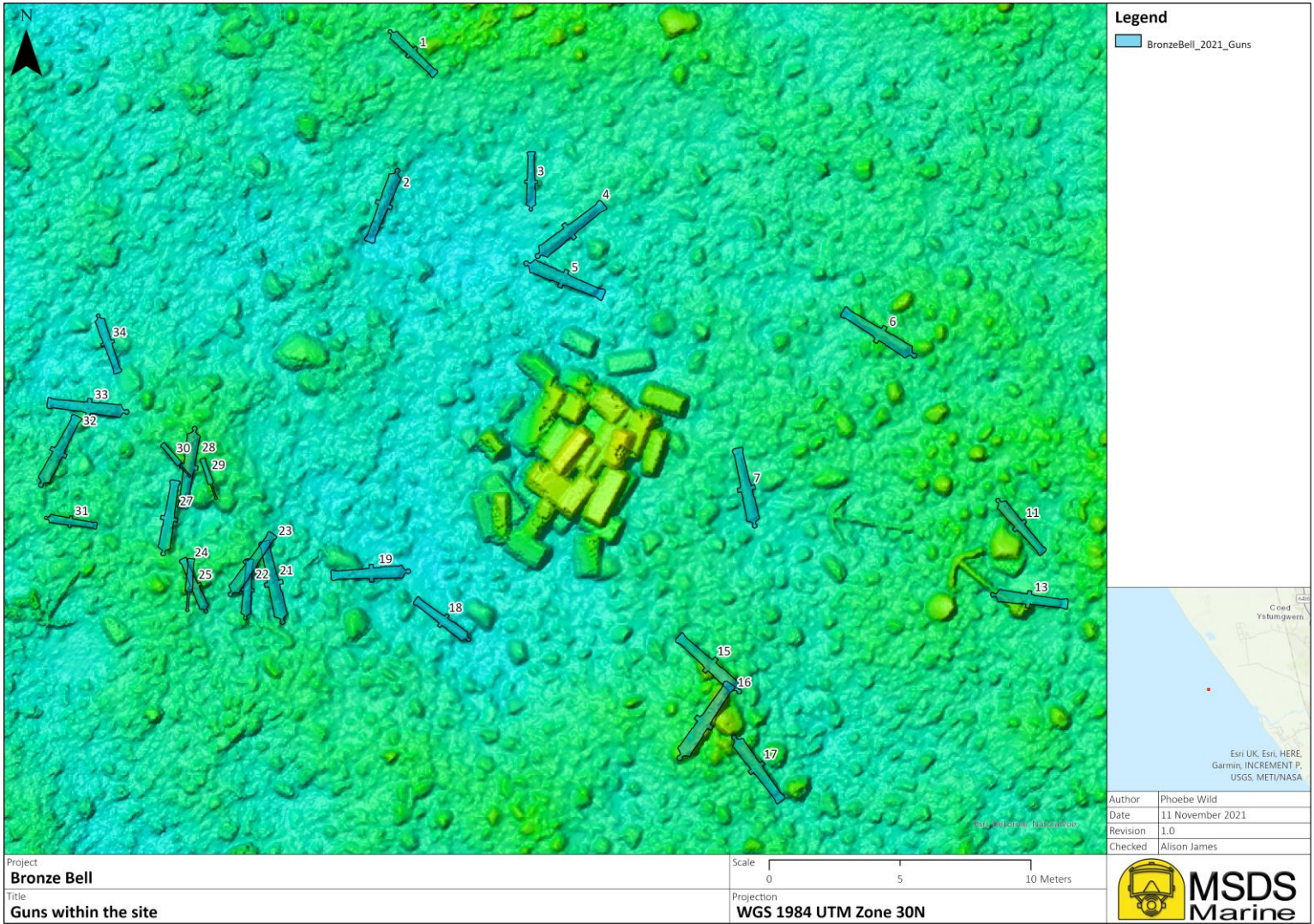


Figure 2 Guns identified within the site

MSDS ID	Zone	Gun Type	Material	Orientation	Level of Concretion	Muzzle to Base	Trunnion to Base	Base to Button	Diameter of Base	Trunnion to Trunnion	Diameter of Muzzle	Width of Trunnion	Length of Trunnion	Bore	Diameter of Tiller	Centroid X	Centroid Y
1	North	Cannon	Cast Iron	135	Moderately concreted	NR	NR	NR	NR	NR	NR	NR	NR	NR	NA	423933	5848300
2	North	Cannon	Cast Iron	200	Moderately concreted	NR	NR	NR	NR	NR	NR	NR	NR	NR	NA	423957	5848295
3	North	Cannon	Cast Iron	1	Moderately concreted	NR	NR	NR	NR	NR	NR	NR	NR	NR	NA	423956	5848288
4	North	Cannon	Cast Iron	50	Moderately concreted	NR	NR	NR	NR	NR	NR	NR	NR	NR	NA	423936	5848291
5	North	Cannon	Cast Iron	110	Moderately concreted	2500	1000	170	450	380	270			NR	NA	423968	5848293
6	East	Cannon	Cast Iron	300	Moderately concreted	NR	NR	NR	NR	NR	NR	NR	NR	NR	NA	423936	5848295
7	East	Cannon	Cast Iron	345	Moderately concreted	NR	NR	NR	NR	NR	NR	NR	NR	NR	NA	423949	5848306
11	East	Cannon	Cast Iron	140	Moderately concreted	2480	NR	NR	500		280	100		NR	NA	423950	5848303
13	East	Cannon	Cast Iron	100	Moderately concreted	NR	NR	NR	NR	NR	NR	NR	NR	NR	NA	423951	5848304
15	South	Cannon	Cast Iron	310	Moderately concreted	NR	NR	NR	NR	NR	NR	NR	NR	NR	NA	423938	5848291
16	South	Cannon	Cast Iron	30	Moderately concreted	NR	NR	NR	NR	NR	NR	NR	NR	NR	NA	423943	5848291
17	South	Cannon	Cast Iron	145	Moderately concreted	NR	NR	NR	NR	NR	NR	NR	NR	NR	NA	423946	5848289
18	West	Cannon	Cast Iron	310	Heavily concreted	2470	1030	250	420	270	260	140	110	NR	NA	423962	5848300
19	West	Cannon	Cast Iron	270	Heavily concreted	2480	980	190	520	420	330	170	110	NR	NA	423931	5848296
21	West	Cannon	Cast Iron	345	Heavily concreted with items	2680	1050	190	430	400	280	150	120	NR	NA	423958	5848284
22	West	Cannon	Cast Iron	5	Heavily concreted with items	1830	740	100	350	320	200	100	80	NR	NA	423956	5848286
23	West	Cannon	Cast Iron	35	Heavily concreted with items	2570	940	150	460	370	340	160	130	NR	NA	423944	5848305
24	West	Swivel Gun	Wrought Iron	5	Moderately concreted	1170	NR	360	220	NR	190	NR	NR	NR	80	423932	5848293
25	West	Cannon	Cast Iron	335	Heavily concreted	1730	700	240	380	320	280	85	70	NR	NA	423945	5848311
27	West	Cannon	Cast Iron	10	Lightly concreted	2520	880	180	440	360	320	110	120	NR	NA	423937	5848295
28	West	Cannon	Cast Iron	190	Lightly concreted	1770	650	160	300	270	200	100	80	55	NA	423932	5848298
29	West	Swivel Gun	Cast Iron	340	Heavily concreted trunnion	2510	1050	170	440	370	310	130	100	NR	NR	423939	5848291
30	West	Swivel Gun	Cast Iron	320	Heavily concreted trunnion	1860	770	150	320	240	220	100	70	NR	NR	423935	5848293
31	West	Cannon	Cast Iron	100	Lightly concreted	1780	700	180	320	300	210	55	70	50	NA	423938	5848292
32	West	Cannon	Cast Iron	30	Lightly concreted	2460	880	240	460	380	280	120	100	80	NA	423968	5848290
33	West	Cannon	Cast Iron	280	Lightly concreted	2510	1030	190	240	320	290	80	100	80	NA	423935	5848296
34	West	Cannon	Cast Iron	160	Lightly concreted	1740	700	180	320	260	240	70	70	70	NA	423936	5848291

Table 1 Attribute Table for Gun dataset