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Thornbury,
South Gloucestershire

363247, 191688

Assessment of
Airborne Laser Scan Data for Archaeology

APS 217 11 04
November 2017



Thornbury, South Gloucestershire

Assessment of Aerial Imagery for Archaeology

Client BSA Heritage

Planning Authority South Gloucestershire Council

Air Photo Services document reference 217 11 04/2

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Site centred at 363247, 191688

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Lidar data

This report summarises the results of examination of Lidar data at a site in Thornbury, South Gloucestershire at coordinates 363247, 191688. Airborne Laser Scan (ALS) data, otherwise known as Light Detection and Ranging (Lidar) data, have been collected from airborne survey platforms in recent years at varying resolutions, and are available for download, processing, visualising and interpretation via the Environment Agency for England website, <http://environment.gov.uk/ds/survey#/download>.

Lidar data indicates variation in the height of the ground surface. Data is collected by an active laser beam fired in pulses which scans the ground surface. The reflected pulses are recorded by the sensor on board a geo-located airborne survey platform, fitted with an inertial measurement unit to record the roll, pitch and yaw of the aircraft.

The point cloud data derived from the survey are processed into a series of Digital Elevation Models (DEM) usually in American Standard Code for Information Interchange (ASCII) format. These include Digital Surface Models (DSM) which contain tree cover and buildings, and Digital Terrain Models (DTM) which remove tree cover and can reveal features beneath the tree canopy (Bennett et al 2012, Hesse 2010, Stular et al 2012).

These data are of assistance in recording micro and macro topographic features which may indicate relict or extant archaeological features and historic landscapes alongside more modern features. Lidar data are best interpreted and used in conjunction with modern and historic aerial photographs and maps to provide ground truth information for features and sites recorded via this prospection method.

The data needed were identified by using the EA timestamp shapefile detailing the Lidar file names within the area of interest and the Ordnance Survey 10km and 5km grid square to identify the grids and quarter sheets. Digital Terrain Models were selected as the primary data source as the ability to remove the tree canopy makes it ideal for prospection. The 2m DSM and DTM data were downloaded which covered the area of interest and can be seen in the associated table which is appended to this report. The data were downloaded on the 23rd November 2017 and visualised on the same day.

The data were visualised into Hillshade, Multi directional Hillshade, Simple Local Relief Model (SLRM), Slope, Sky View Factor, Anisotropic Sky View Factor, Open Positive and Open Negative using the Relief Visualisation Toolkit (RVT) Version 1.2. These visualisations were chosen as they are of most use for archaeological prospection. The multiple ASCII tiles were merged before being visualised for ease of use in the GIS. The data were analysed alongside base mapping and NMP data to double check the topography and nature of features interpreted from Lidar data.

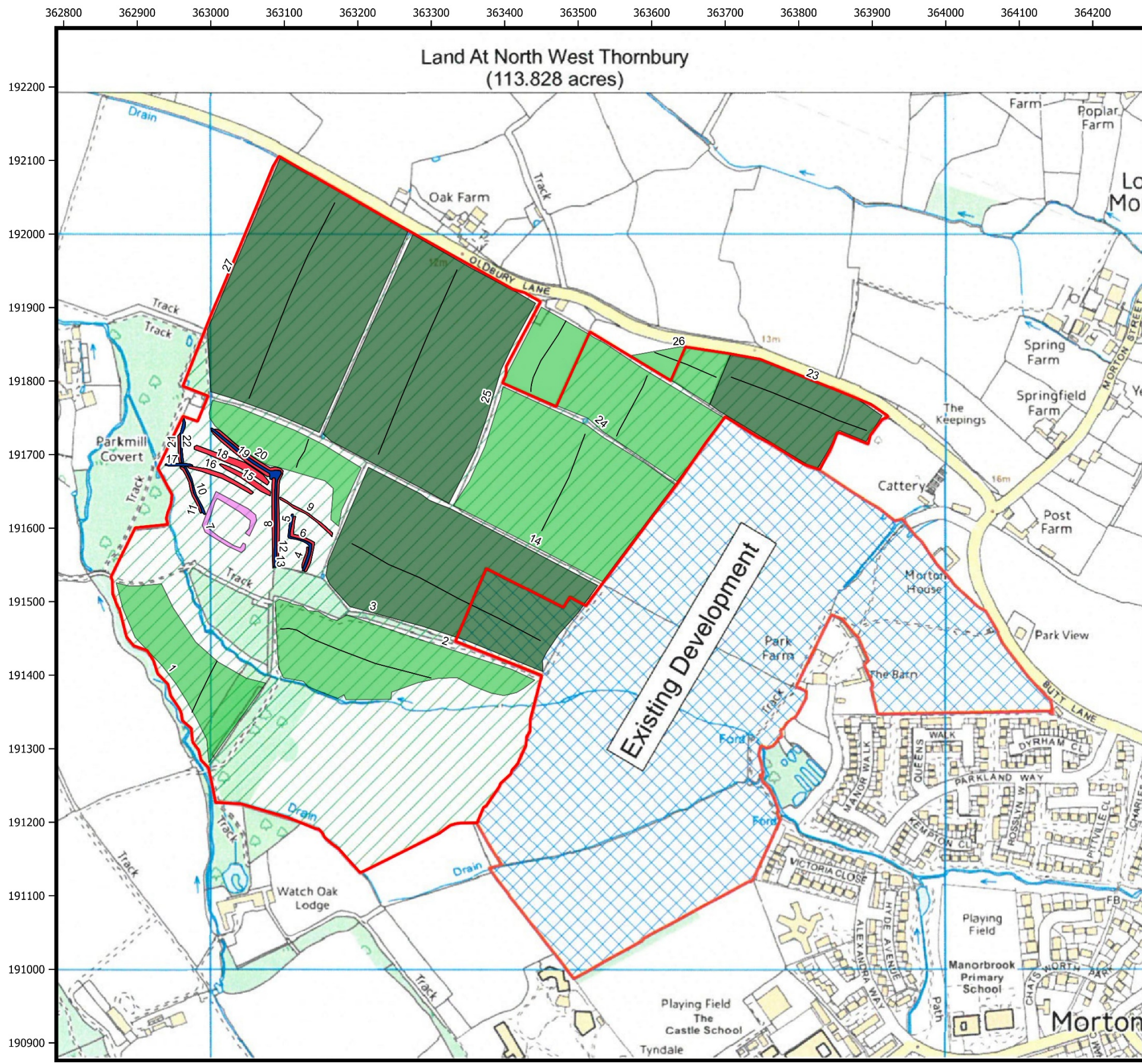
The ST96 2005 2m DTM data provided complete coverage for the area of interest. There was no higher resolution coverage available for the area of interest. Analysis of the data revealed previously unmapped areas of ridge and furrow in the Northeast and West of the site area, and confirmed the previously mapped areas of ridge and furrow and drainage ditches shown on the NMP. Lidar also showed the location of a possible moated site to the west of the site near the drainage ditches.

Lidar data was examined in conjunction with digital mosaics of aerial photos displayed at www.google.com/earth in November 2017.

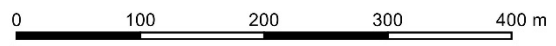
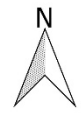
Gazetteer of Sites



APS SITE	ASSET TYPE	BROAD TYPE	COMMENT	NGR
	1 Ridge and furrow	Cultivation marks	Medieval/ Post Medieval field system.	ST 629 913
	2 Ridge and furrow	Cultivation marks	Medieval/ Post Medieval field system.	ST 632 914
	3 Eroded ridge and furrow	Cultivation marks	Partially eroded Medieval/ Post Medieval field system.	ST 633 915
	4 Bank	Earthwork	Bank associated with drainage ditch.	ST 631 915
	5 Drainage Ditch	Ditch	Drainage ditch.	ST 631 915
	6 Bank	Earthwork	Bank associated with drainage ditch.	ST 631 915
	7 Enclosure	Possible eroded moat	Enclosure present on Lidar, possible moated site.	ST 630 916
	8 Bank	Earthwork	Bank associated with drainage ditch.	ST 630 916
	9 Bank	Earthwork	Bank associated with drainage ditch.	ST 631 916
	10 Drainage Ditch	Ditch	Drainage ditch.	ST 629 916
	11 Bank	Earthwork	Bank associated with drainage ditch.	ST 629 916
	12 Bank	Earthwork	Bank associated with drainage ditch.	ST 630 916
	13 Drainage Ditch	Ditch	Drainage ditch.	ST 630 916
	14 Ridge and furrow	Cultivation marks	Medieval/ Post Medieval Field system.	ST 634 916
	15 Bank	Earthwork	Bank associated with drainage ditch.	ST 630 916
	16 Bank	Earthwork	Bank associated with drainage ditch.	ST 630 916
	17 Drainage ditch	Ditch	Drainage ditch.	ST 629 916
	18 Bank	Earthwork	Bank associated with drainage ditch.	ST 630 916
	19 Bank	Earthwork	Bank associated with drainage ditch.	ST 630 916
	20 Ridge and furrow	Cultivation marks	Medieval/ Post Medieval Field system.	ST 631 917
	21 Bank	Earthwork	Bank associated with drainage ditch.	ST 629 917
	22 Drainage Ditch	Ditch	Drainage ditch.	ST 629 917
	23 Eroded ridge and furrow	Cultivation marks	Partially eroded Medieval/ Post Medieval field system.	ST 637 917
	24 Ridge and furrow	Cultivation Marks	Medieval/ Post Medieval field system.	ST 635 917
	25 Eroded ridge and furrow	Cultivation marks	Partially eroded Medieval/ Post Medieval field system.	ST 632 918
	26 Ridge and furrow	Cultivation marks	Medieval/ Post Medieval field system.	ST 636 918
	27 Eroded ridge and furrow	Cultivation marks	Partially eroded Medieval/ Post Medieval field system.	ST 631 919



- Thornbury Shapefile
- Bank
- Drainage Ditch
- Eroded ridge and furrow
- Ridge and furrow
- Enclosure



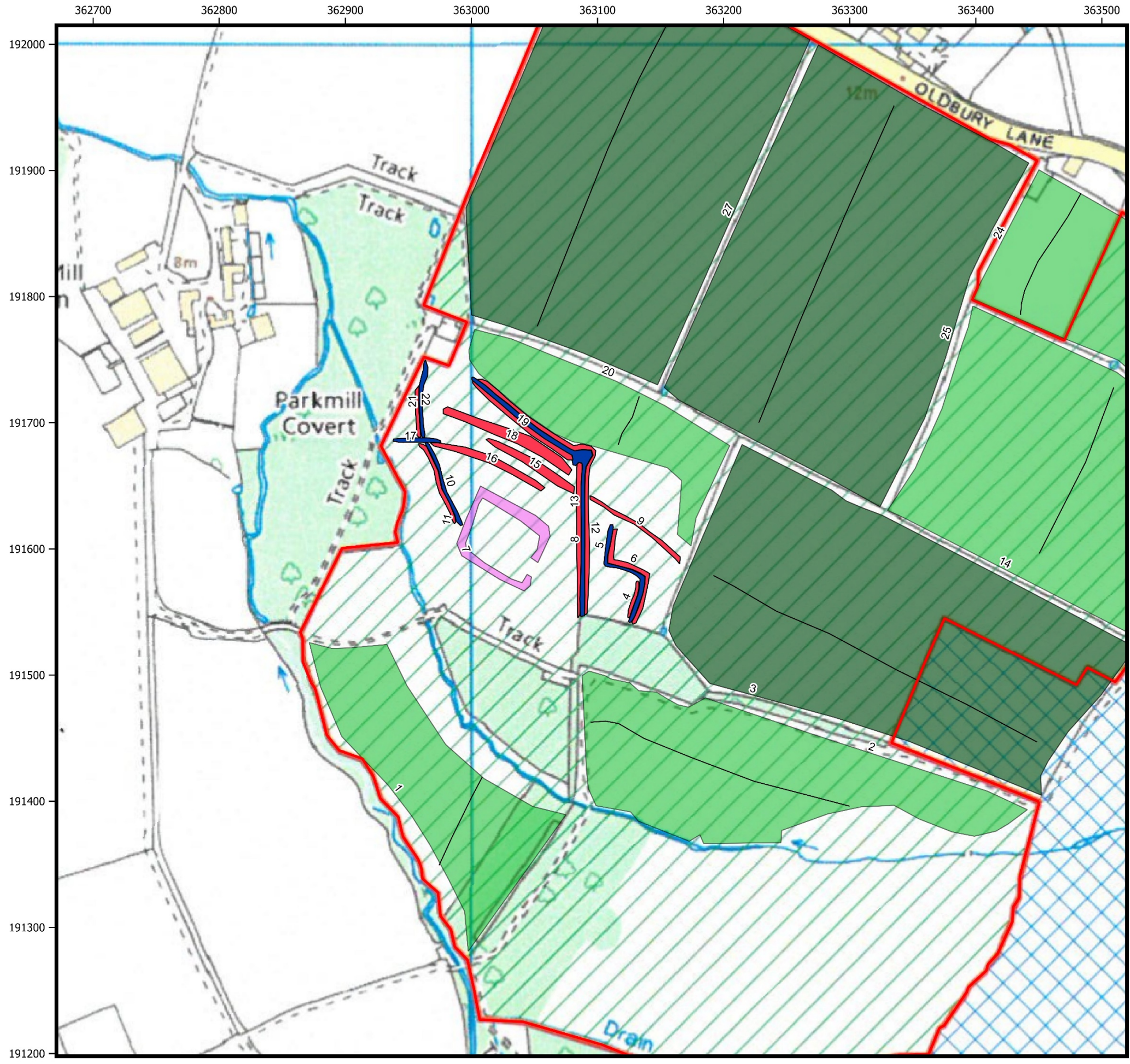
PLAN 1
Overview of features identified on Lidar visualisations within the area of interest

Thornbury
Assessment of Lidar Data

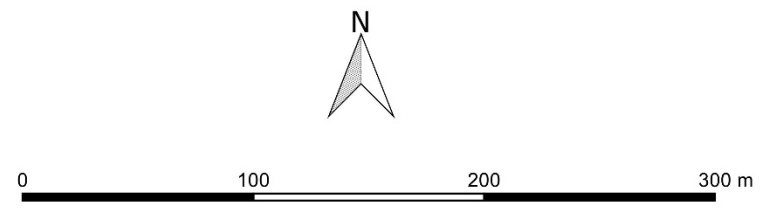
Client: BSA Heritage
Date: November 2017
Project: APS 217 11 04
By: Adam Jarvis
Source: Environment Agency Lidar



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- Thornbury Shapefile
- Bank
- Drainage Ditch
- Eroded ridge and furrow
- Ridge and furrow
- Enclosure



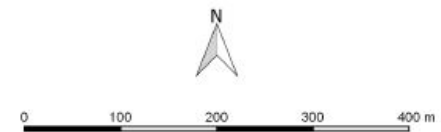
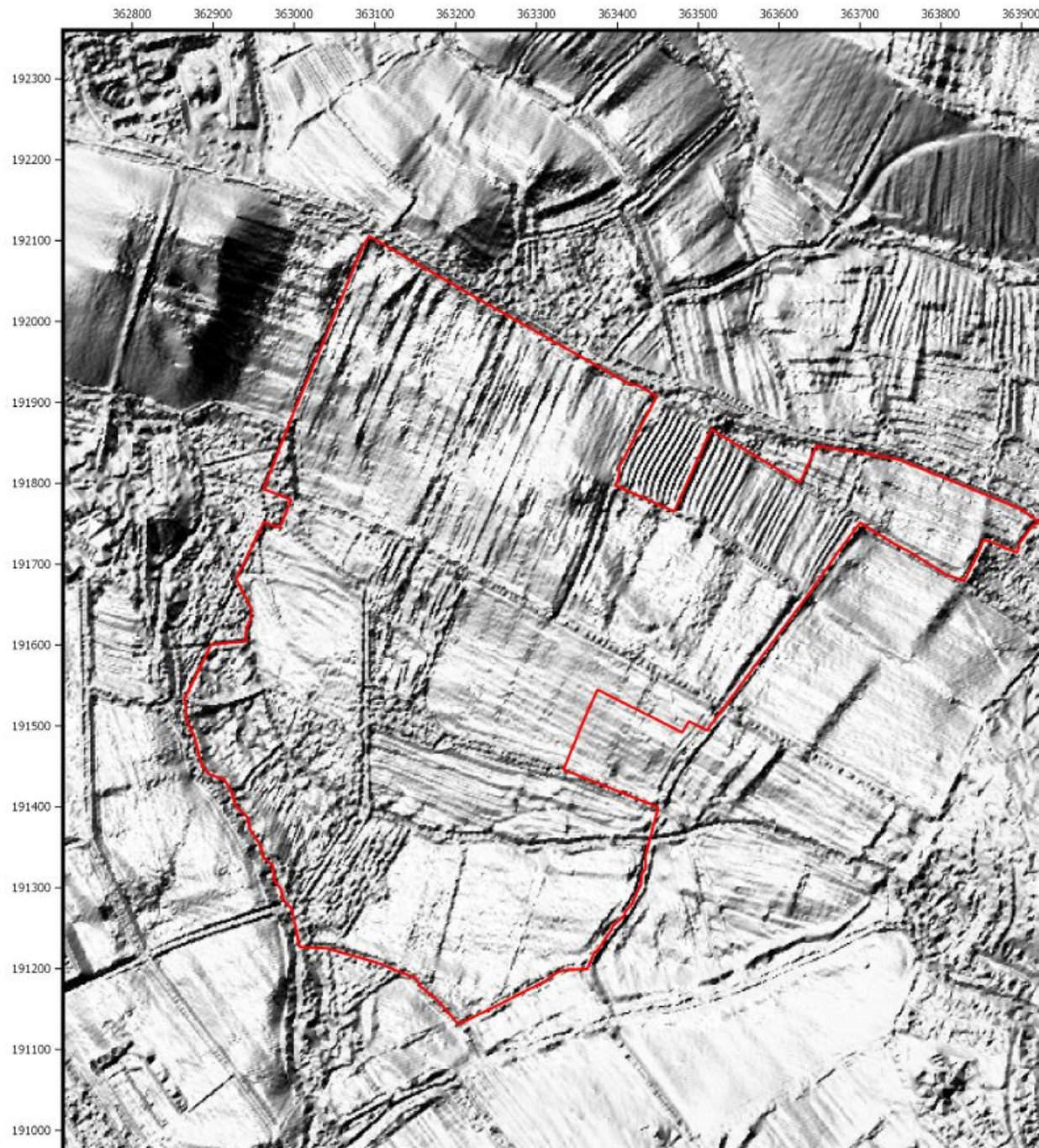
PLAN 2
 Detail of features identified on Lidar visualisations within the area of interest

Thornbury
 Assessment of Lidar Data

Client: BSA Heritage
 Date: November 2017
 Project: APS 217 11 04
 By: Adam Jarvis
 Source: Environment Agency Lidar



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PLAN 3

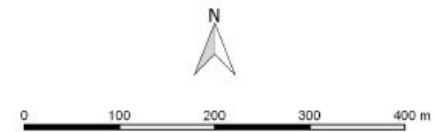
2m Hillshade visualisation of Environmental Agency Lidar data

Thornbury
Assessment of Lidar Data

Client: BSA Heritage
Date: November 2017
Project: APS 217 11 04
By: Adam Jarvis
Source: Environment Agency Lidar



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2m Simple Local Relief Model visualisation of Environmental Agency Lidar data

PLAN 4

Thornbury
Assessment of Lidar Data

Client: BSA Heritage
Date: November 2017
Project: APS 217 11 04
By: Adam Jarvis
Source: Environment Agency Lidar



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LiDAR-derived Local Relief Models - a new tool for archaeological prospection. *Archaeological Prospection* 18, 2
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Nuninger L, 2012
Visualisation of LiDAR-derived relief models for detection of archaeological features. *Journal of Archaeological Science* 39, 3354–3360.

The results are summarised by:

Plan 1 – a pdf file for ease of reference supplied at A4 and A3.

Gazetteer of sites – an Excel file saved as a pdf file for ease of reference

2 sample Lidar visualisations as pdf files derived from screen captures

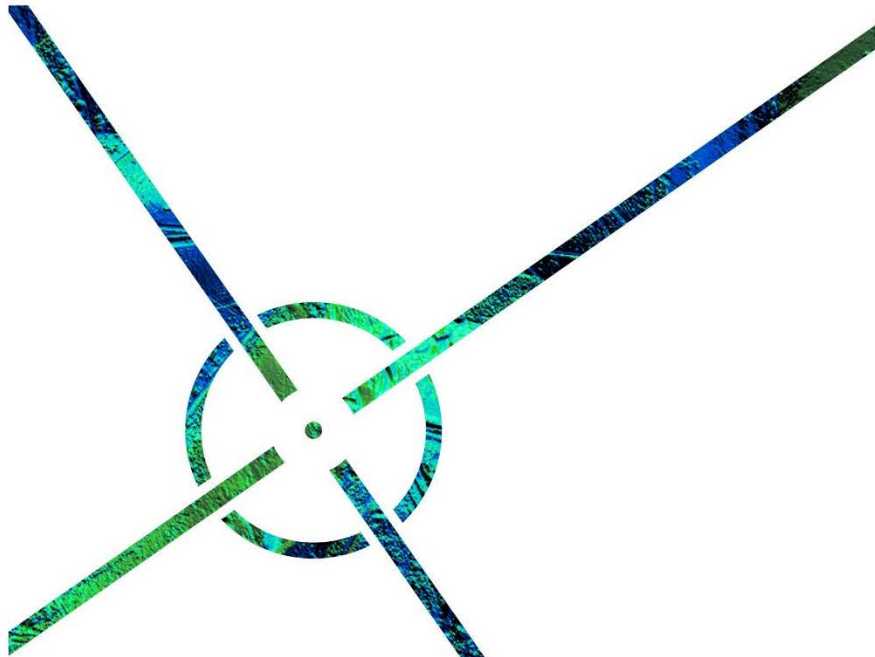
SHP files generated by the GIS recording

All above supplied in one compressed Zip folder.



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