A Place called Home: Understanding Bronze Age (c. 2400-800 cal BC) Settlement in Britain

EDWARD JAMES CASWELL

A Place called Home:

Understanding Bronze Age (c. 2400-800 cal BC) Settlement in Britain

By

Edward James Caswell

Abstract

This thesis studies the form, appearance, location and use of Bronze Age (c. 2400-800 cal BC) settlement sites in England, Scotland and Wales. It begins by providing a historiographical review of British Bronze Age settlement studies. This identifies that recent publications favour site specific discussions, while the past regionalised nature of settlement investigation has resulted in new findings often being overlooked. The thesis identifies a gazetteer of 22,000 potential Bronze Age settlement sites known to the historic environment records of England, Scotland and Wales. Compelled by the observation that prior studies have overly relied upon typo-chronological schema to their detriment, it primarily studies those sites associated with radiocarbon dates. It assesses the form of Bronze Age structures within these sites, the periods in which they are used, their location and the features found within them. It studies these using a bespoke database containing 1085 Bronze Age structures from 316 independent sites representing all excavated and radiocarbon dated examples in England, Scotland and Wales. It also draws upon datasets collated during the data collection phase including a gazetteer of 6975 potential Bronze Age settlement sites, 1488 Bronze Age settlement sites that

have been excavated although not necessarily radiocarbon dated and a dataset of over 9000 Bronze Age radiocarbon dates.

These analyses demonstrate that the dominant form of architecture is the roundhouse, although this takes many forms across the entirety of Britain. It identifies a boom in the construction of permanent settlement structures at 1700 cal BC, followed by a sharp decrease in settlement several hundred years later. It also finds that the majority of Britain was inhabited during the Bronze Age, although locations appear to be preferred closer to major rivers and the coast. These settlements were often short lived. Over half comprised less than three structures and few show signs of extensive social stratification. It concludes by suggesting the possible activities occurring on these settlement sites and, through the use of several other supporting datasets, demonstrates the value in assembling and analysing a national gazetteer of specific Bronze Age phenomena.

A Place called Home:

Understanding Bronze Age (c. 2400-800 cal BC) Settlement in Britain

By

Edward James Caswell

Submitted for the qualification of PhD in the Department of Archaeology

Durham University

2019

Table of Contents

CHAPTER 1: AN INTRODUCTION TO SOCIETY AND SETTLEMENTS IN THE BRITISH BRONZE AGE 1

1.1 Social transformations in the British Bronze Age 1

1.2 Understanding Bronze Age societies in Britain 5

1.2.1 Problem statement 1 6

1.2.2 Problem statement 2 9

1.3 Understanding the Bronze Age in Britain through settlements 10

1.4 Synthesising Bronze Age settlements in Britain 12

1.4.1 Problem statement 3 16

1.5 Aim 17

1.5.1 Research questions 18

1.5.2 Discussion Themes 21

1.6 Approaches to the research questions 21

1.7 Structure of the thesis 22

CHAPTER 2: HOW BRONZE AGE SETTLEMENTS HAVE BEEN STUDIED IN BRITAIN – A REVIEW OF LITERATURE AND RESEARCH CONTEXT 24

2.1 Introduction 24

2.2 The first studies of Bronze Age settlement (18th century–1940) 25

2.2.1 Earliest recognitions of Bronze Age settlements 25

2.2.2 Chronology 27

2.2.3 Finding post holes ... 28

2.2.4 Sussex Bronze Age houses ... 30

2.2.5 Little Woodbury ... 32

2.2.6 Summary ... 32

2.3 Post Woodbury settlement studies (1940-1970) ... 33

2.3.1 Continued excavation ... 34

2.3.2 Typologies ... 37

2.3.3 Radiocarbon dating ... 39

2.4 New Archaeology (1970-1990) ... 40

2.4.1 Continued research into settlements ... 42

2.4.2 Summation ... 44

2.4.3 Defining Bronze Age settlement structure form ... 45

2.4.4 Landscape studies ... 51

2.4.5 Ellison's thesis and 1980 articles ... 54

2.4.6 Narratives ... 55

2.4.7 Summary ... 57

2.5 It's not the economy stupid (1990-2000) ... 57

2.6 Moving to the present era (2000-2019) ... 61

2.6.1 Themes ... 62

2.7 Conclusion ... 71

2.7.1 Reaching proposition 1 ... 72

2.7.2 Reaching proposition 2 ... 74

2.7.3 Reaching proposition 3 ... 75

2.7.4 Summary ... 76

CHAPTER 3: THEORETICAL AND METHODOLOGICAL APPROACHES OF THE RESEARCH PROJECT ... 77

3.1 Introduction ... 77

3.2 Theoretical approach ... 77

3.2.1 Structuring space and understanding the past ... 78

3.2.2 Testing theories or asking questions ... 79

3.2.3 Settlements and landscapes ... 80

3.2.4 Why is big data useful for studying settlement? ... 82

3.3 Definitions ... 85

3.3.1 Time period - Bronze Age ... 85

3.3.2 The region of study – Britain ... 87

3.3.3 Subject matter ... 89

3.3.4 Settlement sites ... 90

3.3.5 Settlement structures ... 91

3.4 Methodology: Data collection, recording and management ... 92

3.5 Data collection ... 92

3.5.1 Defining the thesis's subject matter ... 93

3.5.2 Creating a gazetteer ... 94

3.5.3 Strand 1: Systematic search of HERs/UADs/SMRs ... 98

3.5.4 Strand 2: Grey literature search ... 103

3.5.5 Strand 3: Literature review ... 105

3.5.6 Summary ... 107

3.6 Refining the gazetteer ... 109

3.6.1 Method ... 112

3.6.2 Issues with the method ... 115

3.6.3 Pivoting the study ... 125

3.6.4 Defining the study set ... 127

3.7 Incorporating existing databases ... 128

3.7.1 Radiocarbon data ... 128

3.7.2 Additional site corpora ... 131

3.7.3 Metalworking data ... 131

3.7.4 A methodology for incorporating new sites efficiently into the database. ... 132

3.8 Creating a database ... 134

3.8.1 Criteria ... 135

3.8.2 Database design ... 136

3.8.3 Fields recorded ... 136

3.8.4 Keying data ... 137

3.8.5 Data quality ... 137

3.8.6 Categorisation issues ... 138

3.8.7 Limitations ... 145

3.8.8 Data assessment ... 146

3.9 The database structure ... 146

3.10 Summary ... 149

CHAPTER 4: *WHAT DID BRONZE AGE SETTLEMENTS LOOK LIKE?* A STUDY OF THE USE AND SHAPE OF DOMESTIC ARCHITECTURE AND FEATURES ... 152

4.1 The high-resolution dataset ... 153

4.2 What is the shape of Bronze Age architecture? ... 155

4.3 Circular structures ... 156

4.3.1 Circular architecture size ... 156

4.3.2 Construction method 168

4.3.3 Roundhouse features discussion 196

4.4 Quadrilateral structures 210

4.4.1 Square and rectangular architecture sizes 210

4.4.2 Chronology 216

4.4.3 Distribution 216

4.5 Table summaries 217

4.6 Discussion 219

4.6.1 How representative are the data of the wider samples identified? 219

4.6.2 How applicable are the results of this analysis? 220

4.6.3 When is a house a home? The shape and size of Bronze Age architecture 221

4.6.4 How do Bronze Age settlements change over time? 224

4.6.5 To what extent are the forms of structures seen regionally specific? 225

4.7 Summary 226

CHAPTER 5: *WHEN DID IT ALL HAPPEN?* ESTABLISHING A DIACHRONIC FRAMEWORK FOR BRITISH BRONZE AGE SETTLEMENTS 228

5.1 Introduction 228

5.2 Means of establishing a chronology 230

5.3 Absolute chronologies 230

5.4 Creating an absolute chronology for Bronze Age settlements 232

5.4.1 The raw dataset 232

5.4.2 Data quality and refinement 233

5.4.3 The final data set 237

5.4.4 Specific biases recognised in the study 240

5.4.5 Bayesian analysis 241

5.5 Relative chronologies 261

5.6 Creating a relative chronology for Bronze Age settlements 262

5.7 Discussion 266

5.7.1 Comparing the relative and absolute chronologies for Britain 266

5.7.2 How vulnerable are the modelled narratives to change? 268

5.8 Conclusion 275

CHAPTER 6: *WHERE WERE SETTLEMENTS FOUND?* INVESTIGATING SETTLEMENT SITE DISTRIBUTIONS ACROSS BRITAIN 278

6.1 Introduction 278

6.2 What is the general distribution of Bronze Age settlement sites? 280

6.2.1 Coarse dataset 280

6.2.2 Radiocarbon dataset 290

6.3 Where does settlement density increase? 295

6.3.1 Comparing the density of domestic structures in Britain over time 302

6.3.2 Summary and discussion 306

6.4 Is there a set of preferred environmental attributes for settlement structures? 308

6.4.1 Elevation upland vs lowland 308

6.4.2 People and water 313

6.4.3 Land use 327

6.4.4 Soils 329

6.5 Conclusion 332

CHAPTER 7: DISCUSSION - GETTING CLOSER TO THE *WHYS* OF SETTLEMENT 335

7.1 Bronze Age villages? 336

7.1.1 Village definition 337

7.1.2 What is the average number of houses in a Bronze Age settlement? 337

7.1.3 Summary 341

7.2 DT 1.2 How dispersed are settlements? 342

7.2.1 Method 342

7.2.2 Results 344

7.2.3 Discussion 346

7.3 How far is far? 347

7.4 What are settlements associated with? 355

7.4.1 Enclosures 356

7.4.2 Food 360

7.4.3 Manufacture 361

7.4.4 Burials 363

7.5 Continental comparisons 368

7.5.1 Comparing Early Bronze Age architectural forms 370

7.5.2 Comparisons to Irish Later Bronze Age settlement structures 371

7.5.3 Comparisons to north western european Later Bronze Age settlement structures 373

7.5.4 Structure size 374

7.5.5 Settlement numbers over time 376

7.5.6 Conclusions 379

7.6 Summary 381

CHAPTER 8: CONCLUSION 383

8.1 Introduction **383**

8.2 Results summary and significance **384**

8.2.1 Settlement form 384

8.2.2 Settlement intensity and dates 387

8.2.3 Settlement location 391

8.2.4 Baseline significance summary 394

8.3 Understanding the Bronze Age and its settlements **395**

8.3.1 Models of transformation in the Bronze Age? 396

8.3.2 Progressing Problem Statement 2 411

8.4 Discussion on big data: The wider significance of the thesis' method and results **419**

8.4.1 Data collation method 420

8.4.2 Why is this important? 422

8.5 Future work **425**

8.5.1 8.5.1 Filling in the blanks 425

8.5.2 Summed radiocarbon dates 426

8.5.2 Contextualising the data further - Using new datasets 427

8.5.3 8.5.3 Macro study 428

8.5.4 8.5.4 Dartmoor 428

8.5.5 8.5.5 Looking beyond Britain 429

8.6 Conclusion **429**

APPENDICES 433

9.1 Appendix 1 The database **433**

BIBLIOGRAPHY .... ERROR! BOOKMARK NOT DEFINED.

List of Figures

Figure 1 The chronological framework of the Bronze Age in Britain. 5

Figure 2 The thesis study region 88

Figure 3 Status of data collected from each region 103

Figure 4 All 22015 sites returned during the data collection phase of the study ... 110

Figure 5 Simplified distribution of 22015 sites displayed in Figure 4. 111

Figure 6 Infographic of the data refining process 114

Figure 7 Results of the DBScan cluster experiment in the south of Dartmoor 120

Figure 8 Results of the DBScan cluster experiment in the northwest of Dartmoor 121

Figure 9 Results of the DBScan cluster experiment in the southwest of Dartmoor 122

Figure 10 Results of the DBScan cluster experiment at Grimspouund. 123

Figure 11 The relational design models used for the supporting database 148

Figure 12 Infographic of the features selected for analysis in chapter 4 154

Figure 13 Histogram of the size of roundhouses 160

Figure 14 The distribution of roundhouses by different sizes and height AOD 161

Figure 15 Roundhouse diameters and their distribution across Britain 162

Figure 16 A presentation of the surface area of structures 164

Figure 17 Boxplots displaying the size of the study’s roundhouses 166

Figure 18 Boxplots displaying the size of the those roundhouses with C14 167

Figure 19 Boxplots displaying the size of the those roundhouses without C14...... 167

Figure 20 Ground plan of Hut 3 from Black Patch, Sussex 168

Figure 21 Schematic plan of a simple post ring structure with a visible porch 169

Figure 22 Plan of simple post ring structures 170

Figure 23 The distribution post ring structures in Britain..171

Figure 24 Histogram of the size of single posting ring roundhouses.......................172

Figure 25 SPD of Bronze Age post ring structuresof...174

Figure 26 Schematic plan of a double post ring structure with a visible porch 175

Figure 27 Plan of double post ring structures..176

Figure 28 The distribution of a double ring structures in Britain 177

Figure 29 Histogram of the size of double posting ring roundhouses.....................178

Figure 30 Schematic plan of a ring groove structure..180

Figure 31 Plan of ring groove structures..181

Figure 32 The distribution of ring groove structures in Britain 182

Figure 33 Histogram of the size of ring groove roundhouses.................................183

Figure 34 The distribution of structures with stone features.................................185

Figure 35 Schematic plan of a ring bank structure 186

Figure 36 Histogram of the size of ring bank roundhouses....................................187

Figure 37 Histogram of the size of stone walled roundhouses 189

Figure 38 Terraced rounded structures 192

Figure 39 The distribution terraced structures...193

Figure 40 Early Bronze Age irregular structures 195

Figure 41 The distribution of those Bronze Age structures with gully features......197

Figure 42 The direction of entrances of Bronze Age settlement structures 200

Figure 43 Those doorway orientations where identified divided by period 200

Figure 44 The distribution of those Bronze Age structures with hearths 205

Figure 45 The distribution of those Bronze Age structures with central posts.......206

Figure 46 Scatter plot of rectangular structures width and length 211

Figure 47 Histogram of rectangular structures width and length 211

Figure 48 Histogram of four poster structures width and length 213

Figure 49 Scatter plot of four poster structures width and length 213

Figure 50 The distribution of those Bronze Age rectangular structures 214

Figure 51 Boxplots displaying the size of those rounded structures....................... 218

Figure 52 Boxplots comparing the surface area of all Bronze Age structures 218

Figure 53 The distribution of rectangular structures with floor space > $25m^2$ 222

Figure 54 The reduced number of sites following c14 quality assesment. 240

Figure 55 Modellled SPD of C14 dates found from Bronze Age structures............. 248

Figure 56 SPD of dates directly associated with a Bronze Age structure in Britain 248

Figure 57 Unmodellled SPD of C14 dates found from Bronze Age structures. 249

Figure 58 Modellled SPD of C14 dates from construction phases. 251

Figure 59 Unmodellled SPD of C14 dates from construction phases. 251

Figure 60 Distribution of construction phase dates 252

Figure 61 Modellled SPD of C14 dates from occupation phases. 255

Figure 62 Unmodellled SPD of C14 dates from occupation phases 255

Figure 63 Distribution of occupation phase dates.. 256

Figure 64 Modellled SPD of C14 dates from abandonment phases. 258

Figure 65 Modellled SPD of C14 dates from occupation phases. 258

Figure 66 Distribution of abandonment phase dates.. 259

Figure 67 Diachrnoinc model using provisional relative dates 266

Figure 68 Comparison of C14 and relative diachronic models 267

Figure 69 SPD of all dates, regardless of quality, with and without modelling 270

Figure 70 SPD of all construction phase dates with and without modelling 271

Figure 71 SPD of all occupation phase dates with and without modelling. 272

Figure 72 SPD of all abandonment phase dates with and without modelling 273

Figure 73 The 1488 Bronze Age settlement sites that have been excavated..........281

Figure 74 The “Severn Wash line” 282

Figure 75 The study area divided by National Character Area 285

Figure 76 The Severn Estuary region divided by National Character Areas 286

Figure 77 The distribution of coarse sites divided by period.................................288

Figure 78 The distribution of the 316 C14 sites divided by period..........................289

Figure 79 Those regions divided by the data collection method's effectiveness....291

Figure 80 Those earliest Radiocarbon dated Bronze Age settlement sites 294

Figure 81 The relative intensity of settlements by period (coarse dataset)...........298

Figure 82 The relative intensity of settlements by period (C14 dataset) 299

Figure 83 The relative increase in the number of settlements over time 300

Figure 84 The average increase in the number of settlements over time 301

Figure 85 The relative intensity of radiocarbon dates by period. 303

Figure 86 The relative proportion of settlements divided between height bands .310

Figure 87 The proportion of settlements within distance bands of a main river....319

Figure 88 Graph of settlements within distance bands of a main river 320

Figure 89 The proportion of the 3 datasets within distance bands of the coast 326

Figure 90 Settlement size box plots distribution 339

Figure 91 Dispersal distances of Bronze Age settlements boxplot.........................345

Figure 92 The 10 control points used to assess the dispersal 350

Figure 93 Control points 1, 2 and 3 dispersal experiment results..........................351

Figure 94 Control points 4, 5 and 6 dispersal experiment results..........................352

Figure 95 Control points 7, 8 and 9 dispersal experiment results..........................353

Figure 96 Control points 10 dispersal experiment results.....................................354

Figure 97 Middle Bronze Age cremation burials relationship to settlements 366

Figure 98 The region understood by the thesis as north western Europe.............370

Figure 99 A comparison of the SPD models from this thesis and Ginn 2012..........378

Figure 100 Schematic ground plans of Irish roundhouses traced from Ginn 2016.373

Figure 101 Comparison of ceramics, metal and the thesis' diachronic model. 398

Figure 102 Comparison of metalworking and the thesis' diachronic model...........400

Figure 103 SPD direct crop dates in the British Isles.. 402

Figure 104 Comparison of crop SPD and the thesis' diachronic model 402

Figure 105 SPD all identified Bronze Age burial related radiocarbon dates 407

Figure 106 Comparison of Bevan et al.'s SPD with the thesis' diachronic model. ..408

List of Tables

Table 1 Search terms used to find potential Bronze Age settlement sites 100

Table 2 The thesis' classification system (settlement form)..................................116

Table 3 The thesis' classification system (excavation occurred?). 117

Table 3 The thesis' classification system (assoicated C14 dates). 117

Table 4 Ceramic chronology for the Bronze Age in Britain.....................................141

Table 5 The proportion of those Bronze Age structures general shape 156

Table 6 The effects of underestimating a roundhouse's area by 0.16m 157

Table 7 Average roundhouse areas 159

Table 8 Size of roundhouses divided by time 166

Table 9 Size of roundhouses divided by time using only C14 dated structures 166

Table 10 Size of roundhouses divided by time excuding C14 dated structures 167

Table 11 Chronological distribution of Bronze Age post ring structures................173

Table 13 Chronological distribution of Bronze Age double post ring structures 178

Table 14 Chronological distribution of Bronze Age ring groove structures 183

Table 15 Chronological distribution of Bronze Age ring bank structures...............188

Table 16 Chronological distribution of Bronze Age stone-walled structures..........190

Table 17 Chronological distribution of terraced Bronze Age structures 194

Table 18 Chronological distribution of gully features on Bronze Age structures....198

Table 19 Chronological distribution of structure forms 201

Table 20 Chronological distribution of four poster structures 215

Table 21 Chronological distribution of the rectangular structures 216

Table 22 Quantities of different settlement structures found in Britain 217

Table 23 Quantities of different settlement structures found in Britain 217

Table 24 The diameter of those Bronze Age rounded structures 217

Table 25 The floor area of all Bronze Age settlement structures 217

Table 26 A comparison of the floor space of Bronze Age settlement structures ... 224

Table 27 Radiocarbon quality data identifiede 237

Table 28 The number of Bronze Age sites and features with radiocarbon dates ... 237

Table 29 Organisation and division of radiocarbon dates in the study 238

Table 30 Further division of useable radiocarbon dated structures by reliability .. 238

Table 31 Radiocarbon dates found to directly relate to one phase of structures .. 239

Table 32 Existing bayesian models of settlement duration 242

Table 33 Diachronic model for settlement use over the Bronze Age 260

Table 34 Period of activity identified by radiocarbon dates 265

Table 35 Provisional dates from the data arranged by typological period 266

Table 36 Those regions lacking a single excavated Bronze Age settlement 284

Table 37 Count of sites within each region divided by date 300

Table 38 The quantity of radiocarbon dates per region, per period 304

Table 39 Comparison chart of the ratio of sites and dates per period, per region . 306

Table 40 Upland, lowland count of Bronze Age settlements 309

Table 41 Upland, lowland count of Bronze Age settlements Chi squared test 309

Table 42 Settlement proximtiy to main rivers 317

Table 43 Settlement proximtiy to main or secondary rivers 318

Table 44 Settlement proximtiy to main rivers Chi squared test 321

Table 45 Settlement proximtiy to main or secondary rivers Chi squared test 322

Table 46 Settlement proximtiy to the coast 325

Table 47 Settlement proximtiy to the coast Chi squared test 326
Table 48 Land types used by Bronze Age settlements 328
Table 49 Land drainage quality used by Bronze Age settlements 331
Table 50 The percentages of Bronze Age settlements divided by soil fertility 332
Table 51 Settlement size 339
Table 52 Dispersal distances of Bronze Age settlements in the study dataset 345
Table 53 Provisional date of settlements with metalworking 362
Table 54 The thesis' radiocarbon diachronic model 387

Acknowledgments

This thesis has been a monster of a task, and it is only close to its full potential due to the help, guidance, support and data provided by numerous individuals.

I am particularly indebted to my primary supervisor, Ben Roberts, for his guidance, patience and support in all aspects of this project, among many others, this work, the existing publications from it, and those I hope to be able to produce in the near future would not exist were it not for his nurturing and challenging encouragement.

Additional thanks are also due to the thesis' secondary supervisor Tom Moore, and its advisory panel PhD's Penny Wilson, Mark White, Janet Montgomery whose comments and monitoring helped ensure the thesis was delivered on time and to a satisfactory quality. Similarly this thesis was substantially improved by comments and critiques provided during its defence from Stijn Arnouldsen and Rob Witcher.

This paper was supported by the Arts and Humanities Research Council [AH/L503927/1] through the Northern Bridge Doctoral Training Partnership. I would also like to thank the following institutions for providing grants for fieldwork and conference attendance at various times: Ustinov College and the Grey College and the Rosemary Cramp Fund. I would also to thanks to the CAA International bursary committee and the wider CAA community both for similar funding towards conference participation.

This thesis relies on a wealth of data recorded and preserved by the data from 109 heritage records from England, Scotland and Wales. At the start of the thesis I had little understanding of the data held and the means to exploit this such that special thanks should be given to each of the HER who responded to my no doubt clumsy attempts to access and make use of their data and their willingness to be so forthright in delivering what, at the time, may have seen as irregular requests. Those HER officers who were so patient include (*take a breath*):

Rob Edwards, Cheshire HER, Mark Brennand, Cumbria HER, Lesley Dunkley, Greater Manchester HER, Holly Beavitt , Lake District HER, Ken Davies, Lancashire HER, Dr Ben Croxford , Merseyside HER, Nick Boldrini and Dr John Hammond, Durham HER, Liz Williams, Northumberland HER, Rachel Grahame, Humber Archaeology Partnership, Jennifer Morrison , Tyne and Wear HER, Victoria Bowns, Humber Archaeology Partnership, Hugh Winfield , NE Lincolnshire HER, Mike Hemblade, North Lincolnshire HER, Graham Lee, North York Moors NP HER , Louisa Matthews , North Yorkshire HER, Zac Nellist, South Yorkshire SMR, Rosalind Buck , West Yorkshire HER, Miles Johnson, Yorkshire Dales HER, Nichola Manning , Derbyshire HER, Chris Wardle, Leicester City HER, Helen Wells , Leicestershire HER, John Herridge, Lincoln Heritage Database, Mark Bennet, Lincolnshire HER, Chris(tine) Addison, Northamptonshire SMR, Virginia Baddeley, Nottinghamshire HER, Nick Tringham, Birmingham HER, Anna Wilson, Coventry HER, Jayne Pilkington and Mike Mather, Dudley HER, Lucie Dingwall , Herefordshire HER, Mark Watkins, Sandwell HER, Penny Ward, Shropshire HER, , Solihull SMR, Suzy Blake, Staffordshire HER, Jonathan Goodwin, Stoke-on-Trent SMR, Will Steele, Warwickshire HER, Ellie

Ramsey, Wolverhampton and Walsall HER, Sheena Payne-Luan, Worcester City HER, Aisling Nash, Worcestershire HER, Bedford Borough HER, Sarah Bultz, Cambridgeshire HER , Sam Mellonie, Central Bedfordshire and Luton HER, , Colchester UAD, Alison Bennett, Essex HER, Isobel thompson, Hertfordshire HER, Alice Cattermole, Norfolk HER, Sarah Botfield , Peterborough City HER, Ken Crowe, Southend SMR, Richard Hoggett, Suffolk HER, Patrick Booth , Greater London HER, Teresa Hocking, Berkshire Archaeology HER, Julia Wise, Buckinghamshire HER, -, Canterbury UAD, James Kenny, Chichester District HER, Sophie Unger , East Sussex HER, Alex Bellisario , Hampshire, Dr Becky Loader , Isle of Wight HER, Andrew Mayfield , Kent HER, Nick, Milton Keynes HER, David Radford , Oxford UAD, Susan Lisk, Oxfordshire HER, Jennifer Macey, Portsmouth City HER, Ingrid Peckham , Southampton HER, Emily Brants , Surrey HER, Sarah Orr, West Berkshire HER, Dan Phelps, West Sussex HER, Tracy Matthews, Winchester HER, Rod Millard, Bath and North East Somerset SMR, peter insole, Bristol City Council HER, Emma Trevarthen, Cornwall and Scilly HER, Sue watts, Dartmoor National Park HER, Marrina Neophytou, Devon HER, Claire Pinder, Dorset HER, Andrew PYE, Exeter HER, Catherine Dove, Exmoor National Park HER, Andrew Armstrong, Gloucester City Council HER, Tim Grubb, Gloucestershire HER, Rachel Broomfield, Plymouth HER, Chris Webster, Somerset HER, Paul Driscoll, South Gloucestershire HER, Hal Bishop, Torbay HER, , Redcar & Cleveland HER, Chris Martin, Clwyd-Powys, Marion Page, Dyfed, Edith Evans , Glamorgan-Gwent, Angharad Stockwel, Gwynedd, Ian Scrivener-Lindley , Highland HER, Jen Brown, Aberdeen City, Caroline palmer, Aberdeenshire, Angus, Moray, Andrew Nicholson, Dumfries and Galloway , Stephanie Leith , East Lothian, Doug Speirs and there will be another name, Fife, Julie Gibson, Orkney Islands, Sarah Winlow, Perth and Kinross Heritage Trust, Christopher Bowles, Scottish Borders, Val Turner, Shetland Amenity Trust, Martin O'Hare, WoSAS, Thomas Rees, Dundee City. In particular I would also like to single out Emma Whitcombe, Wiltshire and Swindon HER, who help in the early stages of the PhD’s data collection was vital in defining the overall direction of the thesis.

Throughout my time at Durham the students of the Department of Archaeology have provided an eclectic atmosphere in which to undertake research. The following individuals have contributed enormously both to my work through their inspiring research, determination and have helped me maintain through there all around good will. These include staff at Durham including; Cathie Draycott, Dan Lawrence, and PhD students including Floor Huisman, Stephen Humphreys, Emily Hanscam, Lucie Johnson, Edward Treasure, Abigail Taylor and Michelle De-Gruchy.

For want of a better section in which to mention their names I’d also like to mention Joe Roe, for help on using statistical packages within R and James Edwards for his contribution towards a joint article with myself and Michelle De-Gruchy whose results contribute to this work.

The thesis is the result not only of countless years of research into the topic of Bronze Age settlements but also training, advice and guidance which while not necessarily always visible within the thesis have certainly contributed to its successes. As such I would like to thank Chris Green, Axel G. Posluschny, Rob Wiseman for their advice and comments across numerous events that have helped guide this research. I would also like to single out Joanna Brück and Ann Woodward and Stijn Arnoldussen for allowing me access to their theses which provided a fantastic guidance on how to study Bronze Age settlements.

During the time researching and writing this thesis I was able to take the opportunity of an in work student development placement with the group DigVentures also funded by the Northern Bridge Doctoral Training Partnership. While primarily an opportunity to develop my practical archaeology skills, I found my time with this group was also able to improve the outcome of this PhD in numerous way, as such I wanted to extend my thanks to Brendon and Lisa Westcott Wilkins, Chris Casswell (no relation), Manda Forster, Maiya Pina-Dacier, Johanna Ungemach, Harriet Tatton, Maggie Eno and Stuart Eve. Similarly near to the end of the thesis' write up I was lucky enough to be able to take up an exciting opportunity with the Portable Antiquities Scheme on the proviso that I'd be allowed the time and flexibility to complete this research. This time and flexibility were generously given and so I would like to extend my thanks to Laura Burnett and the member of the South West Heritage Trust for their understanding.

Bringing these acknowledgements to a close I'd like to thank my family, Penina Caswell, John Caswell and Anna Caswell for their support, love and understanding, particularly during the final trying months of finishing this work. The amount of care and attention they gave me during this time is only surpassed by Li who deserves an unending amount of thanks and recognition. Without you the thesis would have been a shadow of its current state.

Chapter 1: An introduction to society and settlements in the British Bronze Age

This thesis explores the structural characteristics, intensity of use, location, and roles of the built Bronze Age settlements in England, Scotland and Wales between c. 2400-800 cal BC. It aims to provide a systematically quantified baseline for this phenomena which may be easily integrated into wider studies of the Bronze Age (c. 2400-800 cal BC), thus furthering our understanding of the period.

This introductory chapter provides a broad context for the thesis. It briefly explains our current understanding of the Bronze Age in Britain, specifically three large social transformations that occurred during the period and how the Bronze Age societies that experienced these changes have been described. It then identifies how the study of Bronze Age settlements is key for developing this understanding and further argues that, for this to progress, a quantitative baseline study of Bronze Age settlements sites in Britain is required. It then sets out the study's aim, objectives, research questions, discussion themes and method for doing so. This chapter concludes with this thesis' overall structure. A full discussion of previous studies of Bronze Age settlements is reserved for Chapter 2.

1.1 Social transformations in the British Bronze Age

The British Bronze Age is a period of approximately 1600 years (Figure 1), placed between c.2400 cal BC and 800 cal BC. During this period *at least* three seismic social transformations occurred that would have fundamentally altered the lives of the inhabitants of the British Isles. It has recently been suggested that the Early Bronze Age (c.2400-1600 cal BC) appears to be a period of substantial demographic change when seen through the genetic record (Olalde, Brace, Allentoft, *et al.* 2018). This record indicates the arrival of a population from continental Europe, possibly the eastern steppe (*ibid)*. While the reasons and mechanisms for the demographic change seen at this time are still debated (Furholt 2019), the end result of this transition was the replacement of approximately 90% of Britain's gene pool over only a few hundred years (Olalde, Brace, Allentoft, *et al.* 2018). This shift is associated with changes seen in the archaeological record, in particular the appearance of Bell Beaker funerary ideology, technology and material culture (Parker Pearson, Sheridan, Jay, *et al.* 2018). Yet, at this time the settlement record is understood to consist of a limited number of ephemeral sites suggesting a mobile population, the form of which is similar to those seen in the Later Neolithic (c.3000-2400 cal BC) (Gibson 2019; Simpson 1971) which may suggest this transformation was not as abrupt as is currently described.

Following a change in the demography of the British Isles in the Early Bronze Age, it is has been argued that it was during the Middle Bronze Age (c.1600-1150 cal BC), and not the Neolithic (c.4000-2400 cal BC), that mixed, rather than pastoral, farming was truly established as a primary means of production (Barrett 1994; Childe 1940 p.187; Stevens & Fuller 2012; Thomas 1991; but see Bishop 2015). This is clearly supported by the appearance of new field systems seen across southern Britain (Yates 2007), and now Ireland (Whitefield 2017), and may be linked to a new form of architecture (Bradley 2007 pp.181–182; Bradley, Haselgrove, Vander Linden, *et al.* 2016 pp.182–188; Ghey, Edwards, Johnston, *et al.* 2007; Jones &

Quinnell 2011; Pope 2015; See also Chapters 2 and 4) that appears to be far more visible and numerous than those structures seen in the Early Bronze Age (Simpson 1971; Gibson 2019).

The importance of these transitions alone would mark out this period as one worthy of understanding. Yet it is also during this time that metals began to be used in the British Isles. The bronze that coined the period's name appears to have first been used for the elaboration of existing technologies such as axeheads (Schmidt & Burgess 1981; Needham 1983) and daggers (Gerloff 1975) and in the elaboration of personal burials (Hunter & Woodward 2014). It similarly allowed the production of entirely new innovations such as halberds (Needham, Davis, Gwilt, *et al.* 2015) and in the later Bronze Age (c.1600-800 cal BC) provided a means of differentiating social status through clothing (Powell 1954; Needham 2000a, 2012; Sheridan & Shortland 2003) and adornments (O'Connor, Roberts & Wilkin 2017; Smith 1959; O'Connor, Roberts & Wilkin 2017; Wilkin 2017; Roberts 2007). Similarly the development of feasting equipment (Needham & Bowman 2005; Gerloff & Northover 2010) and weapons (Colquhoun & Burgess 1988; Uckelmann 2012; O'Connor, Cowie & O'Neil 1995; Davis 2006, 2012, 2015) made of bronze are suggested as contributing to the increasing efficiency and ritualisation of interpersonal competition and violence (Dolfini, Horn & Uckelmann 2018; Horn 2017; Treherne 1995). At the very least then, in the Early Bronze Age (c.2400-1600 cal BC) the appearance of metals allowed the development of new technology, whilst during the Later Bronze Age (c.1600-800 cal BC) it allowed existing societal structures to be transformed into new, and inevitably glamourous, ways. It has been suggested that settlements in Bronze Age Britain reflect a response to this new technology as seen in the rise of new potentially defensive settlements (Allen, Hayden, Lamdin-Whymark, *et al.* 2009; Bradley & Ellison 1975; Brown & Medlycott 2013) that may have been locations of metalworking. Yet it is not known how widespread or representative this change in settlement is or what proportion of sites were used for the production of metalwork.

The significance of the transitions in demography, subsistence and technology mean that it is essential that the Bronze Age is studied and understood within any study of the British Isles' past. Importantly, understanding these islands' development also has a wider impact as it is one of the few regions in Europe that has access to copper, from northern Wales, and tin, from Cornwall. The importance of the former mineral is demonstrated by the vast investment of time in extracting copper from the Great Orme during a relatively limited period, which is at a scale requiring extensive networks and social organisation (Williams & Veslud 2019). The presence of tin in Cornwall is of particular significance as it is one of the few primary sources of the metal in western and central Europe (Radivojević, Roberts, Pernicka, *et al.* 2019 p.148). There is good evidence that the bronze and tin minerals from the British Isles were accessed and traded through networks of exchange, the scale of which has been suggested to extend across Europe and beyond (Ialongo & Rahmstorf 2019; Kristiansen & Larsson 2005; Kristiansen, Lindkvist & Myrdal 2018; Kristiansen & Suchowska-Ducke 2015; Rahmstorf 2019). It is unsurprising then that it has been found within artefacts such as the Nebra Sky disk (Haustein, Gillis & Pernicka 2010; Nørgaard, Pernicka & Vandkilde 2019). Inevitably it can be concluded that, during the Bronze Age, Britain became a part of, affected, and itself influenced by, these networks such that understanding the

Bronze Age of the British Isles has relevance to understanding the societies of the Bronze Age in north western Europe and beyond.

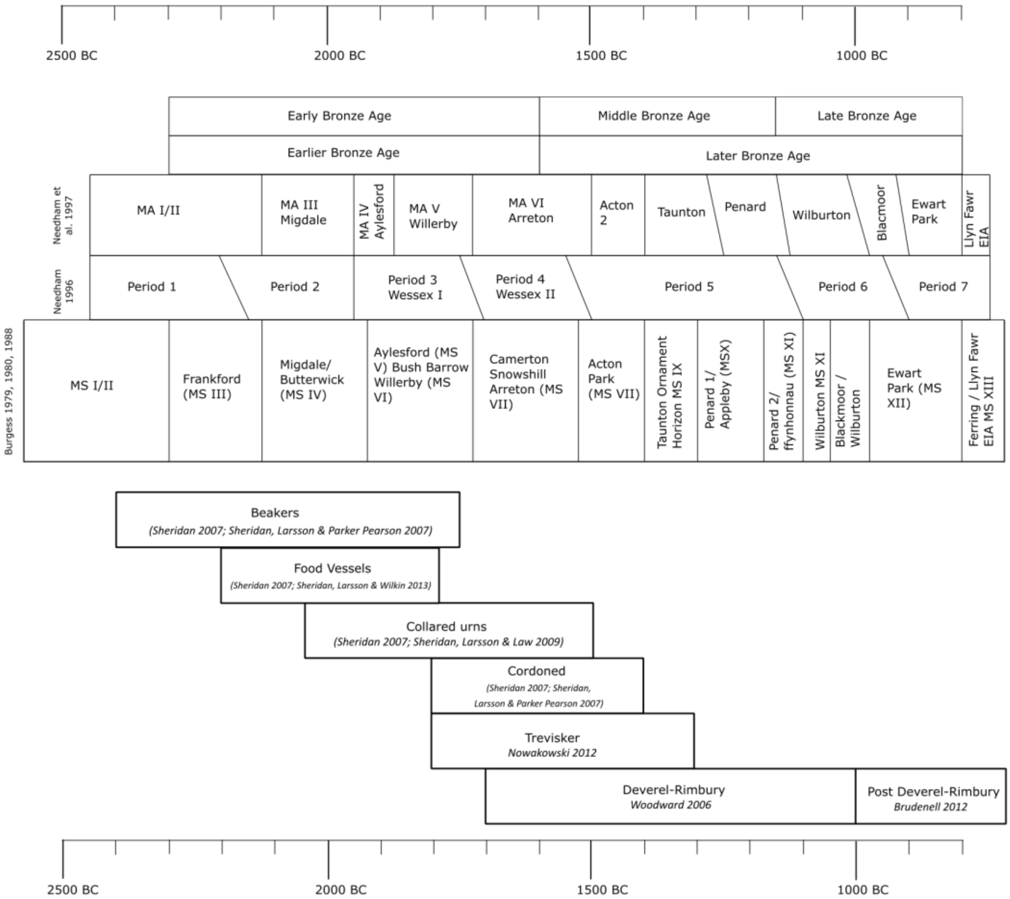

Figure 1 The chronological framework of the Bronze Age in Britain as understood by this study.

1.2 Understanding Bronze Age societies in Britain

During the Bronze Age, the British Isles' population, its means of subsistence, its exploitation of technologies and materials and the social structures supporting these underwent incredibly large transitions which helped define the trajectory of the region's history (see above). The high importance placed on these forms of social transition occurring, and the hitherto unmatched pace at which they occurred within the region, has meant that this period has long been a focus of study for archaeologists in understanding the development of societies in the

British Isles. It would be expected then, that our models for the social structures of this period, and their change over time, would be well understood. Yet, despite over two centuries of study on the period, our understanding of the social organisation of the occupants of Britain is, at best, general and, at worst, contradictory. In particular, I would identify two issues hampering our understanding of the Bronze Age societies of Britain.

1.2.1 Problem statement 1 – the nature of transformations in society at 1600 cal BC

It is now often recited that a large social change occurred in Britain at approximately 1600 cal BC with many discussions of this period being divided into an Earlier Bronze Age (c.2400-1600 cal BC) and Later Bronze Age (c.1600-800 cal BC) (see for example Parker Pearson 2009 and; Champion 2009; Hunter & Ralston 2009 or; the division of Bradley 2007; Webster 2007; Petts, Gerrard & Cranstone 2006; Barrowclough 2008; Bradley, Haselgrove, Vander Linden, *et al.* 2016 p.182). However, it is not known to what extent the differences suggested in models of Bronze Age society between these periods are the result of relying on very different datasets, or to what extent 1600 cal BC is relevant for non-metalwork based phenomena.

Discussions of the Earlier Bronze Age (2400-1600 cal BC) rely on the numerous burials (Garwood 2007), early monuments (Barrett 1990; Bradley & Nimura 2016)and artefacts (Hunter & Woodward 2014) found which, in the main, are limited to non-domestic settings. Settlement sites at this time are few and generally emphemeral (Brück 2012; Gibson 2019; Simpson 1971). As such, the societies of this culture are described as having more in common with the Late Neolithic (c. 3000-2400 cal BC) than those of the Later Bronze Age (c. 1600-800 cal BC). It is telling that there are no integrated accounts for the form of society that existed during the Early Bronze Age in Britain. Instead there are a wide range of social theories focussing on limited domains of study including burial (Fleming 1973; Fowler & Wilkin 2016; Mizoguchi 1993), trade and manufacture (Carey, Jones, Allen, *et al.* 2019; Needham 2000), monument construction (Garwood 2007; Parker Pearson 2012; Renfrew 1973) and subsistence practices (Craig, Shillito, Albarella, *et al.* 2015) with little integration of these into a consistent social model (Barrett 1994; Bradley 2019 Chapter 4; Parker Pearson 2009 are all good examples which separate these domains of evidence).

At 1600 cal BC the quantity of domestic site becomes more dominant (Bradley, Haselgrove, Vander Linden, *et al.* 2016 p.182) with burials lessening in quantity to become all but invisible by the Late Bronze Age (c.1150-800 cal BC) (Brück 1995; Warden, Caswell & Roberts 2016). As such, models of society become more reliant on an archaeological record made up of settlements (Drewett, Ellison, Cartwright, *et al.* 1982; Ellison 1980), field systems (Yates 2007) and the artefacts (Rowlands 1980) from these and manufacturing contexts. The differing evidence bases used to describe the Earlier and Later Bronze Age have, as would be expected, produced differing and often separated discussions of society for the two periods. These emphasises a difference in; subsistence strategies (Drewett, Ellison, Cartwright, *et al.* 1982), social stratification (Fleming 2007; Gilman, Adams, Sestieri, *et al.* 1981; Needham & Bowman 2005), violent and ritual competition (Treherne 1995) and also the realms of ritual activity (Pryor 2001b), although both emphasise the importance of trade within the British Isles and with north western Europe (Bradley 2007; Cunliffe 2013; Darvill 2010; Rowlands 1980).

The strongly contrasting evidence bases for these periods, and the resultant divergent social models, have frequently meant that the Earlier and Later Bronze Age are divided within national summaries (see for example Parker Pearson 2009 and; Champion 2009; Hunter & Ralston 2009 or; the division of Bradley 2007; but see Brück 1997) and regional reviews of the Bronze Age (Petts, Gerrard & Cranstone 2006; Webster 2007; Hodgson & Brennand 2006; Barrowclough 2008). Yet work studying the radiocarbon chronologies of burials (Caswell & Roberts 2018), which suggests a shift in burial form earlier than 1600 BC, and field systems (Yates 2007; Johnston 2005; Fleming 2007), which appear after 1600 BC, suggest that such a clear line at 1600 cal BC may be misleading. For example, it may be that such a hard date is the result of narratives of the Bronze Age societies being built on datasets relying primarily on metalwork and ceramics (Roberts, Uckelmann & Brandherm 2013).

There is then a clear divide in our means of understanding of the Earlier and Later Bronze Age and difficulty in identifying its timing. I would therefore like to argue that: the mechanisms behind, significance of and in fact the differences in social structures in Britain between the Earlier Bronze Age (c.2400-1600 cal BC) and the Later Bronze Age (c.1600-800 cal BC) are poorly understood and that it is unclear to what extent this is an artefact of the material available to study in the archaeological record.

1.2.2 Problem statement 2 – unifying material culture and site based evidence in the Bronze Age

Notwithstanding the identification of a transition in social order at c.1600 cal BC, there is still a further issue in models describing the Bronze Age. Specifically, this is in reconciling a contradictory archaeological record of the Later Bronze Age (c.1600-800 cal BC) in Britain. Narratives describing the Later Bronze Age in Britain suggest societal models relying on mobility of people and knowledge perhaps over vast distances (Kristiansen & Larsson 2005; Needham 2009), trade and the control of said knowledge (Rowlands 1976, 1980) and formalised patterns of warfare (Treherne 1995). Such organisation and co-ordination is well supported by the proposed high-intensity exploitation of the Great Orme mine over a period of only 200 years (Williams & Veslud 2019 p.1192). Yet such models contrast strongly with the landscape and settlement record which have been interpreted as representing more static subsistence strategies (Drewett, Ellison, Cartwright, *et al.* 1982; Ellison 1981) of a more humble nature that rarely discuss the social complexity expressed in those other models. There has yet to be a model of society that reconciles a dataset that has been interpreted as, on the one hand, representing a highly stratified society, frequently in competition, embedded within long distance networks of trade and exchange, with a second dataset which appears to represent relatively routed, humble subsistence groups (Roberts 2013 pp.542–544).

Following Roberts (*ibid)* I would like to argue that, despite the period being of great importance, we do not have a clear narrative or model for the social structures existing in the Later Bronze Age in Britain or how these changed as a result of the appearance of bronze, the changes in demographics (Olalde, Brace, Allentoft, *et al.* 2018) on the island or the shift to an agricultural subsistence base (Stevens & Fuller 2012). Without such models, any identification of similarities or differences in social organisation between communities in Ireland and elsewhere in north western Europe become generalised (Bradley, Haselgrove, Vander Linden, et al. 2016; Brandherm 2019; Harding 2000) and so are unable to suitably situate their discussion with quantifiable phenomena.

1.3 Understanding the Bronze Age in Britain through settlements

It has been argued that settlements, being the space most often occupied and negotiated by people, are particularly useful for understanding past human action (Louwe Koojimans 2000 p.324; Downes & Richards 2005 p.57; Rasmussen & Adamsen 1993 p.139; Arnoldussen 2008 p.14). This is particularly true of the British Bronze Age as settlements are likely to be intimately connected to those social transformations occurring at this time. They have even been argued to be 'central to the constitution of the Bronze Age social world' (Brück & Fokkens 2013 p.98). Unsurprisingly then, progress has been made in understanding social change during the Bronze Age through the integration of archaeological evidence with its contemporary settlement record.

Brück's (1997, 1999a, 1999b) research on the form and transitions in settlement form and use has argued that there *is* a distinct break in settlement form between the Early and Middle Bronze Age due, not to fewer settlements existing, but due to mis-identification. These works therefore argue that that there is a significant social transition placed at c. 1600 cal BC as expressed in current discussions of the Bronze Age (Problem Statement 1).

Rathbone's (2013) study of settlement size has argued that there are no Bronze Age settlements in Britain that may be termed villages, despite the phrase being applied in past studies, with little evidence for settlement nucleation over time. This study has thus reinforced the idea that the settlement record does not support current perceptions of a highly stratified and complex Later Bronze Age society, and itself emphasises that social structures may only be understood through detailed local study. Yet in contrast to this, Pope's (2003, 2007, 2015) work has demonstrated how structure form can be defined and assessed over time to identify architectural traditions which may show regional characteristics and identities. These works clearly demonstrate that settlements do provide a means to understand local social structures but that these need to be contextualised with local factors (Problem Statement 2).

Eve and Crema (2014) have suggested the changing siting of roundhouse structures at the settlement of Leskernick Hill reflect the shifting priorities of the settlement's inhabitants during the later Bronze Age from establishing an ancestral right to the land to maintaining control of local tin resources. Similarly, the work of Bradley (1981) and Ellison (1980b, 1980a) integrating burial sites with settlements have been used to suggest most Bronze Age settlements were occupied by extended families who expressed their regional identity, control of territory and family units partially through locally placed cemeteries. The work of each of these authors therefore clearly demonstrate how the spatial arrangement of settlements and the features in their environment have been used to indicate the priorities of their inhabitants and so help to reconstruct the form of society that may have existed (Problem Statement 2). In particular the work of Eve and Crema demonstrates the potential knowledge gains of studying settlement adaptation, which appears to react to the importance of metalwork.

Tapper's (2012) integration of aerial survey, field walking with excavation and a contextual study of the settlement of Black Patch has identified the life history and violent end of a Bronze Age settlement reflecting the trials of the settlers of this time. This supports notions of a violent competitive period of time argued by some (Treherne 1995; Rowlands 1980) and clearly demonstrates, as the publications above also do, that settlements provide suitable lenses to integrate the disparate archaeological evidence of the Bronze Age in order to assess the validity of those social transformations outlined above. As such, integrating settlement evidence with all other archaeological data is, in my view, the solution through which the Bronze Age may be further understood, and our models of its societies further enhanced.

1.4 Synthesising Bronze Age settlements in Britain

Settlements have been argued to form a suitable lens with which to understand the Bronze Age and particularly those problem statements laid out above (see above), yet it is notable that those case studies highlighted (barring Rathbone 2013) have not been able to study Britain as an entire unit. Part of the reason for this has been the substantial increases in the number of excavations, and subsequent discoveries of Bronze Age settlements since the implementation of PPG16 (Bradley, Haselgrove, Vander Linden, *et al.* 2016; Darvill & Russell 2002). This has magnified the number of sites available to study and so the time required to synthesise discrete phenomenon. Instead, those settlement studies cited above reflect the reality that the majority of Bronze Age settlement scholarship in England, Scotland and Wales comprises site-based narratives (see Chapter 2.8). Where broader analyses do exist, they are traditionally restricted to discrete regions (Brück 1997, 1999a, 1999b; Davies 2016; Ghey, Edwards, Johnston, *et al.* 2007; Jones & Quinnell 2011; Pope 2003, 2015) or concentrated upon the structure and activities occurring within defined settlements or small settlement clusters (Brück 1999a; Pope 2003).

Only two attempts have been made to synthesise the large number of Bronze Age settlements sites now known in Britain, both published by Bradley (Bradley 2007 and 2019; Bradley, Haselgrove, Vander Linden, *et al.* 2016). Both these works provided narratives for the entirety of prehistory, thus relegating Bronze Age settlements to segments within chapters, relying primarily on commercially excavated sites. Through collating this evidence Bradley has been able to argue, that there are limited known settlements dating to the Early Bronze Age, their invisibility relating to their ephemeral structure (Bradley 2007, 172) and structured destruction (Bradley *et al* 2015, 156-7). He then suggested that from 1600/1500 cal BC (Bradley *et al* 2015, 182) that structures became far more substantial (Bradley 2007, 181-2, Bradley *et al* 2015, 185), significantly larger (Bradley *et al* 2015, 185) and increased in numbers compared to those Early Bronze Age settlements (Bradley 2007, 181-2). He also recognised that there was a degree of variety in their form, although the description of this variety is limited to "considerable stone or timber buildings…sometimes enclosed by ditches fences or walls" (Bradley 2007, 181-2) and occasional rectangular structures, some of which may have been longhouses (Bradley *et al.* 2015, 185).

Other patterns suggested included; a continued growth in settlement size into the Late Bronze Age (Bradley 2007, 210), a divide appearing between northern and southern Britain in quantities of settlements with the south having far denser settlements (Bradley 2007, 224), an association with substantial collections of artefacts (Bradley 2007, 182), the development of specialist economies (Bradley 2007, 193, but see Bradley 2015, 188 for a somewhat contra view) and the suggestion that settlements' relationships with their geography was important to their construction but was still poorly understood (Bradley *et al.* 2015, 188).

Clearly these studies have been valuable to understanding the Bronze Age and this period's settlements. However, it is notable that, while these two publications are based on attempts to synthesise all grey literature, one work (Bradley, 2007) contains no quantitative analysis, while the second (Bradley 2007; Bradley, Haselgrove, Vander Linden, et al. 2015) relegates such analysis to limited sections within the first and last chapters. Instead, these works and others they reflect (such as Burges 1980: 2001) evidence their applicability using only a limited number of case studies, presumably selected due to their author's knowledge of their representativeness. The applicability of these to the entire record is not clear and without quantitative analysis, or accessible datasets that allow independent analysis, impossible to gauge how reflective any selected sites, regions, structures or activity patterns are of past realities. Perhaps more significantly, it is challenging to use these datasets within future research projects without a substantial time investment repeating the same exercise.

It is fair then to suggest that there is no research of Bronze Age settlements in Britain that assesses the settlement record for the entirety of the British Isles that is either current, or a near complete analysis that provides its data in such a way as to allow it to be easily re-used and integrated in future research of the Bronze Age. The lack of a comprehensive record has prevented discrete analysis of the distributions of Bronze Age settlement. It is not known then:

a) What the full extent of the variability of Bronze Age settlement structures in Britain is, or the relative quantities of these architectural traditions (but see Pope 2015).

b) The extent to which c. 1600 cal BC represents a sudden or gradual transformation in settlement form and its quantity (Brück 2000).

c) The extent to which settlements structures become more numerous after the Early Bronze Age (Bradley 2007, 182) and whether their numbers continued to rise into the Late Bronze Age.

d) If any such increases in settlement density is limited to discrete regions such as the south of Britain (Bradley 2003, 224).

e) Whether there was in fact an abandonment of the uplands in the Late Middle Bronze Age as is often suggested (Amesbury, Charman, Fyfe, *et al.* 2008; Burgess 1985; Turney, Jones, Thomas, *et al.* 2016; Tipping 2016).

f) The significance of settlements being placed close to, or not, of bodies of water as has been suggested in broader models of the Bronze Age (Eve & Crema 2014; Mullin 2012; Needham 2009; Sherratt 1996).

g) The connection between settlements and highly fertile soils (Bradley 2007, 182).

h) To what extent, if any, suggestions of the association of activities such as enclosing land (Yates 2007), burying the dead (Bradley 1981) or metalworking (Brown & Medlycott 2013) are placed in or around later Bronze Age settlements.

i) To what extent the settlements seen in Britain are more closely aligned to those in Ireland or north western Europe.

j) The reasons behind the perplexing and continuing absence of any villages (Rathbone 2013).

More concerning still is that even the fundamentals of Bronze Age settlements are only vaguely understood. For example, questions such as: to what degree do Bronze Age settlements show regional characteristics? How intensively was the British Isles settled? Or even how many Bronze Age settlements are known? have, at best, only been very broadly estimated and never quantified. When such fundamental questions have not been asked, it is fair to say that Bronze Age settlement in Britain is poorly understood.

1.4.1 Problem statement 3 – the need for a Bronze Age settlement corpus

In short, I suggest that Britain lacks a true baseline study for Bronze Age settlements. Once complete, such a study may easily be integrated with numerous other large data projects which already provide such baseline data for burials (Bristow 1998; Caswell & Roberts 2018; Heise 2016; Hunter & Woodward 2014), metalwork (Needham, Davis, Gwilt, *et al.* 2015; O'Connor, Roberts & Wilkin 2017; Schmidt & Burgess 1981, 1981), monuments (Brunning 2007; Cummings Forthcoming; Dunkin 2012), and scientific analyses studying dating (Bevan, Colledge, Fuller, *et al.* 2017; Stevens & Fuller 2012) and diet (Parker Pearson, Chamberlain, Jay, *et al.* 2016; Parker Pearson, Sheridan, Jay, *et al.* 2018). The opportunity therefore exists to begin to integrate evidence and thereby solve those issues in current narratives of Bronze Age societies in Britain, but only following a baseline empirical study of settlement. Those case studies above, in addition to research projects of contemporary phenomena in north western Europe, demonstrate that it is only with the integration of this knowledge with other forms of archaeological material that will allow the reconciliation of those models of Bronze Age society.

1.5 Aim

It is with Problem Statement 3 in mind that this thesis was conceived to study Bronze Age (c. 2400-800 cal BC) settlement sites in England, Scotland and Wales through a rigorous quantified study that would provide the needed baseline for the phenomena while also furthering our understanding of Bronze Age society.

Specifically, this study aims to:

evaluate the characteristics, tempo, location and roles of Bronze Age settlements in England, Scotland and Wales between c. 2400-800 BC.

Settlements are understood as archaeological sites having clear structural features (postholes, slot-trenches or a combination of the two which form the distinct footprint of a building) whose primary purpose could have been habitation.

For reasons detailed in Chapter 3, the analysis within this project focusses primarily upon those settlements associated with radiocarbon dates. The geographical remit for this project is set as mainland England, Scotland and Wales and all major islands, barring the Isle of Man and the Channel Islands.

The objectives of the thesis are:

Objective 1. To design, create and enter data into a comprehensive database of Bronze Age settlement sites in England, Scotland and Wales whose occupation has been radiocarbon dated.

Objective 2. To characterise the architecture of Bronze Age settlement structures.

Objective 3. To produce a diachronic model of the appearance, use and disappearance of Bronze Age settlement structures using radiocarbon dates and material culture.

Objective 4. To characterise the distribution patterns of Bronze Age settlements across Britain.

1.5.1 Research questions

This aim and objectives are met by answering a series of defined research questions guided by the issues identified above and those identified within Chapter 2. These questions are:

RQ 1. What is the range of settlement structures used within settlement sites during the Bronze Age? (Chapter 4)

RQ 1.1 How do settlement structures vary in their shape?

RQ 1.2 How do settlement structures vary in their size?

RQ 1.3 How do settlement structures vary in their architectural features?

RQ 2. Can a formal typology be prepared for architectural features in the Bronze Age? (Chapter 4)

RQ 2.1 How do Bronze Age settlement structures change over time?

RQ 2.2 To what extent are the forms of structures seen as regionally specific?

RQ 3. How does the intensity of settlement structures in Britain vary across the Bronze Age? (Chapter 5)

RQ 3.1 Can a model for the changing intensity of settlement occupation be identified with radiocarbon dates?

RQ 3.2 Can any temporal differences be identified between when settlements were being constructed, occupied and abandoned?

RQ 3.3 Can a model for the changing intensity of settlement occupation be identified through material culture?

RQ 3.4 To what extent do models for the changing intensity of settlement made with radiocarbon dates and material culture align?

RQ 4. How are Bronze Age settlement structures distributed across Britain?

(Chapter 6)

RQ 4.1 How does settlement density vary over the British Isles?

RQ 4.1.1 How does settlement density over the British Isles vary over time?

RQ 4.2.2 Do certain regions show a disproportionate change in numbers of structures over time?

RQ 4.2. 3 Can an origin point be found for Bronze Age settlement structures?

RQ 4.2 Is there a preferred set of environmental attributes for the placement of Bronze Age settlement structures?

RQ 4.3 Can an upland/lowland divide be identified in the location of Bronze Age settlements?

RQ 4.4 How does the distribution of Bronze Age settlement sites vary in relation to bodies of water?

RQ 4.4.1 What is the typical distance from a Bronze Age settlement to a river?

RQ 4.4.2 What is the typical distance from a Bronze Age settlement to the sea?

RQ 4.4 To what extent are Bronze Age settlements placed for potentially favourable agricultural conditions?

1.5.2 Discussion Themes

The results of the answering the above research questions have wider consequence to those themes in Bronze Age settlement studies identified above (Chapter 1.4). While this thesis will not attempt to answer these questions to the same extent, the work required being the scale of a separate similarly sized study, it is able to further comment on them. These themes are:

DT 1. The dispersal of Bronze Age settlement structures.

> DT 1.1 Can Bronze Age villages be identified?
>
> DT 1.2 To what extent are Bronze Age settlement sites dispersed or nucleated?
>
> DT 1.3 How closely related are Bronze Age settlements to one another?

DT 2. What are the activities occurring near settlements?

> DT 2.1 Enclosing areas around and within settlements.
>
> DT 2.2 The association of metalworking with settlements.
>
> DT 2.3 The association of burials with settlements.

DT 3. To what extent is a “British” Bronze Age settlement tradition appropriate?

DT 4. The integration of legacy datasets.

1.6 Approaches to the research questions

The primary method employed to answer those research questions identified has been the generation of, often simple, observations of the archaeological record using queries of a dataset generated as part of the thesis (see Chapter 3). This dataset was formed by identifying, collating and then unifying data held by over 100 heritage records from England, Scotland and Wales. By doing so a database of over c.22, 000 potential Bronze Age settlements sites were identified, a sample of which then had its literature gathered. The data from these reports was systematically assessed and recorded into the database. The scale of this dataset is large for a thesis project. The primary dataset used for analysis lists 316 settlement sites, from which over 1500 settlement structures were recorded in addition to other features such as pits and wells. Across these data over 130 fields of information were recorded in order to characterise and sort the information suitably for analysis. This database is further supported by lower resolution data of sites (not included within the sample but drawn upon in the discussion in Chapter 8) and a radiocarbon dataset of over 3000 records. The number of reports read and synthesised within the high resolution, coarse dataset, potential dataset and supporting data totals over 2000 reports.

1.7 Structure of the thesis

The thesis is divided into seven chapters in addition to the introduction (Chapter 1).

Chapter 2 provides a background and literature review of previous studies of Bronze Age settlements and their structures in England, Scotland and Wales. By doing so it highlights: the past and present factors that have shaped the understandings Bronze Age settlements; the challenges of relying solely on typologically based chronologies; the dominance of regional and site-based narratives and the absence of broader syntheses.

Chapter 3 presents the thesis' theoretical and methodological approach. It outlines in detail how the data used to support this project was identified, collated, recorded and then analysed.

Chapter 4 explores the forms of architecture seen in the Bronze Age, in other words, **what** settlements structures have been recognised from the Bronze Age in Britain.

Chapter 5 examines the changing intensity in the presence of settlement structures across the Bronze Age, in other words, **when** Bronze Age settlements and their structures were used.

Chapter 6 studies the distribution of these settlements and compares the presence and/or absence of settlement over geological, riverine/coastal, and topographical traits of the landscape, in other words, **where** Bronze Age settlements and their structures were used.

Chapter 7 integrates the results from the previous chapters and discusses their implications in relation to other qualitative and quantitative analyses of Bronze Age settlement size, dispersal, nearby features and contemporary settlements in near continental Europe.

Chapter 8 summarises the main findings of the thesis and makes clear their relationship to wider scholarship of the period and those issues cited above and in Chapter 2. It explores how the research in thesis can advance our understandings of Bronze Age settlements. It concludes with proposals for further potential research.

Chapter 2: How Bronze Age settlements have been studied in Britain – a review of literature and research context

2.1 Introduction

This chapter aims to justify the reasons for the objectives expressed in Chapter 1, and the methodology stated in Chapter 3, through a historiographic review of the study of Bronze Age settlements from the 19th century to the present day. By doing so, it highlights the key scholars, sites and theories that have developed over two centuries of archaeological research, before concluding on the current perspectives of Bronze Age settlement sites. It critically evaluates the methods, theories and sites that have shaped Bronze Age settlement studies in Britain and where this now leaves research on this sub-discipline. The study of Bronze Age settlements and their structures in Britain and beyond has a long history. As such, it was decided to present this review chronologically, rather than thematically, so as to better identify the approaches towards, and the reasons behind, current understandings and models of settlements. It will demonstrate that:

1. Archaeological research of Bronze Age settlements in the last two decades has favoured site specific discussions. There has been little synthesis of the wide corpus of settlements sites discovered during this time beyond discrete regions within the British Isles.

2. Bronze Age settlement studies have been highly regionalised throughout their study, resulting in their findings often being overlooked in similar studies focussed on other geographic regions.
3. Narratives on the appearance and expansion of Bronze Age settlements have been organised and divided using typo-chronological schema. However, such schema are based on material culture whose changes and chronological ranges may not correlate with the transitions seen in the settlement record.

This review is particularly focussed on those studies that investigate British Bronze Age settlements. To remain concise, it does not present a review of all the methods that are available to study settlements and their context.

2.2 The first studies of Bronze Age settlement (18th century–1940)

2.2.1 Earliest recognitions of Bronze Age settlements

It is not uncommon for texts to state that prehistoric settlements made of post holes were recognised only after the publication of Bersu's investigation of Little Woodbury (Bersu 1940). For example, it has been suggested that before Bersu, archaeologists only thought pit dwellings were used for settlement during the Bronze Age (Evans 1989 pp.46, 48). Similar views are also expressed in Ginn's work on Bronze Age settlement in Ireland (Ginn 2016 p.7). Yet, as will be discussed below, it is very clear that stone-built roundhouses and post-built roundhouses were identified, investigated and dated to the Bronze Age from the mid-19th century onwards.

Roundhouses must have been recognised for some time in northern Britain to allow George Tate (1861, 1862) to publish a synthesis of this site type as early as 1861. In this he described the excavation of 12 hut circles across seven different sites. Pope (2003 p.4) has also identified similar fieldwork at this time in the same region (Maclagan 1862; Turnbull 1862). In south west England, stone-built roundhouses were recognised and became the focus of a series of excavations by the Dartmoor Exploration Committee of the Devonshire Association from 1894. During a 50 year period, the group excavated 150 hut circles from 20 different settlement sites (Radford 1953 p.55). Similarly, areas in the south east of England were clearly being recognised to show evidence of settlement, if not the houses themselves, as early as 1902 (Blaker 1902). That these studies are less frequently cited or recognised is perhaps an early indication of how the regionalisation of settlement studies has prevented a broader understanding of the phenomena.

Those early 19th and 20th century texts that did identify Bronze Age settlements were not limited to discussing only the discovery of roundhouse sites, but also their use. This is evidenced in the works of George Rome Hall who discusses, with reference to ethnographic material, how light would have worked in the structures and the effect that this would have had on cooking (Hall 1880a, 1880b) – an arguable early use of phenomenology (Pope 2003 p.4). However, while it is clear in Pope's review of northern British settlements (Pope 2003 pp.2–25) that studies into roundhouses were frequent, it is also certain that the methods of excavating, and the knowledge of roundhouses, was not as well developed or widespread until the middle of the 20^{th} century. This is clearly exemplified by Pitt-River's account of the excavation of South Lodge at Cranbourne Chase (Pitt-Rivers 1898). When re-excavated in the 1980s, it was found this site contained a clear post-built roundhouse, yet this was never recognised in Pitt-Rivers' archive (Barrett, Bradley, Bowden, *et al.* 1983 p.201).

2.2.2 Chronology

The study of chronology did not develop synchronously with the study of settlements. The Three Age system was first postulated in 1817 by C. J. Thomsen In Denmark and subsequently published in 1836 (Rowley-Conwy 2007). This acted as a basic chronological framework through which archaeologists could date features. This framework was then further developed and sub-divided using seriation-based typologies. In British archaeology this first occurred by sub-dividing the Bronze Age into three periods based on its metalwork (Evans 1881). This tripartite scheme became embedded and institutionalised into summaries of Britain and Ireland (Fox 1932; Kendrick & Hawkes 1932). While an alternative scheme of division was advanced by Montelius, who proposed a six phased scheme for the seriation of bronze metalwork in Britain (Montelius 1908), this was influentially rejected by Abercomby, although not entirely disproved (Coffey 1913). Particularly relevant to the dating of the Bronze Age settlement sites is the landmark publication of Abercromby's corpus of British and Irish pottery. This formalised many Bronze Age pottery types and also identified the "Deverel-Rimbury" form (Abercromby 1912 pp.7–14) which was placed at the end of the Bronze Age. This later publication is of particular importance as those settlements that were found were dated to what was then termed the Late Bronze Age due to their frequent association with Deverel-Rimbury pottery (Crawford 1922) which itself was thought to be solely dated to the Late Bronze Age until more recent studies in the 1950s (see Chapter 2.3.3). This was further supported by Crawford (1922) who suggested that bronze razors were similar to Late Bronze Age continental examples while British Bronze Age cremation cemeteries with Deverel-Rimbury pottery were likened to the European Late Bronze Age Urnfields. Thus, settlement and field systems, which up to this point had only been associated with Deverel-Rimbury pottery, were seen as solely Late Bronze Age phenomena.

Early Bronze Age settlement structures were thought to be non-existent during the early 20th century. As a result, in the early discussion of “settlements”, it is clear that the term already saw its use broadening from an archaeological site which contained a structure, to representing a region where human activity of almost any kind took place. This is perhaps typified by Crawford’s highly influential summary of Early Bronze Age settlement in Britain, which identified settlement solely through the presence of artefacts which are used to infer human activity, yet it includes no mention of the settlement structures that these people inhabited (Crawford 1912).

2.2.3 Finding post holes

Early roundhouses had first been recognised as stone-built structures, which may partly be due to the relatively late recognition of post holes. While these had certainly been identified in Roman contexts by 1901, as seen by David Christison’s publication on Roman signal stations at Castlecary, Perthshire in 1903 (Christison

1901), it was only in 1920 that they were described on a prehistoric site as part of a structure. This breakthrough was made by Curle during the excavation of Dun Troddan broch, where a ring of post holes were interpreted as representing a ring of roof-supports (Curle 1920). Wooden hut circles may have been identified before this point along the coast of Lincolnshire, however their excavator, Hazeldine Warren, only published these findings in 1932 (Warren 1932). As such, Pope (2003 p.5) describes this as a seminal moment in the recognition of coherent timber architecture as, while the postholes had already been seen, it was the first time that the implications of these features had been made clear.

Following Curle's observation of a prehistoric post-built structure (Curle 1920), this form of architecture was more widely identified, particularly in the south east of Britain. In certain instances this was combined with existing assumptions of dwellings, as seen in Wolseley, Smith and Hawley's interpretation of the Bronze Age settlement at Park Brow which, despite identifying post holes that "were no doubt post-holes for roof-supports", still suggested that the floor was sunk into the ground surface (Wolseley, Smith and Hawley 1927, 6). Furthermore, between 1936-39, ovoid 'huts' found beneath the corridor house of the Roman villa were excavated in Nottingham at Mansfield Woodhouse (Oswald 1949) while in Wales, two timber polygonal structures surrounding hearths were interpreted as huts at the Breiddin in Powys (O'Neil 1937). Clearly then by the mid-1930s, excavators were aware of prehistoric timber-built circular architecture.

While the full reconstructions of these post holes were not depicted in these early studies, the roundhouses were presumed to take on the appearance of round huts with thatched roofs. These drew on parallels in the developing ethnographic record (Wake 1939). Yet the archaeological reports of these Bronze Age sites were not yet critical enough to note that the early excavated Bronze Age roundhouses lacked the central post of those huts seen within these ethnographic parallels.

2.2.4 Sussex Bronze Age houses

From the 1930s, post built roundhouses were already being clearly described as Bronze Age in date and as full roundhouses comparable to those seen in the Iron Age, albeit predominantly in Sussex. This region was intensively investigated by Curwen (Curwen 1929, 1930, 1934, 1937; Holleyman & Curwen 1935; Parsons & Curwen 1933). In particular, at the site of New Barn Down, Curwen was able to identify two post-built roundhouses visible as circles of post holes found within an earthwork enclosure which showed some evidence for a palisade or wooden screen (Curwen 1934a). The collection of earthworks at New Barn Down was paralleled at numerous other sites in the region which had not been excavated (e.g. Holleyman & Curwen 1935). The inclusion of Deverel-Rimbury pottery and a Bronze Age spearhead at New Barn Down therefore raised the possibility that at least some of these other settlements, visible only as earthwork enclosures with occasional depressions, represented similarly dated Late Bronze Age settlements as at Kingley Vale (Curwen 1934b). This was further reinforced by the excavation at Plumpton Plain which produced an almost identical set of post holes in concentric circles associated with Deverel-Rimbury pottery (Holleyman & Curwen 1935).

This finding was particularly pertinent as it was first thought that the earthworks that were visible above ground were simply pounds for corralling cattle and other livestock. Indeed, Stone states that the majority of these sites were devoted solely to corralling cattle, citing Cranbourne Chase as an excavated site showing no internal structures (Stone 1941 p.114), although it has since been shown to have included a post-built roundhouse (Barrett, Bradley, Bowden, *et al.* 1983). It was also understood at this time that the geographic distribution of roundhouses may not have been limited to Sussex. A further roundhouse associated with Deverel-Rimbury ceramics was also found on the Isle of Wight at Gore Down (Dunning 1932), while Stone's excavation of Thorny Down in Wiltshire was carried out explicitly to test if such settlements could be found on similar sites elsewhere, revealing at least nine potential roundhouses (Stone 1937, 1941).

The investigations in the south of England at New Barn Down (Curwen 1934a), Kingley Vale (Curwen 1934b), Plumpton Plain (Holleyman & Curwen 1935), Gore Down (Dunning 1932) and Thorny Down (Stone 1937, 1941) provided the assemblage and type sites of Late Bronze Age settlement in Britain for the next three decades. Ultimately these selected sites allowed a synthesis of settlement sites and their environs, all apparently demonstrating that Late Bronze Age life was "essentially a system of upland tillage, centred on large or small farms which were situated on hills and which were served by roads which ran for the most part along the ridges" (Curwen 1954 p.165). It is notable that these features were dated using Deverel-Rimbury pottery. This prevented any roundhouses being identified in northern Britain, where the ceramic chronology was not nearly as developed (see Gibson 1982). The consequence of this in scholarship being that northern Britain became increasingly depicted as a land with a harsh climate and inferior soils and/or a poor cousin of the south and east (Fox 1932). It can only be surmised that this localised identification of sites meant that far fewer roundhouses were considered to be Bronze Age rather than Iron Age leading to statements such as "the situation in England with regard to houses of pre-Early Iron Age date…" is "…frankly deplorable" (Clark 1937 p.469), even when Bronze Age roundhouses were clearly known about, excavated and published.

2.2.5 Little Woodbury

The excavation of Little Woodbury in Wiltshire in 1938-9 was designed specifically to mimic 'open area' continental excavation methods which had been employed with great success in revealing structures through recording post holes (Bersu 1940; Lucas 2001 pp.43–44). This method was able to identify two large Iron Age post-built roundhouses (c.12 m in diameter) and validated and popularised the excavation of settlement sites to a high technical standard, combined with the detailed recording of features and deposits. Pope (2003, 9) describes the significance of this excavation as representing "the dawn of the modern era in prehistoric settlement studies" and highlights that the work prior to those works in Sussex, north Wales and Northumberland were reliant on individual researchers with local agendas as detailed above. The substantial impact of Little Woodbury upon subsequent excavators of Bronze Age and Iron Age settlements in Britain is outlined below.

2.2.6 Summary

It can be seen that by 1940 many of the necessary observations required to study Bronze Age settlement, namely the recognition of structures, a chronological structure and an increasingly standardised field method had been made, thus providing a foundation from which fieldwork and scholarship dedicated to Bronze Age settlement could be built. However, whilst settlements had begun to be identified, none were known from what was then termed the Early and Middle Bronze Age, whose only domestic remains were thought to be middens. Similarly, the record was not so complete as to suggest a settled landscape leading to most interpretations of society at this time as either backward pit dwellers or, more favourably, pastoral nomads (Childe 1940).

2.3 Post Woodbury settlement studies (1940-1970)

The period following the publication of Little Woodbury, between 1940 and 1970, can be seen as one of consolidation during which numerous summaries of British prehistory were produced, all of which agreed on the nature of settlement during the Bronze Age. Within these, the Early and Middle Bronze Age remained periods bereft of settlements (Piggott 1949 p.132; but see Hawkes & Hawkes 1953 p.77 for the suggestion that settlements in Dartmoor were Early Bronze Age in date) which was taken as indicative that these people were pastoralist nomads (Hodges 1957). This pastoralism was then seen as continuing into the Late Bronze Age alongside a new, more sedentary settlement practice that was focussed around crop farming in small fields adjacent to larger fields that focused on the rearing of cattle. This new practice, as is typical of any interpretation of a new tradition at the start of this period, was initially seen as resulting from a wave of fresh invaders bringing with them a new form of subsistence (Piggott 1949 pp.109–110, 131, 148).

2.3.1 Continued excavation

These summaries all typically cite the same Bronze Age settlements noted above (with the exception of Kingley Vale) yet during this period several new settlements were excavated which remain influential today. Between 1940 and 1970, the Cornish and Devonian Bronze Age settlement record gained particular attention through programmes of excavation targeting the numerous upland stone-built roundhouses clearly visible to field archaeologists. Excavations at sites such as Trewey Downs (Dudley 1941), Grimspound (Radford 1953) and Dean Moor (Fox 1957) all produced houses containing pottery broadly ascribed to a Deverel-Rimbury tradition (Trevisker ware having not yet been defined). While some variety in settlement form was noted as at Trewey Down (Dudley 1941), which had a sunken floored building, no established typology had yet been proposed for these settlement sites. As such, their date was often inferred based on their size, with sizeable buildings considered more complex and therefore Iron Age in date (Radford 1953).

Within these excavation reports (e.g. Fox 1957) however, it is possible to identify the first suggestions that the settlement forms that appear in Britain need not have been the result of invaders from the continent (as suggested in Piggott 1949). It was also during this period of study that the first connections between settlement and climatic change were made. In particular, it was suggested that on Dartmoor the abandonment of the upland settlement structures in the Late Bronze Age was seen as a response to a colder wetter period (Dudley 1941 p.125; Radford 1953 p.77).

In the north of Britain excavation also continued, albeit at reduced rate, as seen in the work of Feachem (1960, 1962, 1965). These excavations identified a different site form to that seen in the majority of southern Britain, one that was defined by unenclosed terraced platforms containing single houses made of post holes. While those sites excavated provided the bases for Feachem's later typology, it is notable that, even with relatively late studies of this area (Feachem 1960), a Late Bronze date was only tentatively suggested although it was also thought that this new structure form was the result of a migrating population (Feachem 1960 pp.64–65).

2.3.1.1 Key sites

Between 1949 and 1953 the Bronze Age settlement at Itford Hill, Sussex, was excavated (Burstow, Holleyman & Helbaek 1958). This site has proved to be particularly influential within discussions of Bronze Age settlements in the British Isles, the publications describing this site still forming the reference material for many past and current summaries (Barber 2003 pp.75–76; Bewley & Bewley 2003 pp.87–88; Bradley 1978 p.142, 2007 p.190; Brück 1999 p.146; Brück & Fokkens 2013 p.87). Inspired by the discovery of the settlement at Thorny Down (Stone 1937, 1941), this site was completely stripped following the method established by the excavation of Little Woodbury (Bersu 1940). Over a period of five years (1949-1953) a settlement of at least 12 huts was excavated. This found that each hut was placed upon a circular platform (Burstow, Holleyman and Helbaek 1958) terraced into a slope, with the back wall being placed close to the slope. The significance of these platforms was not realised until a later date and reinterpretation (Ellison 1978).

The first publication of Itford Hill suggested that not all the buildings were for habitation but all were used concurrently; with two huts reserved for sleeping, one for weaving and storage, and eight further huts all for storage and workshops (Burstow, Holleyman and Helbaek 1958, 210). The material culture from this site made it clear that, as on the Plumpton Plain and New Barn Down sites, the Itford Hill settlement was Late Bronze Age in date.

A similarly influential and frequently cited Bronze Age settlement, Shearplace Hill, was also excavated during this period (Rahtz & ApSimon 1962). Excavation of this site revealed a small settlement made up of between two to four roundhouses (Rahtz & ApSimon 1962). Rather than provide a type site this settlement's frequent citation relates to its detailed publication and subsequent reinterpretation (see Avery & Close-Brooks 1970 and below).

2.3.1.2 Interpreting settlements

Little comment was made on the duration of settlements at this time. Some observations suggested that their occupation was short (Burstow, Holleyman & Helbaek 1958 pp.209–210; Dudley 1941), due to the low number of artefacts found within them, while others suggested that the distribution of finds within settlement structures were reflective of activity areas (for example see Stone 1941 p.118 but see below for a contra view). Yet these opinions were never contrasted with later sites which showed clear evidence for multiple phases as at Trevisker (ApSimon, Greenfield, Biek, *et al.* 1972) or Shearplace Hill (Rahtz & ApSimon 1962). Similarly, while some were still propounding the effect of invaders in the change in settlement patterns (Feachem 1960 pp.64–65; Radford 1953 p.74), it is clear that

Deverel-Rimbury settlements were beginning to be understood as a native development.

2.3.2 Typologies

With the increasing number of settlement sites being found, it became possible to develop typologies for the development of later prehistoric settlements. The scholarship in this period did not make use of the newly introduced radiocarbon dates and, as a result, identified only a few Bronze Age settlements, all of which were typologically dated to the Late Bronze Age (see those site reports referenced above). For example, it is stated in within the excavation report of Broomwood, Kent, that the then curator of the British Museum felt that “Bronze Age hut sites are not too common” (Parsons 1961 p.142). Pope’s (2003, 28) analysis of northern Britain supports this assertion, suggesting that less than one quarter of the then published structures were of Bronze Age date, with only 18 structures having a secure date to this period.

What schema did exist within this period were based solely on social evolutionary principles (Parsons 1961; Gardner, Savory & Williams 1964), such that larger and presumably more complex constructions were dated to the Iron Age while only those settlements that were excavated and shown to include Deverel-Rimbury pottery were placed in the Bronze Age. As such, it is unsurprising then that Parsons’ created a typology based solely on form (Parsons 1961). Similarly, the scheme proposed by Gardner and Savory in their discussion of Dinorben hillfort suggested that roundhouses began in the Bronze Age as small huts which grew over time eventually becoming larger and requiring two rings of supporting posts in the Iron

Age and also shifting from the use of wattle and daub to stone (Gardner, Savory & Williams 1964).

A similar evolutionary perspective is seen in Jobey and Tait's (1966) typology of northern roundhouses, which sees an ever increasing complexity and size in the form of the roundhouse as prehistory progresses (Jobey & Tait 1966 p.22). Jobey and Tait (1966) should be lauded for: their consideration of the placement and arrangement of structures, both within the enclosure and within the circular structures; the observation that these houses may have been used to stall cattle; and that the ring ditch and ring-groove were not successive construction types. Despite these observations, all of the schema described above paid little attention to the similarity in plans of sites that were classified as Late Bronze Age or Early Iron Age at sites such as at Eldon's Seat in Dorset (Cunliffe & Phillipson 1969) and so making the connection that many settlements may be earlier in date.

It was also during this period that Feachem (1965) produced his own typology based on the his studies of the field archaeology in northern Britain (Feachem 1958, 1962, 1960). In this he defined and details the following types: open platform settlements; simple ring houses; ring groove houses; ring ditch houses; and the advanced variants of all of these forms. Feachem does briefly suggest a chronology for these developments based on their sophistication (Feachem 1965 p.118). However, it is clear that this text placed less importance on such social evolutionary schema, and it is notable that chronology before this section of his discussion is only mentioned once, stating that roundhouse settlements appear sometime in the late 2nd millennium BC (Feachem 1965).

2.3.3 Radiocarbon dating

While much excavation and study of Bronze Age settlements occurred between 1940 and 1970, the most significant change to Bronze Age settlement studies was brought about by the discovery of radiocarbon dating (see Renfrew 1974 Chapter 1 for a full discussion). Using this method, it became possible to peg artefacts and material culture to an absolute point in time without requiring seriation and parallels with well archived material. This revolution did not so much change the order of previously established typologies, which are becoming more and more validated into the present day (Needham 1996; Needham, Ramsey, Coombs, *et al.* 1997; Roberts, Uckelmann & Brandherm 2013), but proved to significantly back date the origin of certain forms of structures in addition to ceramic and metal artefacts in Britain, first thought to be brought by invaders who emulated monuments and technologies from the Mediterranean (Renfrew 1973a, 1974).

The backdating of Deverel-Rimbury pottery into the Middle Bronze Age was significant for Bronze Age settlement studies as typically the roundhouse settlements that were thought to be Late Bronze Age were almost always dated using the associated Deverel-Rimbury pottery assemblages found on these sites, which were thought to be Late Bronze Age in earlier models. The revelation that this pottery type dated well into (at this time) the 15th century BC first became apparent in 1954 when a radiocarbon date placed a Deverel-Rimbury sherd found in the Netherlands to the Middle Bronze Age (Glasbergen 1954 p.129). The back-dating of Deverel-Rimbury pottery to the Middle Bronze Age meant that those settlements found with this material must also be Middle Bronze Age in date.

However, this new dating had the confounding effect of temporarily leaving a vacuum of settlement in the Late Bronze Age, as there were no remaining defined artefact types found on settlements that could be dated to this period. As a result, Late Bronze Age settlements were not discussed or identified until the 1980s (Barrett 1980 p.297; Cunliffe & Phillipson 1969; Jones & Bond 1980; Ladle & Woodward 2009 p.371; Moore & Jennings 1992), when Barrett was able to define Post Deverel-Rimbury plain ware (Barrett 1980). This confusion led to some settlement sites being termed Late Bronze Age (using established seriation dating schema) when they would in fact be the same as what was newly considered Middle Bronze Age (e.g Harding 1964). It was only when it was demonstrated that the material once thought as Late Bronze Age was in reality dated several centuries earlier (e.g. Smith 1959 pp.155–159) that a Middle Bronze Age date for settlement was gradually accepted.

2.4 New Archaeology (1970-1990)

During the 1970s an ever-increasing quantity of excavation was carried out, which itself enlarged the corpus of Bronze Age settlement sites in Britain. While much of the material published during the early parts of this decade was limited to site reports, the quantity of information becoming available heralded a new period of the summation and analysis of the entire settlement corpus. It was by this point that the dearth of settlements, once thought to be an Early and Middle Bronze Age phenomenon, was backdated and confined to the Early Bronze Age (Brück 1999b p.52; Childe 1940 p.98; Simpson 1971 p.131). While some potential Beaker settlements were identified (Bradley 1970; Simpson 1971, 1976), few contained settlement structures, and those that did were smaller, less regular in form and made mostly of shallow stake holes (*ibid*).

During the 1970s there was also an increased emphasis on the landscape setting and contextualisation of settlement sites (best exemplified by Drewett, Ellison, Cartwright, *et al.* 1982). At this time there was a newly widespread recognition of field systems across southern Britain (Fleming 1988) and smaller irregular enclosures seen across England, Scotland and Wales (Bradley 1978; Feachem 1973). The acknowledgment of these systems allowed debates on the subsistence practices of the Middle and Late Bronze Age to continue which then catalysed in the rejection of a primarily pastoralist lifestyle for those inhabitants of Britain during the Bronze Age (Bradley 1972).

However, while the pace of investigation increased during the 1970s, a general consensus on Bronze Age settlements role and function cannot be said to have been reached until the 1980s. It was in 1980 that the proceedings of the *Settlement and Society* conference was published (Barrett & Bradley 1980). This two volume monograph represented the emergence of a more settlement and landscape-orientated narrative for the Later Bronze Age (Barrett & Bradley 1980). Within the text was the suggestion to divide the Bronze Age into two periods (Coles & Harding 1979; Barrett & Bradley 1980). These were an Earlier Bronze Age, that was dominated by funerary rites and monumental constructions, and Later Bronze Age, dominated by domestic structures and agricultural produce and metalwork (Bradley, Haselgrove, Vander Linden, *et al.* 2016 pp.171–172). This two stage division of the Bronze Age has proved influential within regional summaries of the

Bronze Age and subsequent scholarship of the period which is frequently divided between studies on an Earlier and Later Bronze Age (Brennand, Chitty & Newman 2007; e.g. Petts, Gerrard & Cranstone 2006; Webster 2007).

2.4.1 Continued research into settlements

2.4.1.1 Southern England

By this point, the publication of Later Bronze Age settlement sites can be described as becoming more formulaic, their discovery or excavation being seen as less revolutionary, and instead confirming and reiterating the findings of earlier excavations. As a result, reports of Bronze Age settlements became shorter (Cunliffe 1970; Lewis & Walker 1976), with their discussions limited to citing the similarities with well-known sites excavated and published a generation earlier such as Shearplace Hill and Itford Hill.

It is notable that these smaller studies did not attempt to critique the established orthodoxy that settlements of the Later Bronze Age were made up of villages of post-built roundhouses used by sedentary farmers set down by these type sites. For example, there is no critique of the number of structures found at sites such as Itford Hill or Park Brow, whose number of houses contrasted strongly with those smaller settlement sites which only contained pairs of structures. Such diversity was explained as “only to be expected” (Cunliffe 1970 p.12). As a result, most observations stated that the settlements housed single family units.

Furthermore, there was no critique into the limited number of artefacts found within settlements, how they were abandoned, or the presence of a structure underlying the settlement deposits. Instead the debris found within them was understood to be indicative of the nature of their use during their occupation which was thought to be limited to a relatively short amount of time (c. 25 years) (Cunliffe 1970; Jobey 1978). This is best exemplified in Cunliffe's offhand rejection of any other factor affecting their appearance, "unless, of course, rubbish was scrupulously removed from the inhabited area, which seems less likely" (Cunliffe 1970 p.12).

The new Late Bronze Age settlement sites being found included those with only a few post built roundhouses such as Aldermaston Wharf and Knight's Farm (Bradley, Lobb, Richards, *et al.* 1980) and also those settlement sites which contained a far larger numbers of structures as at Reading Business park (Moore & Jennings 1992). Publications of these sites (see above) understood the nature of these Late Bronze Age settlements, which were similar in form, were differentiated from those Middle Bronze Age settlements by the distribution and quantity of artefacts found within them (Bradley, Lobb, Richards, *et al.* 1980 p.255). In addition, the first ringworks of eastern England, such as Mucking south rings (Bond 1988; Jones & Bond 1980), and hillforts such as Rams Hill and Mam Tor (Bradley & Ellison 1975; Coombs & Thompson 1979), were recognised.

2.4.1.2 Northern England

It is notable that the oft cited examples of Bronze Age settlements published from 1970 onwards are frequently those from the south of England. Indeed, Megaw and Simpson's summary of the British Bronze Age notes only the dearth of settlement in the north of Britain (Megaw & Simpson 1979 p.287). Yet settlements were being identified in this region, as in the earlier 20th century, although those projects that did occur were confined to the agendas of certain archaeologists such as George Jobey. This particular archaeologist, whose experience was based upon frequent excavations in the north of Britain, particularly in southern Scotland, conducted excavations in response to the perception that the region lacked settlements, in this case meaning habitation structures (Jobey 1980). His investigations identified post-built roundhouses with a slightly different architecture to those seen in the southern lowlands, namely the ring bank form (see above), at two sites which were broadly contemporary with the sites containing Deverel-Rimbury pottery (Jobey 1978, 1980, 1983). These northern settlements also employed a mixed economy focussed on cereal cultivation and the raising of cattle (Jobey 1978 p.95). Jobey’s work is notable in recording the difference between enclosed and unenclosed settlements, which he considered a response to changing to a more protective design brought about by climatic deterioration (Jobey 1983 p.18). Further developing this theory was the idea that, with this downturn, people began to move to, not away from, marginal lands (Jobey 1983; Sensu Burgess 1980).

2.4.2 Summation

By 1970, Bronze Age settlements had been confidently recognised for almost half a century and since this time an ever-increasing number were being excavated. This larger corpus of sites made it possible for a new synthesis to be produced which pooled together the archaeological evidence for Bronze Age settlement without having to primarily rely on artefact distributions. As a result, it was possible for Simpson to effectively critique the notion that Early Bronze Age settlements simply didn’t exist (Simpson 1971). Within this work, the low number of settlements was highlighted, although crucially nine sites were confidently dated to the Early Bronze Age (Simpson 1971 p.132). This allowed the first rigorous suggestion of why such a dearth existed, in this case a combination of subsistence practices which were thought to still be in part transhumant, and that some sites might be hidden due to colluviation in the lowlands (Simpson 1971 p.132).

2.4.3 Defining Bronze Age settlement structure form

It can be suggested that it was in the period of the 1970s and 1980s that the reconstructed form of Bronze Age settlement structures were studied further than simply the citation of ethnographic parallels (see above). In particular, the work of Musson (1970) has been one of the most influential to visual reconstructions of roundhouses and the understanding of settlement plans in the subsequent decades (See the covers of Bell 1990; Brown & Medlycott 2013; Garner, Allen, Wenban-Smith, *et al.* 2007; and Preston-Jones 2007; and reconstructions within Burstow, Holleyman & Helbaek 1958 p.209; Collard, Darvill, Watts, *et al.* 2006 p.407; Hamilton 2002 pp.165–167; Jones 1998 p.44; Kelly, Conway, Williams, *et al.* 1988 p.133; Kendrick, Barclay, Cowie, *et al.* 1995 p.62; Toolis 2005 p.496). This paper (Musson 1970) was the first to observe that numerous forms of house design might be indicated by comparable arrangements of post holes. By doing so, it also brought to light that early interpretations of Bronze Age houses were built on the impression that they should be technologically inferior to those of the Iron Age (by containing a central post), but in truth the excavated evidence did not support such an assertion. Key to this, he (Musson 1970 pp.267, 272–273) stressed that there is an unrealistic contrast between small central posted houses of the Bronze Age and the large double ring post holes of the Iron Age. Within this same paper, Musson discussed how such forms underwent stress depending on their design, methods of roundhouse construction and the use of different materials (Musson 1970 p.274). It was the first publication that recognised roundhouses need not end at their post ring: through recognising platform sites cut into hills and the placement of the scarp, he suggested that the walls for these structures were not marked by the internal post ring (Musson 1970 p.269). This, he argued, diverted rainwater and helped create a wall. He also recognised worn floor surfaces could be smaller than the apparent outside edge which may have led some to think these lowered surface marked the edge of Bronze Age roundhouses, but suggested it was natural for most habitations as habitation patterns create less wear at the edges of their occupation space. This is supported by pits within the radius of the post holes, which must be under the wall if not spread out. As a result, sites such as Itford Hill had their proposed surface area, in effect, doubled (Musson 1970 p.269).

Such an interpretation of Bronze Age post rings was timely as, from the well-published settlement at Shearplace Hill, a similar reconstruction of a Bronze Age house was independently suggested (Avery & Close-Brooks 1970). This and Musson's (1970) work were therefore of great significance as they provided evidence that the evolutionary typologies of the 1960s either had to be backdated or were not applicable.

These reinterpretations were then applied to other larger settlements such as Itford Hill which had first been interpreted as representing multiple roundhouses all occupied contemporaneously (compare for instance the reconstruction in Burstow, Holleyman & Helbaek 1958 p.209; with Ellison 1978 p.35). This site’s subsequent re-assessment demonstrated that it was actually occupied in a series of four phases (Ellison 1978). As such, the work of Avery and Close-Brooks' (1970) and Musson’s (1970) reinterpretations suggested that large roundhouses had their roots firmly in the Bronze Age, with little to distinguish them, barring their finds, from those of the Iron Age. This new interpretation was quickly referenced and supported (Burgess 2001 p.229; Forde-Johnston 1960; Megaw & Simpson 1979 p.264) such that Guilbert set out to identify in which other cases roundhouses may be in fact made of two rings, or that is to say, that their inner ring was reserved solely to provide support the post for the roof and not the placement of a wall (Guilbert 1981, 1982a, 1982b). Crucially, this work made a significant contribution to such interpretations by recognising that the outer ring need not leave as readily identifiable evidence as that of the inner ring (Guilbert 1981). Using evidence from Crickley Hill, where double ring roundhouses had been identified, it was able to prove that the outer ring of a roundhouses did not need to penetrate the ground such that these outer rings could escape detection if the site had been truncated. In such circumstances “there need not be any archaeological vestige of it, even on a site that has suffered little from erosion” (Guilbert 1981 p.299). While this paper was also clear to emphasise that such a conclusion did not mean all roundhouses were likely to be double ring in form, it did conclude that a great many were likely to be of this type (Guilbert 1981 pp.310–313)

In conducting this work, Guilbert was also able to use the same corpus of sites to investigate whether any typology might be applied to such buildings or whether there were any particular architectural traditions followed. He tentatively suggested a resemblance between Sussex Middle Bronze Age post-built roundhouses based on simple symmetry and repetition in design based around a single post (Guilbert 1982a). While this interpretation on its own was far from compelling, he was able to follow up this work with further investigation which suggested that far from being ad-hoc structures, the houses were built according to a standardised form following a long-held and well-understood structural system of post arrangement (Guilbert 1982b). Subsequent to this, Hill (1984) identified a general adherence to optimum dimensions which would provide maximum stability through a balanced distribution of roof weight between the outer wall and post ring (Hill 1984). As such, by the 1980s the form of roundhouses was well understood.

Following Itford Hill, the site of Black Patch, which was excavated by Drewett (1982), has been one of the most influential Middle to Late Bronze Age settlement sites within Bronze Age settlement studies in Britain (cited 116 times according to Google scholar current of February 2019). The detailed excavation and then publication brought about new theories on the economic relationships of settlements (Drewett 1982). The site at Black Patch was discovered by George Holleyman in 1949. A survey of the surviving earthworks was made by Eric Holden and published in Curwen's *Archaeology of Sussex* (Curwen 1954 fig 55), yet it was only in 1979 that the site was eventually excavated and published. This was to a modern archaeological standard with high resolution recording of all the features on the site. Critically, Drewett’s excavation confirmed the form of Bronze Age roundhouses as proposed by Musson (1970) and Avery and Close Brooks (1970). Similar to the evidence seen at Shearplace Hill and the sites suggested by Musson (1970), this site showed pits and features found in locations that would have been cut by the wall of these buildings if they had been placed in the locations indicated by the inner post ring (Drewett 1979b). Furthermore, excavators were able to identify the ring of post holes, postulated by Musson (1970) and Guilbert (1981), on the outer bank (See for instance Figure 20). This confirmed that such outer walls could exist and indicated that houses that were only visible as single post rings may originally have had outer post rings that were missed due to their ephemerality. Meanwhile, the high quality of excavation was able to confirm that the spread of debris in these sites also followed the pattern, of an inner ring of postholes terraced into the soil with an outer ring on the edge of the terrace and near its front porch, proposed by Musson (1970). As such, Drewett was able to conclude that the postholes, which had been excavated and previously interpreted as the remains of the walls of the structure, actually represented internal roof supports, thereby increasing the extent of the internal floor surface (Drewett 1979a p.6).

Within this schema it was proposed that the large post hole in this form found at the entrances to these huts prevented lateral stress on the southern side, while the bedding of post holes prevents this stress everywhere else (Drewett 1979b). The results of Black Patch helped confirm the postulated reconstructions of Bronze Age roundhouse structures proposed in the early 1970s, however, they were perhaps more influential in their use to support the creation of an economic model of subsistence that still underlines most models of Bronze Age society today (Drewett 1980, 1982). These models are based on the assumption that the debris spread across the site of Black Patch was distributed during the occupational life of the houses and was left in situ at the moment of desertion, with the material culture unmoved by the inhabitants (ibid). As a result, Drewett (1980, 387-9) was able to suggest that areas were demarcated as having certain functions based on the amount of light able to enter the buildings in different zones. For example, dark sides were interpreted as having had a storage function (Drewett 1979b p.7). Furthermore, certain activities could be located with great detail. For example, flint was interpreted to have been knapped on site outside of the houses, with only the finished blades brought inside (*ibid*). Drewett also suggested hearths were placed near the centre of the house at the entrance and these were missed at Itford Hill due to their ephemerality (*ibid)*.

Crucially, Drewett developed a model based on interdependency first within the settlement site, with the suggestion that there were shared interdependences by the connections between houses, ponds and fences (Drewett 1980 pp.387–389). Following the assumption that the site was used only by an extended family (through using the Itford Hill assemblage as a reference), Drewett (*ibid)* suggested that such a unit may work similarly to units seen to Uganda. In this ethnographic parallel, a parcel of land is taken by a daughter from her mother, whilst the entire family is united by a shared compound (Gulliver 1965), as argued for at Black Patch. Within this system central huts appear, which might have had connotation with a chief or ”big man” model although not separated on grounds of sex (Drewett 1980, pp.387-9).

This model was developed further by Drewett, who wanted to attempt a more thorough assessment of the material found at Black Patch and its location set against all other known settlements (and their assemblages) in its region (Drewett 1982). Far from finding that these sites relied on one another for resources, this research suggested that all material exploited by the occupants of each settlement was within a reasonable collection distance (Drewett, Ellison, Cartwright, *et al.* 1982). It was then further suggested that the locations exploited for farming were not always the most productive to each settlement, suggesting that such a settlement layout had not been optimised to this preference. This had significance to Drewett's model of how these sites interacted, which suggested only three reasons for interaction between settlements remained (with trade between settlements being unnecessary): the redistribution of surplus; the defence of the hut clusters, or the access to wider redistribution networks (Drewett 1982 pp.392–399). Such a narrative fits well with the suggestion of Ellison (Ellison 1980b) that emphasised that settlements were occupied by extended family units (see below).

2.4.4 Landscape studies

By the late 20th century, a sufficient corpus of settlement sites and their varied forms (discussed above) had been collated. It became possible for more developed syntheses of Bronze Age settlements to be discussed by integrating the settlement evidence with other archaeological sites, artefact distributions, and environmental evidence. As seen with the study of Black Patch, combining these previously separate evidence bases allowed the contextualisation and understanding of settlements in their landscape (Drewett 1982). This landscape approach is best demonstrated by the publication of the *Settlement and Society* conference (Barrett and Bradley 1980). This monograph, in addition to defining the juncture between the Earlier and Later Bronze Age, also served to cement a narrative of Bronze Age Britain which was not solely based on its artefact distributions.

The publication was the result of a conference which aimed to produce a model for the Later Bronze Age. The publication of the conference proceedings included regional summaries of the regions of; the south west of England, the Marlborough Downs, Cranbourne Chase and Wessex, Kent, the Thames Valley, Norfolk, South Lincolnshire, Eastern Yorkshire, and regions of East Anglia. While this monograph has proved influential in defining much of Later Bronze Age scholarship, certain observations and critiques must be highlighted in its approach. Firstly, barring chapters on Eastern Yorkshire, and South Lincolnshire regions, it was entirely focussed on the archaeological record of southern England, with no mention of Wales, Scotland or northern England, despite numerous settlements being known, well excavated and published (see discussion above). Similarly, and more importantly, it is clear that the term 'settlement' was not defined within the conference, or within the monograph's individual chapters, in any precise terms. As such, the papers within the monograph range from those exclusively focussing on habitation sites containing structures (as this thesis project would understand a settlement) (Drewett 1980; Johnson 1980; Jones & Bond 1980; Needham & Longley 1980), while others discuss settlement in their region using material remains such as pottery scatters and hoards as a proxy for settlement activity, which in some cases lack any mention of true habitation sites (Chowne 1980, 1980). More accurately, these later papers describe the occupation of regions, but not the region's settlements. This emphasises somewhat the variance in the use of the term settlement and how regional approaches to settlements study has made reconciling such data difficult.

2.4.4.1 Other critical Landscape studies

While the *Settlement and Society* (Barrett & Bradley 1980) monograph is of importance to all Later Bronze Age scholarship, there were also several other key studies that have remained influential to this day. The first of these is Bradley's review publication on Bronze Age pastoralism in Britain (Bradley 1972). Within this review, it was suggested that earlier archaeologists had been too hasty to apply the term pastoralists to those people who lacked archaeologically recognisable settlements. Bradley recognised that the transition between transience and pastoralism need not exist. As a consequence of this paper, all subsequent summaries of Bronze Age settlements have described settlers of Britain as primarily agriculturalists (until Stevens & Fuller 2012).

Similarly, it was during this period between the late 1970s and 1980s that the larger scale of agricultural infrastructure in the Later Bronze Age was increasingly becoming realised and investigated (Fleming 1988; Pryor 1974, 1978, 1980, 1984). Fuelled by the (re)discovery of the Reaves in Dartmoor (Fleming 1988) and the identification of large organised field systems in East Anglia (Pryor 1974, 1978, 1980, 1984), the presence of Celtic fields found at least as early as 1923 (Curwen & Curwen 1922) was re-affirmed. No longer were field systems limited to the earthworks immediately surrounding the settlements (often termed pounds).

As such, the works of the 1980s were able to bring together settlement excavations for the first time into compelling syntheses, which all agreed on a narrative that stressed a junction occurring during the Middle Bronze Age; i.e. dividing the Bronze Age as a whole into an Earlier Bronze Age and a Later Bronze Age. This narrative structure has been used in almost all studies of the Bronze Age since this time (see for example Parker Pearson 2009 and; Champion 2009; Hunter & Ralston 2009 or; the division of Bradley 2007; Webster 2007; Petts, Gerrard & Cranstone 2006; Barrowclough 2008; Bradley, Haselgrove, Vander Linden, *et al.* 2016 p.182), with no further fundamental changes in the following three decades. The establishment of this narrative is perhaps best evidenced within the synthesis of the excavation and survey of Cranbourne Chase (Barrett, Bradley & Green 1991).This text summarised the difference between the Earlier and Later Bronze Age compellingly with the later period being where “the dominant structure of the landscape was now given by the actions of the living in relation to daily procedures of agricultural reproduction” (Barrett, Bradley & Green 1991 p.225).

2.4.5 Ellison’s thesis and 1980 articles

Worthy of particular mention during the period of research between the 1970s and 1990s and published within *Settlement and Society* and in other publications are the works of Ann Woodward (née Ellison) on settlement sites (Bradley & Ellison 1975; Ellison 1978, 1980) and her doctoral thesis on Later Bronze Age pottery (Ellison 1975) . Her publications provided several primary observations of Middle and Late Bronze Age settlement sites and their structures which have since been tested in one form or another in almost all later publications. In particular, her suggestions of the occurrence of house pairs (Ellison 1978 p.35), influenced by Clarke (1972), defined by one larger and one smaller house structure is often recited, combined with the suggestion that settlements comprised, not numerous and contemporary houses, but smaller domestic units which may have been occupied only one at a time (Ellison 1978 p.35). These units would only consist of one residential hut which was coupled with one other smaller roundhouse that acted as an ancillary building, along with smaller four poster structures that were used for storage.

Additionally to these findings, Ellison's thesis (1975), which looked at classifying pottery into typologies from the Middle Bronze Age, argued for the regional distributions of Deverel-Rimbury pottery negotiated by redistribution sites in six areas (Ellison 1975 p.280, 1980b). It was also her reinterpretation of the Itford Hill assemblage (Ellison 1978; within Holden 1972), as discussed above, that suggested that the settlement was not occupied in one phase but in four episodes.

2.4.6 Narratives

This section has shown that fuelled by: increased excavation; increased study on settlement form; the application of radiocarbon dating, and the contextualisation of sites within landscapes, it became possible to define a new narrative for Bronze Age Britain between 1970s and 1980s. This is clearly seen in the texts of the period that summarise the Later Bronze Age Britain period as one which was defined by its economy both in the use of field systems and the redistribution of metal and other finely crafted artefacts (Bradley 1978b, 1984). While this perspective was seen as conflicting with the Early Bronze Age settlement record, the assumption that Early Bronze Age communities were different and more primitive peoples was also rejected (Simpson 1971). Instead, Early Bronze Age communities were seen as agriculturists whose settlements had yet to be found. These narratives became developed only through the contextualisation and understanding of habitation at this period. The site of Itford Hill (Burstow, Holleyman & Helbaek 1958; Ellison 1978 p.35) became influential in the description of Bronze Age settlements which were summarised as sites found in lowlands, and often on chalkland, during the British Later Bronze Age. These were seen to have been made up of a series of roundhouses clustered together within fenced or embanked enclosures (see for instance the plan within Drewett 1980). The infamous refitting sherd from a nearby cremation cemetery in a barrow at Itford Hill (Ellison in Holden 1972 p.110) led to suggestions that these were occupied by extended family units who lived in the area and were then buried in nearby cemeteries (Bradley 1981; Ellison 1980a).

By the late 1980s, a narrative for Bronze Age settlements had been established. In Burgess (1980) this started with the Late Neolithic and Early Bronze Age, with settlements being made up of tents but placed within an agricultural world as seen in the field systems and sizeable monuments across the country (Burgess 2001 p.194). By comparison, the Middle Bronze Age comprised robust, paired roundhouses with Deverel-Rimbury pottery on the Wessex and Sussex chalklands (Burgess 2001 pp.199–209) and Trevisker pottery in the south west of England (Burgess 2001 pp.210–211) and “upland” settlements elsewhere (Burgess 1980 pp.211–213). Four and six post structures were also more regularly recognised (Burgess 2001 p.228, Gent 1983) as part of Bronze Age settlement sites. By this time, the idea that these were just cattle pounds was discounted (Burgess 2001 p.280) with any such sites probably being attributed to the Iron Age. Those upland settlements were then thought to be abandoned in 13th century BC (Simmons & Proudfoot 1970 pp.208–211, 212–216; Caseldine 1999; Burgess 1985; Taylor 1975). Those Bronze Age settlements that were discovered were understood to have housed extended families practicing mixed farming in manured field systems, as well as spinning and weaving their own textiles (Burgess 1980 Chapters 5-6).

2.4.7 Summary

The late 1970s and particularly the 1980s might be seen as a cauterising period in Bronze Age settlement studies. By this time it had begun to be recognised that hillforts (previously reserved as Iron Age sites) had their origins in the Late Bronze Age and continued their use into the Iron Age, thereby somewhat blurring the division of these two periods (Coombs & Thompson 1979).The size of data now available to marshal by archaeologists coupled with a reliance on positivist theory (Johnson 2010 pp.39–41) allowed the creation of coherent and complementary summaries of site types. However, synchronously with these later changes was a growing dissatisfaction with the New Archaeology movement of the early New, or Processualist, Archaeology (Johnson 2010 pp.102–105). Settlement studies were not excluded from this revision, although it was only in the 1990s that they were truly re-evaluated wholesale.

2.5 It’s not the economy stupid (1990-2000)

The post-processual movement emerged in the late 1980s and rose into prominence in the 1990s as a variety of diverse approaches of “interpretive” archaeologies (Schofield, Carman & Belford 2011 p.35) however, as a paradigm shift in theoretical thinking, its key component is recognised as one reacting against the positivist thought of the 1970s and 1980s (Johnson 2010 p.105). It recognised that human experience and context was vital to understanding the archaeological record. With this movement came further ways, or at least validation of existing methods, to understanding archaeology. These often included the study of gender, phenomenology and site formation processes (Hill 1995; Gero & Conkey 1991; Tilley 1994; Tringham 1991). Settlement studies were not exempt from these developments (see below) although it might be suggested work influenced by this movement came later in the 1990s than in other fields.

It was during this time that the oft-cited sun-wise model was first made explicit (Oswald 1991, 1997). This model, defining the structured placement of items and features within houses based on their direction to the sun is notable, not just for its interpretation of a shared system of belief underlying houses but also for the recognition that the interpretation of this patterning may not be straightforward, as 'the disposal of material when a house was abandoned may . . . have been different from when it was in use' (Fitzpatrick, Barnes & Cleal 1995 p.87), an observation markedly different to those assumptions underlying interpretation of settlements in the preceding period.

The most often cited author of this period regarding research in Bronze Age settlements is Brück, who produced a series of publications (Brück 1999a, 1999b, 2000, 2001, 2006, 2007) building on her thesis (1997). This thesis aimed to study the Early to Middle Bronze Age transition through an analysis and comparison of these period's settlements. It analysed a sample of 51 Early Bronze Age sites, and an additional five Later Bronze Age sites with possible Early Bronze Age phases, and 65 Later Bronze Age sites taken from the Wessex, Sussex and Thames Valley region (*ibid*). The thesis introduced several key themes discussed in her later published articles. Namely, it discussed the issue of identifying Early Bronze Age settlements and it assessed the structuring of space within settlements throughout the Bronze Age within an interpretative framework that suggested these changes and settlement forms represented the social organisation of their occupants more directly than their economic functions.

Significant to this thesis' methodology, Brück's work studying Early Bronze Age settlements concluded that the lack of this settlement form is predicated on archaeologists using only a narrow form of the term, essentially looking for house structures (Brück 1999b). Her 1999 work made the distinction that while these settlements may appear transient and were likely only occupied seasonally, they did not evidence a pastoral economy that Bradley (1972) had rejected. As such, any hard divide between what sites were termed as settlements and what sites were not was misleading.

The remaining arguments presented by these studies were formed on the principle that settlements, and specifically their design, were "related" at both a practical and metaphorical level to the lifecycles of their inhabitants (Brück 1999a). This contrasted with almost all earlier works which identified the remains found within houses as representing the economic activities that occurred within them (Burstow, Holleyman & Helbaek 1958; Cunliffe 1970; e.g. Drewett 1980; Drewett, Ellison, Cartwright, *et al.* 1982; Ellison 1980). From this point of view, any changes to settlement design reflected the changes in their owners' demographic, social and economic circumstances. Using this distinction, she suggested (Brück 1999a) that any changes in structure and form would reflect the changing *needs* of their occupant's time (cf, Goody 1958; Moore 1986 pp.91–102) and that this biography was informative for understanding the ways in which settlements were consciously, and unconsciously, used and manipulated by their occupants. For example, by identifying that only 7% of settlements were built on the same spot as earlier structures, Brück suggested that Bronze Age children (both male and female) may have routinely moved away from their parental home and set up their own household upon marriage (a neolocal residence pattern) (Brück 1999a p.149). Through this analysis, Brück also raised the principle of formalised settlement abandonment as a theme that has been more recently further developed (*ibid* and see below).

Brück's works (Brück 1997, 1999a, 1999b, 2000, 2001a) produced numerous findings but perhaps their most significant effect was the wholesale reintroduction of non-economic roles into the discussion of settlements (Jones 2015 p.30) and the theory that the structuring of settlements helps reveal the social organisation of its occupants. This stated, it is important to note at this point that while these works (Brück 1997, 1999a, 1999b, 2000, 2001a) often subsequently form the core references for many settlement publications and monographs, Brück's work explicitly focusses solely on southern Britain and only on a sample of the most well-known and published sites in this region. For example, at no point in these works does she contextualise her results of ephemeral Early Bronze Age settlements with the much clearer house plans seen in the Western Isles (see sites discussed in Simpson 1971, 1976; and Parker Pearson & Zvelebil 2014 for further sites) .

The period of the 1990s can be seen as one where awareness and recognition that archaeological interpretation is always hermeneutic emerged. For the Bronze Age in Britain, this meant that a wide range of possible underlying purposes for the arrangement of archaeological finds were construed, some of which may have had spiritual, religious or societal underpinnings. This realisation was not limited to Bronze Age structures and was seen in the works by Bowden and McOmish (1987) on hillfort morphology, Bradley (1990) on metalwork deposition, Hill (1994) on structured deposition, Lawson (1994) on ritual feasting and in the varied interpretations and investigations into the reasons behind roundhouses being orientated in specific directions. This shift away from solely economic explanations of settlements is best demonstrated in the works of Brück which, together with those studies above, can be seen as shifting emphasis in research “from food production and agriculture towards the socialising role of the settlement and the presence of ritualized practices within the domestic sphere” (Jones 2015 p.30).

2.6 Moving to the present era (2000-2019)

By 2009, the debate between the superiority of either processualism or post-processualism can have said to have ceased, as seen in the opening key note of TAG 2009 (Díaz-Andreu García, Giles, Hicks, *et al.* 2009) with the majority of archaeologists recognising the merits and methods of both (see also Bintliff & Pearce 2011). This has been a productive period of time for Bronze Age settlement studies as this, together with the advancement of scientific research methods (for example, wider adaptation of GIS systems, radiocarbon date calibrations, strontium isotope analysis on cremated human bone) has allowed numerous research programs to be conducted (see below), building on the continually expanding dataset, which was only enhanced by the advent of developer-funded archaeology

(Cooper 2012 pp.317–318; Darvill & Russell 2002 p.16) along with a theoretical liberalness to apply theory or data as the author wished. Several themes can be said to have been discussed including debates on; pastoralism vs sedentism, the structured abandonment of settlements, the retreat of settlement from the uplands of Britain, the choice in settlement location, memory and summation of regional forms of settlement structures.

2.6.1 Themes

2.6.1.1 Pastoralism Vs. Sedentism

It had been thought that the issue of pastoralism versus sedentism had been settled in the 1970s, with both the Early and Late Bronze Age representing periods of agriculture despite the more direct movement of individuals in the Early Bronze Age. However, with the publication of Stevens and Fuller (2012), there has been a renewed interest in the prospect of identifying pastoralism in the Bronze Age. The results of this study, based upon analysing large datasets of archaeobotanical evidence and radiocarbon dates, present a compelling case that in Britain the use of domesticated crops dramatically decreased following the Early Neolithic. While the results of this study should not be overstated or seen to represent the entirety of the Britain (Bishop 2015), it is supported by some contemporary and later scholars in their discussions of the possibility – once again- of pastoralism. For example, at Cotswold community (Hearne & Adams 1999 pp.69–72; Powell, Smith & Laws 2010b) there has been the suggestion that the site was used only as a seasonal settlement that pastured a mobile cattle herd, with its inhabitants' lack of interest in farming indicated by the complete lack of storage pits showing any domesticated plant remains. Similarly, in south west England, the landscape of the Severn Estuary was seen as containing post-built roundhouses designed to be seasonal camps for its inhabitants to move between the nearby upland and estuarine zones, dependent on the seasons and environment (Bell 2013).

2.6.1.2 Abandoning sites

As discussed above, it was once thought that the assemblages found within houses might represent the original material left behind in the abandonment of the settlement (Cunliffe 1970; Drewett 1980). This view has been increasingly criticised since the late 1990s. Building on Brück's identification of the manipulation of settlement structures within houses (Brück 1999a) and LaMotta and Schiffer's (LaMotta & Schiffer 1999) suggestion that what survives in the archaeological record is representative of formalized abandonment rather than occupation, it has now frequently been suggested that homes were structurally abandoned (Nowakowski 2001; e.g. Webley 2007). Such an interpretation originated in the recognition of special deposits found on Middle and Late Bronze Age sites, from which there was a suggestion that the houses of the Late Bronze Age were modified or destroyed in elaborate closing rituals. These rituals have been suggested as including the "cleaning" of these settlements (Nowakowski 1991) through the removal of traces of settlement activity including structural timbers and the scraping of floor surfaces.

The recognition of the ritual abandoning of settlement has not been limited to specific settlement structures, such as roundhouses, or to the Middle and Late Bronze Age, but has also been identified on Early Bronze Age sites (Gossip & Jones

2009; McCullagh & Tipping 1998; Quinnell, Nowakowski, Lawson-Jones, *et al.* 2008). Furthermore, it is not geographically distinct, with both houses in lowland (Ladle & Woodward 2009) and upland locations showing evidence of apparent closing ceremonies (Jones 2008; Nowakowski 2001; Robinson 2013). As a result, the nature of this commemoration has begun to be theorised. For example, Bradley (1998a, 46) suggested that Neolithic long houses which had been covered by mounds may have memorialized past occupants, an interpretation later applied to the excavated settlement at Scarcewater (Jones, Taylor & Butcher 2010). Ethnographic parallels with the Gow of Bajo Urunmamba in western Amazonia have been also been used to suggest that the structured abandonment of these sites is due to taboos on living in homes once occupied by the dead (Nowakowski 2001).

This is not to say that more systems-based approaches to settlement histories have not also been considered. For example, the phasing of settlement has also been increasingly studied (Halliday 2007; Ladle & Woodward 2009) through either the application of high resolution radiocarbon dating programs or the analysis of overlapping sites. Debate exists as to whether these identified phases of occupation represent continuities (Brossler, Early, Allen, *et al.* 2004; Brossler & Allen 2013) or sites occupied in series of punctuated episodes (Halliday 2007). Webley (2007) has associated the ritual abandonment of structures with the sun-wise models proposed in the 1990s. In this research the houses at Broom and Broomfield were notable for the selective removal of posts on the left side of the building following their abandonment, while those on the right were left intact. Within this same work, however, he was able to note that such abandonment practices may have been a minority rite (Webley 2007 p.170). While it would be accurate to state that most discussions of settlement abandonment have favoured ritual interpretations, it should also be recognised that other interpretations have been suggested such as the deliberate burning down of settlements, as at Black Patch (Tapper 2012).

2.6.1.3 Diachronic models

Of late, there has been a renewed interest in studying transitions in settlement sites over time, particularly the Middle and Late Bronze Age transition to the Iron Age. For example, the work of Davies (2017) in Wessex and Sites (2016) in the south of England both have stressed that the divide at this chronological point is somewhat arbitrary. Both highlight the value of diachronic studies of the Bronze Age. The former author identified how particularly large settlements were in fact a palimpsest of non-contemporary structures, the nature of which varied as time progressed (Davies 2016 pp.428–430), while the latter author focussed on the increase in structure and storage area over time (Sites 2015 p.287).

2.6.1.4 Upland abandonment

The occupation and subsequent abandonment of upland locations has long been discussed in settlement studies (Fox 1932, Appelbaum 1954), with Burgess first developing the hypothesis that catastrophic climate change was a primary factor in driving communities from upland locations in Britain in the 1960s, followed by key influential publications in the following two decades (Burgess 1968, 1974, 1980). This study continues into the 21st century (Tipping 2016, 191), with attempts to better define what can be classed as upland and then more accurate comparisons of settlement forms between these regions (Tipping 2016).

2.6.1.5 Location

The settlement studies of the 1980s are frequently described as beginning to contextualise archaeological sites and the evidence found within them with the wider known distributions of artefacts, sites and environmental evidence. Yet it is clear that these contextual studies primarily focussed on economic explanations for these landscapes. Such studies continued following the turn of the millennium but have become far more varied. This is perhaps best evidenced by Tilley's unconventional publication of the excavations in Dartmoor in and around the site of Leskernick Hill (Bender, Hamilton & Tilley 2007). This research was defined by the experience of excavating and being in the landscape of this settlement. The variety in landscape study is also best typified by a very different study on the same site by Eve and Crema (2014). This project has been one studying the settlement's location in relationship to other features within the site environs using GIS (Eve & Crema 2014). One publication from this project suggested that settlement location shifted, from a focus on a nearby barrow cemetery, to pay greater respect to nearby tin resources in the region (Eve & Crema 2014 p.275). Even more mathematically robust and philosophically grounded models have also been proposed for this region's settlements classifying space as a means to identify social distance (Wiseman 2016).

Landscape studies have also been applied at the site level scale as in the works of Hamilton and Manley (2001). These researchers visited all the known hillforts in the south east of England, noting their topography, morphology and chronology in an effort to understand the contexts of these locations (Hamilton & Manley 1997, 2001). By grouping hillforts temporally, they were able to identify that only hillforts belonging to the Later Bronze Age/Early Iron Age were inter-visible with contemporary hillforts. Amongst other findings this suggested that "the hill-fort users had connections with the landscapes which the sites visually accessed" (Hamilton & Manley 1997 p.25).

It is notable that, despite several publications including environmental reports, few still integrate these results to explore reconstructions of these landscapes in order to understand the role of settlement. A rare example of this, yet showing the value of such an approach, has been the work of Bell in the Severn Estuary (Bell 2013 pp.326–327). His analysis combined extremely detailed environmental analysis of the region with selected Bronze Age settlements excavated in the region to understand the role of those settlements which were found to be placed in the landscape to exploit a seasonal model of movement between the uplands and lowlands in the region (*ibid*).

2.6.1.6 Memory

The work of understanding the social organisation and transformation so effectively demonstrated by Brück (1997, 1999a, 1999b, 2000, 2001) has continued into the 21st century. Studies in sites across the UK frequently echo the findings and suggestions of Brück. A significant development within this area of research has been the association of memory, settlements and landscapes. For example, Jones's (2008, 2015) study of aerial surveys and excavations of settlements throughout Cornwall has been able to identify the similarity in form between ring cairns and houses (which were often misidentified by archaeologists). By recognising the potential of memory in the construction of these sites and in their re-arrangement

Jones argued that apparent breaks in practice between the Earlier and Later Bronze Age may not have been as pronounced as first suggested (Jones 2013a, 69). Similarly, he suggested that occasions where variation are seen in the construction or abandonment of structures may be explained through community memory was misremembered or corrupted both intentionally and unintentionally through slight deviations in practice appearing over the repeated practice (Jones, 2008, 2013; Robinson, 2013).

2.6.1.7 Summarising Bronze Age settlements

Work has also continued, to an extent, to collate evidence for syntheses of this material. A national attempt can be seen in the regional research frameworks of England and national research frameworks of Scotland and Wales (IFA Wales/Cymru n.d.; Historic England n.d.; Downes n.d.). The mandate of these particular programmes has been to characterise the form and distribution of the archaeology (Algao 2019; Historic England 2019; Oliver 1996). However, due to their wide remit, covering all archaeology from the Palaeolithic to the modern period, these frameworks, at best, present general overviews of Bronze Age settlements supported by occasional case studies.

More comprehensive summaries of Bronze Age settlements do exist, although these almost always align to modern geopolitical boundaries (e.g. Ghey et al. 2007; Waddington 2013; Jones and Quinnell 2011; Waddington and Passmore 2016) which are notable for defining regionally specific forms, often without discussing the possibility of these forms being found outside these regions. One attempt that extends beyond boundaries defined by traditional counties is the synthesis of the

Thames through Time project (Lambrick, Robinson, Allen, *et al.* 2009; Morigi, Schreve, White, *et al.* 2011) which instead studied the region of the Thames Valley. The findings of this project characterised later prehistoric settlements as being made up of a standard repertoire of subsoil features encompassing post holes, pits, water holes, gullies, ditches and a few less common deposits containing debris of domestic living and farming and exchange.

Somewhat different to these is the work of Rachel Pope (Pope 2003, 2015; and see Ghey *et al.* 2007; Pope 2007). While still focussing on discrete geographic regions (Wales, the north of Britain, Scotland) her work has been able to encompass wider geographical settings. These works (Pope 2003, 2015; and see Ghey *et al.* 2007; Pope 2007) also focus solely on the design and structure of the roundhouses found on settlements across the Bronze Age and the Iron Age. Much of this work builds clearly on her unpublished thesis which systematically discussed the structures of roundhouses across northern Britain and has been able to define radiocarbon based chronologies for settlement forms (Pope 2015) while critiquing over-interpretative accounts for the features that survive (Pope 2003, 2007).

2.6.1.8 Summary

And so we arrive to our present day situation. The range of forms of settlement seen across the Bronze Age are now known, although these are discussed primarily within regional summaries (Pope 2015; Waddington 2013; Jones & Quinnell 2011; Guilbert 1981; Musson 1970; Waddington & Passmore 2016; Morigi, Schreve, White, *et al.* 2011; Davies 2016; Ghey, Edwards, Johnston, *et al.* 2007; Mamwell 2018; Jones & Quinnell 2011) and a consensus has arrived suggesting that few settlement structures are known in the Early Bronze Age with the numbers increasing from the Middle Bronze Age into the Late Bronze Age. Since the 1950s, there has been a recognition that Bronze Age settlement sites should be understood within their landscape context. The methods available to now do so, ranging from environmental analysis, comparative feature study and more experimental analyses, has allowed such discussions to become the subject of a large portion of monographs (Allen, Hayden, Lamdin-Whymark, *et al.* 2009; Brown & Medlycott 2013; Evans, Tabor & Vander Linden 2016; Jones, Gossip & Quinnell 2015; Ladle & Woodward 2009; McCullagh & Tipping 1998; Parsons 1961).

Bronze Age settlements have been theorised extensively such that single site excavations are able to produce interpretative suggestions for the human use of sites supported by references to the underlying cosmology of these sites (Lambrick 2009 pp.142–148). Yet, while broad consensus exists, this has been never truly accumulated and then integrated into a national picture of all sites across the country, despite regional variances crossing typical modern social political boundaries e.g. Cornwall-Devon, Scotland and Northumberland and Cumbria, and Wessex.

The effect of the introduction of PPG16 and developer funded archaeology up until the early 21st century has been well charted (e.g. Darvill & Russell 2002) although it has not been formalised since the financial crash of 2008 and the subsequent rapid decrease in archaeological fieldwork, with the professional archaeology a third smaller as of 2015 from 2007 (Aitchison 2015 p.11). The sheer scale of this work has meant that large efforts have been made simply to summarise the available evidence. By necessity these works have typically tackled single regions, no larger than a series of geographically coherent counties (Pope 2015; Waddington 2013; Jones & Quinnell 2011; Guilbert 1981; Musson 1970; Waddington & Passmore 2016; Morigi, Schreve, White, *et al.* 2011; Davies 2016; Ghey, Edwards, Johnston, *et al.* 2007; Mamwell 2018; Jones & Quinnell 2011). There are two exceptions to this norm seen in Bradley's syntheses of developer-led grey literature across Britain (See Chapter 1.4) although this is written in such a way to highlight only a few selected case study sites, rather than represent those data collected. This has led to publications built on lifetimes of excavations across regions, which may or may not include the grey literature, depending on its availability, however these inevitably produce the conclusion that these results must be contextualised with their neighbouring regions but with little text dedicated as to how this may be accomplished.

2.7 Conclusion

This chapter has produced a historiographic review of the study of Bronze Age settlements, charting the gradual backdating of settlements into the Bronze Age, key syntheses of certain settlement types and how these have been contextualised within larger narratives.

The study of settlements has been discussed across five phases of time:

1. 18th century to 1940: The earliest study of prehistoric settlements in Britain and the placing of some of these into the Late Bronze Age.
2. 1940-1970: The concerted and systematic study of this now discovered form of site and their backdating to the Middle Bronze Age.

3. 1970-1990: The period synchronous with the rise of "New Archaeology" where the study of settlements became ever more standardised and their roles within economic systems more theorised and made more explicit.
4. 1990-2000: A decade when the purposes and form of settlement became more thoroughly theorised resulting in the extension of analysis and interpretation beyond solely economic attributes.
5. 2000-present: The most recent developments which comprised a consensus on the form of settlements and their chronology, which has now allowed more site-specific narratives to be produced in a flexible theoretical school.

2.7.1 Reaching proposition 1

The historiography above has charted how the study of settlement can be seen as one that; initially focussed on identifying sites; then on identifying the distributions of sites; then contextualising sites within their immediate environs first as a means to understand their economic function; then theorising sites more fully to understand their role in developing and reproducing social structures and has been most effective when fully integrating the study of settlements into their environs.

This has resulted in numerous high-quality monographs (Best 2014; Brossler, Early, Allen, *et al.* 2004; Brown & Medlycott 2013; Cooper & Edmonds 2007; Evans, Tabor & Vander Linden 2016; Garner, Allen, Wenban-Smith, *et al.* 2007; Jones, Taylor & Butcher 2010; Ladle & Woodward 2009; Moore & Jennings 1992; Simpson, Murphy & Gregory 2006) and articles (see above) that to an extent cover the same developments within their reporting. Namely, they discuss the discovery of the sites, their life history, the economy they were placed within, and how they might have functioned for their occupants. However, their discussion of the site's place within wider distributions is often more limited. Typically, they contextualise their settlement with only a selected sample of Bronze Age settlements, the selection method of which is never made clear (Brown and Medlycott 2013; Jones, Taylor and Sturgess 2012). The reasons for this are fairly simple in that there have been no recent syntheses of this form of settlement that have studied a region larger than Wales. Those syntheses that do exist are limited in number (Ghey, Edwards, Johnston, *et al.* 2007; Jones & Quinnell 2011; Mamwell 2018; Pope 2015; Waddington 2013; Waddington & Passmore 2016) or provide anecdotal summaries of Bronze Age settlements (Petts, Gerrard & Cranstone 2006; Webster 2007). As such, I would make the following proposition:

1. Archaeological research of Bronze Age settlements in the last two decades has favoured site specific discussions. There has been little synthesis of the wide corpus of settlements sites discovered during this time beyond discrete regions within the British Isles.

It has been due to the identification of proposition 1 that this study exists. It is my contention that in order to develop our understanding of the Bronze Age and the large social transformations occurring during the period a thoroughly quantified baseline study of its settlements is required (see Chapter 1.3). The lack of this synthesis (Problem Statement 3) prevents integration of the various strands of evidence now available into a coherent model (Problem Statement 2).

2.7.2 Reaching proposition 2

The lack of synthesis regarding the results of more recent excavations has resulted in the continued reliance on well-known, often-cited Bronze Age settlement studies and as a result, a focus on only those sites well-known to that region. It is clear from the review above that developments seen in the north of Britain are not often recognised in those discussions of southern settlements and are under cited. Pope's (2003) work was a direct reaction to this. Similarly, I would make the following proposition:

2. Bronze Age settlement studies have been highly regionalised throughout their study, and this has lessened their impact and the application of their findings.

It is due to the identification of proposition 2 that a geographical remit has been set to include England, Scotland and Wales together and to not sub-divide the subsequent dataset on geographical grounds. Regional syntheses for Wales and Scotland (Ghey, Edwards, Johnston, *et al.* 2007; Pope 2015) and smaller regions have been produced (Davies 2016; Jones & Quinnell 2011; Sites 2015). Yet these are often irregular in their sampling strategy (See Chapter 3.5.2). By doing so, a more developed understanding of domestic settlement during the Bronze Age across the entire region can be gained, which can be contextualised and integrated with other similarly large studies of Bronze Age phenomena (e.g. Caswell & Roberts 2018; Needham, Davis, Gwilt, *et al.* 2015; Yates 2007). By taking a non-regional perspective, a broad account of Bronze Age settlement structures may be identified. While this will inevitably leave gaps in understanding within regions, as detail is lost, by doing so it is hoped that those existing gaps in knowledge will be diminished instead of being continually reinforced.

2.7.3 Reaching proposition 3

Theis chapter has also highlighted that the study of Bronze Age settlement was subsumed within studies of later prehistoric settlement in the early 20th century and that progress in this field was not synchronous with developments in chronology. This is particularly relevant as the apparent dearth in settlements, which varies over time and by period, is often caused by the incomplete datasets available to date sites to a particular period, such as Middle Bronze Age settlements in the early 20th century or Late Bronze settlements in the 1980s. It has been shown how incorrect assumptions about Britain's Bronze Age settlement record, such as the simple presence of Middle Bronze Age structures, the extent to which structures increased in complexity over time, or the nature of settlements used, may be in part be explained by the means in which settlements have been dated by their associated material culture. Similarly, it has been recognised in many reviews that the irregular development of material culture typologies has limited the visibility of settlement sites (Bradley, Haselgrove, Vander Linden, *et al.* 2016).

As such, I would make the following proposition:

3. Bronze Age settlements have relied upon typo-chronological schema which have heavily shaped their study, although such schema are based on material culture whose changes and chronological ranges may not agree with the transitions seen in the settlement record.

It is due to the identification of proposition 3 that only those sites with associated radiocarbon dates have been selected for analysis. In almost all previous studies, changes in Bronze Age settlements over time has been defined by material that does not closely relate to these sites. This has led to periods initially being misunderstood and sites now being incorrectly classified (see above discussion). Similarly, regions without developed seriation-based models are understudied. By only studying sites with radiocarbon dates, a scientifically independent chronological model for settlement change can be identified, along with how this relates to existing chronological schema (Problem Statement 1). By doing so, many well-excavated and published sites providing unique case studies are unused, yet these may be re-integrated in future projects with a known diachronic framework.

2.7.4 Summary

This literature review above has produced a historiographic review of the study of Bronze Age settlements that has allowed three propositions to be justified on the nature of the Bronze Age. It is to improve on these current deficiencies that a study of Bronze Age settlement structures across England, Scotland and Wales was first envisioned. This established, the following chapter (Chapter 3) is now able to discucss how the study of Bronze Age settlements in Britain should be theoretically and methodologically approached.

Chapter 3: Theoretical and methodological approaches of the research project

3.1 Introduction

This chapter builds on the critical review of past Bronze Age settlement research in Britain in Chapter 2 and outlines the theoretical and methodological approach taken in this thesis to address the aims, objectives and research questions outlined in Chapter 1. It is divided into three sections. Firstly, it outlines the theoretical underpinnings of the thesis. Secondly, it states and justifies the spatial, temporal and archaeological definitions used within it. Thirdly, it presents the overall methodology employed to meet its research questions.

In particular, it provides an overview of the project's data collection which is fundamental to the validity of the theoretical and methodological approach. This includes: the database designed to record this information; how information has been keyed into this database; how supplementary datasets have been used to enhance the database and how the database has been organised and used to answer the research questions identifed. At each point in the chapter there is a critical appraisal of limitations and biases of the methods chosen and how these issues have been addressed.

3.2 Theoretical approach

This section now explains the theoretical justifications and assumptions that underlie the study as a whole. The study aims to enhance our understanding of the

British Bronze Age primarily through an analysis of its settlements and their environs. As demonstrated in Chapter 2, the study of ancient settlement in Britain is as old as the discipline of archaeology itself and has been theorised for just as long. This thesis does not aim to follow a particular school of thought or test a specific social model, such that it is not this chapter's intention to rehearse these same debates in full. However, it is important to make explicit those theoretical foundations upon which it relies for its own analysis.

3.2.1 Structuring space and understanding the past

It is now widely recognised that physical spaces are manipulated by people to establish individual and collective identity, and through doing so that society is established and experienced (Bourdieu & Figuier 2015 [1971]). This has been witnessed in numerous ethnographic studies (Bourdieu and Figuier 2015 [19701]; Carsten 1997; Fewster 1999; Jackson 1983; Lévi-Strauss 1982; Pearson and Richards 1994; Waterson 1990; see also the papers in Carsten and Hugh-Jones (eds) 1995). Wiseman (2014, 2016) has suggested that this may be routed to the conceptual metaphor "physical distance" is "social distance". He argues that this metaphor is established during childhood where positive situations of warmth and affection are associated with the physical closeness to parents such that a cognitive link between proximity and affection are hard wired into most human cognition Wiseman (2014 pp.137–138). Thus, distance is hard wired into human cognition to describe verbally and physically the structure of social distances between people and groups.

I agree that the structuring of space is an effective means for understanding human actions from the past. In understanding these actions and accounting for human agency we are better able to understand the societies they worked within and the changes that occurred during these periods. Following Downes and Richards (2005 p.57) and Louwe Koojimans (2000 p.324), I would argue that settlements, being the space most often occupied and negotiated by people, are particularly useful for understanding past human action. Roberts explains the reason for this being that houses, and by extension settlements, form “a nexus for expression as well as perpetuation and reiteration” (Roberts 1996 p.5). Similarly Buttimer (1980 p.167) argues people’s identity is so connected to their sense of place that a study of place may be more effective in understanding identity of living peoples than psychoanalysis. It is for these reasons that I believe settlements provide a particularly useful medium through which to unite the disparate strands of archaeological evidence now available in the study of the Bronze Age (Chapter 1.3).

3.2.2 Testing theories or asking questions

The identification and interpretation of functional actions and ritual actions in the structuring of settlements has been the subject of considerable scholarship (Brück & Goodman 1999; Pearson & Richards 1994). Whilst it has been generally accepted that both functional and symbolic considerations influenced at least architectural styles in prehistory (Sharples 2010; Webley 2007), debates on the application of ethnographically-inspired, ritual theories to prehistoric settlement sites have continued. The most often cited, and now thoroughly critiqued, example that can be given is of the sun-wise model for later prehistoric houses. Many papers have attempted to identify the presence of this model (Oswald 1997; Pearson and Sharples 1999), the result being that many reports will identify the presence of south-east facing porches but not those with a different orientation within the body of their main texts. However, Pope (2003, 48-50 & 175-177) has demonstrated that such models do not universally apply. Whilst I recognise the scholarly contributions to expanding the potential understandings of Bronze Age settlements, this project is not focussed on evaluating the validity of these models or in attempting to find other ethnographic models that may be further explored. Rather, it seeks to analyse questions of similarities and differences in settlement architecture, intensity of use, location, and function within their landscape context.

3.2.3 Settlements and landscapes

Since at least the 1970s (Aston & Rowley 1974; add see Darvill 2008 for a brief history of this) it has been understood that the landscape context of archaeological sites is as important to their function, and so our understanding of their occupants' lives (see above), as the internal structure of those settlements. It is now well understood that, in much the same way that the structuring of space within settlements can inform on the social order within them (see above and in particular Wiseman 2016), those people's interaction and reaction to their surroundings can be assessed and then interpreted to comment on the social order behind the architectural and spatial design of settlements and monuments (Bradley 2000; Hill 1995; Tilley 1994; Parker Pearson 1996). I agree that settlements are undeniably phenomena related to place (Norberg-Schulz 1980) and that their structure, function and location are intimately connected (Martin 2000), such that they must be studied together, as will be demonstrated throughout (but see particularly Chapter 6 and 7).

While the use of landscape archaeology has not been without its critiques, these have tended to be in the specifics of its application rather than the underlying value of using this information. For example, many early landscape studies were criticised for placing an over-reliance on environmental variables (a very good example being Fox 1932; and see discussion in Arponen, Dörfler, Feeser, *et al.* 2019) This critique is certainly acknowledged, such that I am careful throughout not to suggest that either human agency or environmental conditions are the sole reason for change. Similarly, more recent critiques of landscape archaeology (well reviewed in Hacıgüzeller 2012) have suggested that certain analyses, typically those done within a geographical information system (GIS), are removed from reality (e.g. Fitzjohn 2007; Tilley 2010) rather than from the perspective of a mobile individual (Llobera 1996 p.613). Yet in contrast to this, there have now been instances where theories that had been proposed based on observations in the field (Bender, Hamilton & Tilley 2007; Tilley 2010) were later refuted after spatially analyses were conducted using computer-based techniques. One such example is the proposition that Bronze Age houses at Leskernick Hill in Dartmoor were placed to provide views of nearby barrows (Bender, Hamilton and Tilley 2007; Eve and Crema 2014). While this may have been the case when standing outside those huts, augmented reality experiments conducted by Eve have suggested that views of these structures were overstated (Eve 2014). Similarly, the placement of 'minilith' monuments on Exmoor have been interpreted as marking the location of hides for hunting (Tilley 2010 pp.335–346), yet their location has since been convincingly demonstrated to be unsuitable for such a role (Gillings 2015a). There are now numerous studies (Eve 2014; Freundschuh & Egenhofer 1997; Gillings & Pollard 2016; White & Surface-

Evans 2012) that have shown how the careful and considerate use of spatial analysis methods are not undermined by such critiques, as many techniques are now available which help quantify human perception. As such I do not avoid the use of computer-based mapping of sites, the extraction of data using these techniques or the modelling of human movement, on the understanding that in the latter case what is produced is a model which may be compared to the physical reality.

3.2.4 Why is big data useful for studying settlement?

"*We need a bottom-up prehistory that starts with the data and where the interpretative structure is the final part of interpretation"*

Pope 2003, 57

The quote above was Pope's (2003, 57) conclusion when reviewing the study of roundhouses in Britain. It was reached after reviewing the many ways in which these structures had been interpreted, and the issues that arose with the numerous theoretical frameworks that had been proposed (Pope 2003, Chapter 2 and particularly 56-7). In particular, she recognised the need for robust analyses of large, high quality datasets. Yet this section, and the entire of Pope's thesis (2003), makes no direct mention of the value to archaeological research of its data's collection and recording in the first place, although its method makes clear the value that the author places on doing so. This reveals an innate bias in many modern studies of archaeological phenomena which focus on how data should be studied rather than the value of its collection. Perhaps this is because the value in having a single dataset gathering all known evidence for a particular phenomenon is fairly self-explanatory. For example, this allows simple questions, such as “how many houses have been found that date to the Bronze Age?” to be investigated. These factual observations can frequently disagree with contextual impressions gained through extensive reading. This study aims to highlight the value of quantified analyses of comprehensive datasets, in the identification of observations of the record that may not marry with pre-existing perceptions of Bronze Age settlements.

Further to this, once this data has been brought together, it may be compared to similar material from a different geographical or temporal locations or, as is done in Chapter 7, be used in conjunction with contemporary data sets of archaeological phenomena, such as field systems, metalworking and burials, to understand the interaction between each of these and so the nature of the activities occurring during the Bronze Age. The raw value of such studies is clearly recognised as seen in the Prähistorische Bronzefunde projects (see for example Burgess & Gerloff 1981; Colquhoun & Burgess 1988; Davis 2012, 2015; Gerloff 1975; Gerloff & Northover 2010; Schmidt & Burgess 1981; Uckelmann 2012). There are a growing number of large data studies in Britain today, however at best these subsume the Bronze Age within them. These include the EngLaId project (Cooper & Green 2016), the AEMAP Project (Koch & Cunliffe 2016), and work studying developer funded sites in north western Europe (Bradley 2007, 2019; Bradley, Haselgrove, Vander Linden, *et al.* 2016) or do not study this period’s material at all (Allen, Brindle, Smith, *et al.* 2015).

Without this work, any such attempts must expend considerable resources identifying, collecting and then recording this information. Not only is this costly, it also frequently results in sites being cherry-picked for analysis, as they are well known/published, which itself results in only those well-known and frequently cited sites being used, the significance of which continues to be magnified as time moves on. I would argue then that their value is in the collecting of data through being able to ask easily defined questions of the record.

"The greater number of observable and/or known parameters that can be demonstrated should improve the validity of the inferences that can be made."

Dunkin 2012, 25

There is demonstrable value in compiling large datasets. Such value has been made clear in Bronze Age research in the study of ancient DNA (Olalde, Brace, Allentoft, *et al.* 2018), radiocarbon dates (Palmisano, Bevan & Shennan 2017) and to a lesser extent burials (Caswell & Roberts 2018; Bristow 1998). The results of these have helped support and sometimes alter existing narratives for the period. Yet, it is also notable that these data collection studies are in the minority. The majority of research published since 2000 have at best only cited lists of sites as regional comparisons to specific forms of site such as sunken floored roundhouses (Gossip & Jones 2008), ringworks (Manby 2007), Bronze Age hillforts (Hamilton & Manley 2001) and lake-based dwellings (Cavers 2006). It was on this basis that I decided that there would be a large benefit to investigating Bronze Age settlement in Britain at a broad scale through a single dataset.

3.3 Definitions

3.3.1 Time period - Bronze Age

For the purposes of this thesis, the Bronze Age in Britain is considered as the period between 2400 cal BC and 800 cal BC. The start and end boundaries for this period are not consistently applied across all research projects, such that some justification should be made as to the dates chosen.

The majority of scholarship on a start for the Bronze Age centres on a debate for the presence or absence of an earlier period acting as a transitional stage between the Neolithic and Bronze Age, often termed the Chalcolithic (Allen, Gardiner, Sheridan, *et al.* 2012 pp.xxv–xxvi; Brück & Carlin 2012; O'Brien 2012; Roberts & Frieman 2012). If this intermediate period is recognised, then reviews of the Bronze Age place its beginning around 2200/2150 cal BC (e.g. ScARF 2012a, 13-15), while those that do not in general place the initiation of the Bronze Age at 2400 cal BC (Roberts 2008; Roberts, Uckelmann & Brandherm 2013; Parker Pearson 2009; and note that the majority of regional research frameworks in Britain share this schema including Hodgson & Brennand 2007; Petts, Gerrard & Cranstone 2006; Webster 2007). The latter period definition has been chosen as the start date of the Bronze Age, not to comment on the presence or absence of a Chalcolithic, but to enable its dataset to support discussions of the Bronze Age regardless of theoretical stance. By doing so, it was hoped that the study would also be able to identify any transitions in Bronze Age structures' form and their use between the Chalcolithic and Early Bronze Age. Furthermore, it is also able to include those settlements that may be placed in the Beaker period and so comment on their similarity, or not, to the rest of the record (e.g. Besse & Desideri 2005) and also assess the change in settlement at a time that may be marked by large population replacement (Olalde, Brace, Allentoft, *et al.* 2018).

The choice to end the study at 800 cal BC has been a pragmatic one. The thesis was conceived through identifying three problem statements in understanding the large social transformations occurring specifically during the Bronze Age. The year 800 cal BC is consistently quoted as the termination of the Bronze Age in the vast majority of chronologies (Roberts 2008; Roberts, Uckelmann & Brandherm 2013; Parker Pearson 2009; and note that the majority of regional research frameworks in Britain share this schema including Hodgson & Brennand 2007; Petts, Gerrard & Cranstone 2006; Webster 2007), hence its use here. However, there has been suggestion that the transition between the Late Bronze Age and Earliest Iron Age is not a sharp divide, in much the same way that the Late Neolithic and Early Bronze Age share certain affinities (Davies 2016 p.2; but see Needham 2007 which debates this point). There is potential value in extending the study of any archaeological phenomena from the Bronze Age into the Iron Age such that a justification for not doing so is required. In particular, it is worth recognising that the number of roundhouse structures, and so settlements, vastly increases in the Iron Age (Pope 2003 fig 9.15). The result of including these settlements would be to make the target dataset too large to compile in the time available without adjusting the geographical or study material's scope to accommodate these sites. It has been already identified that there is value in providing a non-regional narrative (Chapter 2.7.1) therefore it was decided to use the traditional boundary for the Bronze Age. However, the presentation of this thesis' dataset does enable a future study to easily integrate an Iron Age dataset with the work of this thesis to further study the Bronze Age-Iron Age transition.

3.3.2 The region of study – Britain

The geographical remit for this project was set as mainland Britain, including all its major islands, barring the Isle of Man and the Channel Islands (Figure 2). By studying this region, it is argued that this study is, to a certain extent, able to avoid arbitrarily dividing the dataset between regions based on modern geopolitical boundaries. It should be noted however that in excluding material within Ireland and mainland Europe it is somewhat following modern geo-political regions which may not have held relevance during the Bronze Age. The choice to omit Ireland, and to a similar extent the Isle of Man, has been in response to two recent pre-existing large scale projects that have already collated, analysed and synthesised much of the relevant Bronze Age settlement data (Ginn 2016; Crellin 2014). The choice to not study regions in mainland Europe has been a pragmatic one. Such analyses are archaeologically sound, with the English Channel/La Manche being recognised as, far from being a barrier in the Bronze Age, a well traversable (Clark 2004; McGrail 1997 pp.207–222, 268–288) and relatively coherent and distinctive region in of itself through which ideas, technologies and people were transmitted (Needham 2009; Lehoërff & Talon 2017). However, keeping the study region to England, Scotland and Wales meant that the region of research is limited to an area whose study was manageable in the allotted time. Furthermore, these countries broadly follow the same planning legislation, survey and excavation methodologies and storage of archaeological data (Bradley, Haselgrove, Vander Linden, *et al.* 2016;

Bradley 2007). As such, by limiting analyses to these regions less attention need be paid to bias inherent in data recovery and recording (cf. Webley et al. 2012). Whilst cross-analysis between all the regions stated above was not possible within the scopes of this research project beyond a general comparison (Chapter 7.5), future research extending to Ireland and mainland Europe would be of high value to Bronze Age archaeology.

Figure 2 The study region. Made with Natural Earth. Free vector and raster map data @ naturalearthdata.com

3.3.3 Subject matter

The term “settlement” has been used for various purposes (Roberts 1996, 15). The term is primarily used within British archaeological reports to denote the location of a domestic structure (as is done here), but it has also been used to subsume areas far larger than those sites discussed here (see for instance Bailey 1999 using the term for Tell sites) or as a term to describe simply the presence of human activity indicated by the discovery of residual artefacts (Bond 2006; Chowne 1980; Crawford 1912). Attempts have been made to design scales that describe settlement (Müller-Wille cited in Butzer 1964 pp.340–341). However, as Brück argued (Brück 1999b) the division of settlements based on such scales is often laden with modern social and political ideas, for example surrounding the size and types of structures and buildings found on sites which reflect modern concentrations of human habitations (Brück 1999b), which do not necessarily reflect the habitation practices of the Bronze Age or what were considered as habitations at that time.

I agree with the findings of Brück (1999b) that settlement sites, particularly in the Early Bronze Age in Britain, may take on less robust forms appearing only as pits, occasionally post holes or scatter of artefacts within what might not be traditionally understood as settlements sites. However, to study all such sites across Britain is not feasible within this thesis as a study of such a form would necessitate studying all known Bronze Age activity. By reducing the study sample to archaeological sites having clear structural features (post holes, slot-trenches or a combination of the two which formed the distinct footprint of a building) whose primary purpose could have been habitation, the sample is reduced to a manageable scale. This latter point also provides a sound theoretical justification for studying this sample of the material. Bronze Age settlement structures as meant by the thesis would have required significant time and resources to be constructed (Brück 1999a). As such, the decision to invest this time may have been an important one, such that measuring the rate at which this changed over time is valuable for understanding the lives of those occupants (Chapter 5).

3.3.4 Settlement sites

The recognised settlement sites within this thesis are understood to be:

"archaeological sites having clear structural features (post holes, slot-trenches or a combination of the two which formed the distinct footprint of a building) whose primary purpose could have been habitation".

In practice, this has included any site with a substantial number of archaeological features that are likely to have been part of a roofed structure in which people may have lived (Chapter 3.6.2.1). These features include:

- Dispersed post holes, the form of which is not certain but was likely to be more substantial than a fence line
- Pits and hearths in close proximity and features which may indicate a structure
- Preserved timber structures such as platforms

Sites were also included if they contained structures that indirectly indicate the presence of a settlement in the locality, such as four posters, which are typically seen as storage buildings (Gent 1983).

Some hillforts and large middens (Lawson 2000; for a developing contra view Waddington et al. 2018) have been shown to have been formed during the Late Bronze Age, or to have origins in this period . Their size and form certainly meet the criteria of requiring large time investment and could well represent permanent settlement locations. However, on many of the former, Bronze Age activity may be limited to only occasional findspots and the nature of the Bronze Age activity in these areas is uncertain. Similarly, the intentions behind the formation of middens, and recently their Bronze Age date, have been questioned (Waddington, Bayliss, Higham, *et al.* 2018). As such, only those sites featuring structures which directly provide evidence for the presence of settlement in the locality; such as burnt mounds, waterholes, open air hearths and burials were included, rather than hillforts with no Bronze Age structures.

3.3.5 Settlement structures

Throughout the thesis, a distinction is made between settlement sites and settlement structures. The latter of these terms encompasses all structures within a Bronze Age settlement, regardless of function. Structures in this vein are understood to be above ground composite features (thereby excluding features such as pits) that would have served a domestic function within the settlement. These could include:

- Post-built houses (roundhouses and longhouses)

- Granary structures
- Fence lines

Notably, this classification excludes features such as burnt mounds.

3.4 Methodology: Data collection, recording and management

Within Chapter 1 it was argued that a significant contribution to Bronze Age settlement studies can be made by providing a quantified baseline study of Bronze Age settlements in Britain (Chapter 1.3, Chapter 2.7 and Chapter 3.2). A method was required that would be able to identify the scale of the data, record it, and analyse those selected sites in order to address the research questions identified. This section provides an overview of the thesis' data collection; the database designed to record this information; how information has been keyed into this database and how supplementary datasets have been used to enhance the database. At each point in the chapter, there is a critical appraisal of limitations and biases of the methods chosen and how these issues have been addressed.

3.5 Data collection

A method had to be devised for identifying the majority of radiocarbon-dated settlements in Britain which might also indicate how representative this sample of settlements was within a suitable recording system. For ease of description, the data collection can be described in two phases:

- Creating a gazetteer
- Refining the gazetteer

3.5.1 Defining the thesis's subject matter

This thesis aims to study all temporally secure Bronze Age settlement sites of England, Scotland and Wales. Settlements within this context are understood as archaeological sites having clear structural features (post holes, slot-trenches or a combination of the two which formed the distinct footprint of a building) whose primary purpose could have been habitation. This was with the intention to exclude occupation sites which might include temporary shelters, such as short-term camps, or those indicated solely through lithic scatters.

A temporally secure site is defined as one which includes at least one radiocarbon date directly associated with one significant phase of the settlement, such as its construction, occupation, abandonment or repair (see Chapter 5.4.2). The reasons for this are due to the fact that existing chrono-typological schema for ceramics do not provide comparably detailed or similar phases of chronologies for the regions encompassed in their distributions. A consequence of the variable resolution in ceramic typologies by region is that in the south of Britain, Middle Bronze Age settlements may be distinguished from Late Bronze Age settlements through their ceramics, yet in the northern regions no such distinction is possible. This makes any comparison of change over time in settlement characteristics over the entirety of the British Isles challenging. Limiting this analysis to those sites with radiocarbon dates allows each site to be temporally placed within a new diachronic framework (Chapter 5.4) that enables a study of change in those settlements' form, location and use over time and that also provides a representative sample of all sites excavated and all regions, regardless on the advancement of any specific regions' material typology.

3.5.2 Creating a gazetteer

Projects similar to this thesis have relied upon existing databases from which to draw their research. However, the literature review has identified that, while there have been numerous studies of settlement in the Bronze Age across Britain (Brück 1997, 1999a, 1999b; Davies 2016; Ellison 1975; Ghey, Edwards, Johnston, *et al.* 2007; Pope 2015; Sites 2015; Waddington 2013), there has yet to be a quantified baseline study of settlements in Britain. Similarly, there have been few studies of Bronze Age settlement that have then subsequently made their data available as spreadsheets, often providing only site lists or data limited tables that must be replicated by hand (Brück 1999a, 1997, 2007; Pope 2003, 2015; Sites 2015) although see (Ghey, Edwards, Johnston, *et al.* 2007). This makes it impossible from existing literature to ask simple questions for Bronze Age settlement such as "how many Bronze Age houses have been identified in Britain?" Similarly, no single list exists which identifies all Bronze Age domestic sites in Britain with radiocarbon dates. As such, the first step to be accomplished for the study was to identify a list of sites to be researched. A bespoke method was designed to produce such a list. This method was designed upon reflection on three common methods to produce similar gazetteers of contemporary archaeological material.

Type 1.1 - a literature search of existing journals

Extensive literature reviews of journals were frequently used in studies that were published in the early 2000s (Bristow 1998, 2001; Pope 2003). These would rigorously review every journal relevant to their research area and identify sites by reading all articles that had the possibility of containing relevant information to the research project. While effective, this is a very time-consuming method of studying all of England, Scotland and Wales, requiring countless hours reading text irrelevant to the study across numerous locations. Few libraries hold all regional and local journals and as such, any review of this kind requires travel to numerous archives over many months.

A major flaw in this data collection method is the fact that these reviews rely on the assumption that the majority of sites and discoveries would be announced within local or national journals. However, since the great influx of developer-funded excavation from the 1990s with the introduction of PPG16, this reporting has become less common, with commercial private sector organisations producing the largest volume of material being placed within grey literature reports (Donnelly 2016 p.24). As such, this form of study was deemed unfeasible in the time available and unlikely to identify the majority of settlements discovered which were relevant to this study.

Type 1.2 – ad hoc data collection of data from a region

Ad hoc data collection study is related but not identical to the literature search method described above, in that there has been data collection, but this approach does not make the scope of the literature search explicit. For example, Sites' (2016, 71) study of the Bronze Age-Iron Age transition in Denmark and southern Britain states it accessed published literature with little further detail. It has to be presumed that these are found through a less systematic method than the full literature search method. Ad hoc data collection reviews are frequently found in discussion sections of site reports, regional reviews and in thematic journal articles (Brown & Medlycott 2013; Gossip & Jones 2008; Johnson, Waddington, Baker, *et al.* 2008; Ladle & Woodward 2009). This can provide an effective means of accessing a large quantity of readily available data, yet comes with the caveat that they rely on only those data that are well known to the researchers and which may not be reflective of the current archaeological evidence at large. This issue only becomes magnified over time as those same sites that are cited in frequently used academic publications become increasingly exposed to the detriment of those described solely in less often cited sources, such as grey literature. A clear example of how this occurs can be shown with the sites of Itford Hill (Burstow, Holleyman & Helbaek 1958) and Black Patch (Drewett 1982), which together are referenced at least 223 times according to Google Scholar statistics (current of February 2019). These sites still form the most often cited "type sites" for Bronze Age settlements in England, Scotland and Wales, despite the limited number of radiocarbon dates from each, and the limited publication details of Itford Hill. It also notable that a similar type site in Scotland, Green Knowe (Jobey 1978), which was published at a broadly similar time and has more associated radiocarbon dates, is cited far less (55 times according to Google Scholar statistics in February 2019). As such, this method was thought to be unsuitable if its results were to truly represent the archaeological record.

Type 2 - collation of existing corpora, or the use of an existing collection (whether personal or belonging to another institution) from which further literature may be identified

Some studies have used existing gazetteers, either developed by themselves (Yates 2007) or others (Ginn 2016), from which further literature is identified within the subject material's bibliographies and through ad hoc to resources which may hold similar information. No single gazetteer exists for Bronze Age settlements found across Britain, as was used by Ginn for Bronze Age settlements in Ireland (but see below), making such a method impossible.

Type 3 – queries to existing archives such as museums (typical for artefact-based studies)

Some previous thesis projects studying forms of material culture identify lists of established collections of such material and conduct fieldwork investigating each location's archives accepting that some material may be missed, but that the majority of items will be studied, including those of the best quality (Brudenell 2012; Law 2009; Rowlands 1976; Taylor 1988; Wilkin 2013). Such methods are highly effective for material culture held by collections (*ibid)* however, I am not aware of studies that have attempted a review of site information from the equivalent archives, the issue being that few models for obtaining this data are available to follow and adapt.

These three means of data collection were felt to be unsuitable for this study, while a combination of one or more of these was likely to be too time-consuming and highly probable to produce an uneven study across the entirety of the research area.

A new method therefore had to be devised that met criteria to avoid such biases and produce as transparent and representative a record as possible. The method had to:

- Provide a representative corpus of known Bronze Age settlements;
- Identify all radiocarbon dated settlements;
- Provide national coverage;
- Be able to make clear any biases within the record;
- Provide a consistent search method that did not introduce any further regional research biases into the gazetteer;
- Be reproducible in future studies

Based on the past experience in gathering heritage data in a comprehensive survey of Middle Bronze Age cremations in Britain (Caswell & Roberts 2018), a bespoke solution was created to meet these points. This involved three strands; (1) a systematic search from heritage databases, (2) supplementing this work with grey literature reports and (3) a detailed review of published summaries of Bronze Age settlement.

3.5.3 Strand 1: Systematic search of each record office responsible for maintaining catalogues and the protection of heritage sites in England, Scotland and Wales

In Britain, numerous government and private office record offices exist which contain records of heritage sites. These offices go by various names; Historic Environment Records (HERs), Sites and Monuments Records (SMRs) and Unitary

Authority Databases (UADs). These vary greatly in the areas covered, data recorded and in the quality and consistency of records kept. However, these offices' roles are to form the primary record of all heritage assets in Britain and are the primary consultation point of any developer wishing to carry out an archaeological evaluation as part of the planning process (Blake et al, 2015). In addition to each county possessing a HER, SMR and/or UAD, a national list of monuments is also recorded and maintained separately by Historic England (HE), Historic Environment Scotland (HES) and Archwilio (Archwilio 2019, Historic England 2019, Historic Environment Scotland 2019).

These records may be understood as representing the knowledge of the nation, although the currency of this knowledge is debatable (see below). With this purpose in mind, it was decided that these records and the HER/SMR/UADs of Britain should form the primary data source for the project.

The vast majority of Britain's record offices use relational database systems which typically record individual sites and events (Emma Witcombe Pers comm, English Heritage 2012). Each record includes a summary text and often categorises these records further, including limited variables by which they might be identified. In almost all records the main limited variables is a monument or site type. This is chosen from a pre-defined thesaurus. For England and Wales, this lexicon has been defined by Historic England (Historic England 2015), and for Scotland by Historic Environment Scotland (2015). Other limited variables often include period, which may be recorded as a phase or year, and location is almost always included if known. Scottish record offices are notable in that certain offices do not use period filters, while many records are now held by the HES database Canmore, which also often omits a period filter. In all cases, each record can be searched using a query on the variables chosen to be included. As such, it is possible to produce a formalised methodology for requesting data from these records which can then be repeated and assessed critically in future studies.

Where possible, each record's heritage feature list was searched according to a pre-defined list of search terms (Table 1). These were obtained through a comprehensive search of each monument lexicon, which then included relevant sub-set terms. In practice, most sites were returned through three terms; Domestic, Occupation Site and Fortification. Records were returned in two formats where possible; a PDF site report and associated location file, typically in ESRI ArcMAP form. This provides full reference information, location data and brief (often incomplete) summaries of the site.

Domestic	Town	Lake Village	Crannog
Settlement	Hillfort	Hut Circle Settlement	Hut
Occupation Site	Fortification	Village	Hut Circle
Dwelling	House	Hamlet	Broch
Structure	Round House (Domestic)		Souterrain

Table 1 Search terms used to find potential Bronze Age settlement sites in this study

3.5.3.1 Issues with the method

There are three complications when carrying out an intensive data search as detailed above. Firstly, the accuracy of the data returned is not guaranteed, which is recognised though these records' own published guidelines. The accuracy of this data is questioned for two reasons: its currency and its effective recording. The former is raised as it has been recognised that lags exist between fieldwork and reporting of grey literature which can extend to several years (Donnelly 2016, 116). The indexing of such reports can have further delays as backlogs can build. The latter is raised as, despite best practice being stressed and practiced, the scale of the data held by each record makes it inevitable that certain errors may exist which have not been identified, either created through human error or from lack of revision over time when new information becomes available. An example of such an error may be in the revision of the dating of certain material culture such as Deverel-Rimbury pottery, which is still sometimes found within HER records to be described as Late Bronze Age (c. 1150-800 cal. BC), when it is now known to be predominantly a Middle Bronze Age (c. 1600-1150 cal. BC) ceramic form (Woodward 2009 pp.265–270).

The second complication is that the terms used in the search cover more sites than the study wished to identify. For example, the term "domestic" covers features such as pits, hollows, trackways and field systems. These data all required sifting and eliminating from the core dataset (see below). This issue proved costly in research time, yet it also allowed the broadest search possible, such that the first issue is somewhat mitigated, in that if a site is currently labelled with any evidence related to domestic activity but not specifically structure related features, a review of its long text appropriate broad term makes it known to the study even if poorly recorded.

Finally, there was an issue with data availability. At the time of writing this thesis, those councils who fund and run historic record departments have undergone several phases of funding cuts due to a period of austerity in the United Kingdom (Anon 2019; Cooper & Green 2016 p.277). As a result, certain offices do not supply data (see below), charge for use of the service, restrict research access to the archive or no longer exist. As such, it was not possible to conduct a completely comprehensive data search in this project.

3.5.3.2 Strand 1 results

This study identified 108 heritage databases' data collections. From the 108 offices, 93 of these were able to supply the data requested while 15 (15%) of these were unable to directly supply data (Figure 3). Some did not return contact or did not supply data after attempts to contact these records (City of York HER, Colchester UAD, Southend SMR, Buckinghamshire HER, Aberdeen City, Edinburgh, North Lanarkshire, Bedford Borough HER). Others were only able to supply data for a fee (Northamptonshire SMR). Some suggested their data was best obtained from another system (East Dunbartonshire, Dundee City, Fife), while others could not supply their data digitally (South Yorkshire SMR, Merseyside HER). Only one provided data solely for commercial requests and so could not be accesed at all (North Somerset HER).

However, those records that did supply data were responsible for regions that, when combined, represented 95% of England, Scotland and Wales' surface area, such that the quantity of information was sufficient for the purpose of this study. In the majority of cases, data was supplied in the requested formats. Over 20,000 records were returned using the search terms provided, typically under the "Domestic" classification.

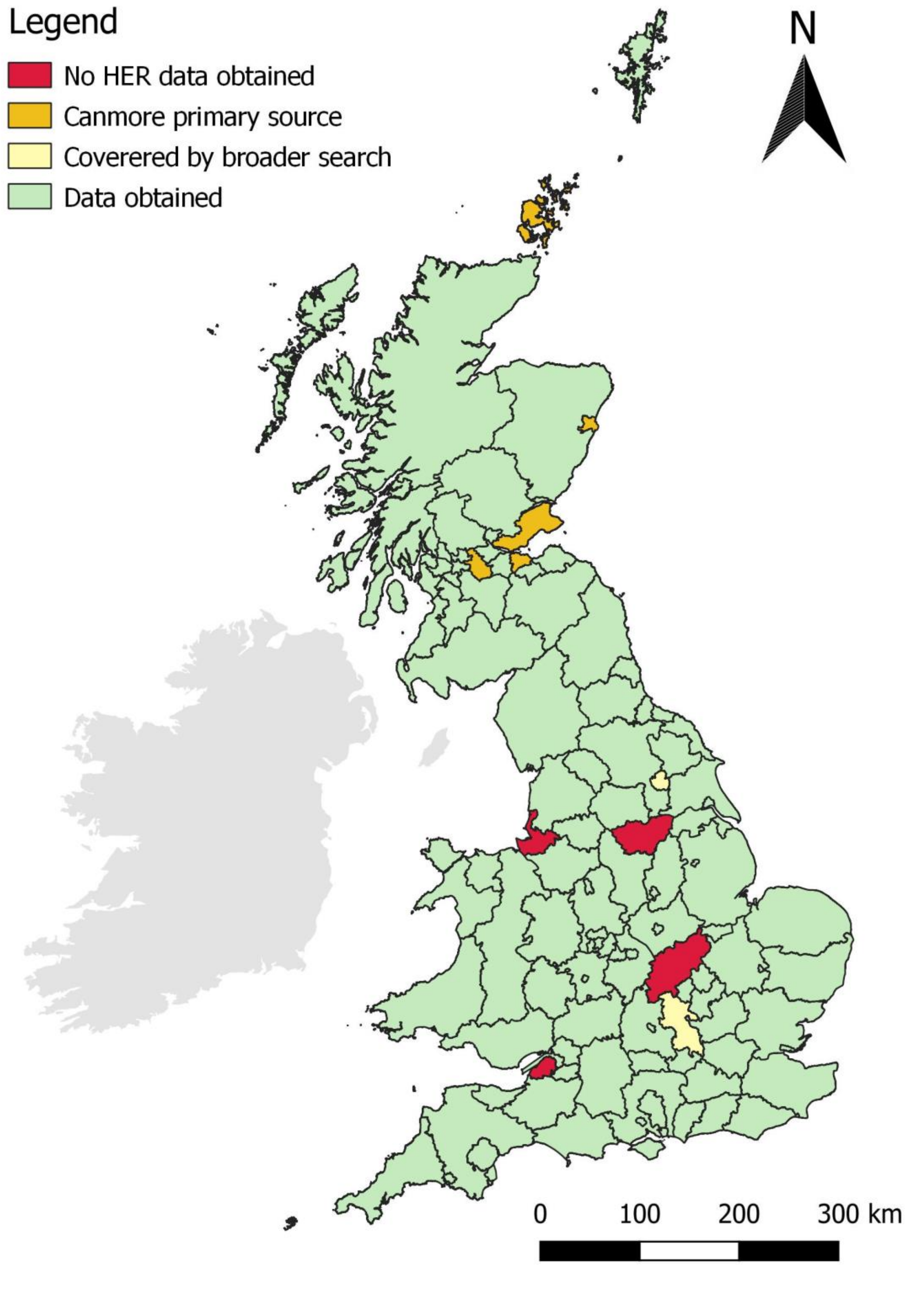

Figure 3 Status of data collected from each region. NB. some smaller regional office e.g. Canterbury or Colchester are not illustrated. Contains OS data © Crown copyright and database right 2019.

3.5.4 Strand 2: Grey literature search

Due to limited funding and resources, national records often have a backlog of sites that have yet to be entered into their systems, as grey literature records produced from developer-funded operations require digitisation for this to proceed. It is not atypical for these backlogs to run as distant as work carried out in 2007, although in practice this can then be advanced to 2012 as development in Britain severely decreased during the recession (Aitchison 2015). Yet the value of these reports was such that a means of identifying sites not recorded by heritage databases had to be produced.

Adapting a methodology devised by the EngLaId project (Green 2012), it was decided that a second search focussing on grey literature sites would be useful in identifying sites “invisible” to the search of Strand 1 and 3. The Archaeological Investigations Project (AIP) database (Bournemouth University, 2010) was selected for this purpose, as it is intended to contain all grey literature records up until 2010, when the project’s funding ended. While this project does not record all the work carried out during this time (see reference) it does provide a similar search record to that of existing heritage databases. Likewise, it covers the period likely to have been included within any record’s backlog.

3.5.4.1 Issues with the method

While the grey literature search method helped supplement the data provided by the first strand of data collection, there are several issues worth highlighting with this record. Firstly, the AIP only records data of excavations in England, not Scotland or Wales, potentially leading towards a bias to only this country. Fortunately, a review of all excavated roundhouses up until 2007 and a review of later prehistoric settlement up until 2013 exists for Wales (Ghey et al. 2007, Waddington 2013), while Bronze Age roundhouse architecture in Scotland has also recently been reviewed (Pope 2015), such that it was thought that the sites identified through this means and the literature cited in their discussions would be likely to identify any sites missed through a search of the regions' HERs.

Another issue identified was that a review of the AIP database when compared to similar records, namely the National Monuments Record (NMR), and Online Access to the Index of Excavations (OASIS), and the HER of Staffordshire (Evans 2013) found that the AIP did not record all excavations and had demonstrable gaps in the record, concluding that "the AIP is a good resource for the location of most grey literature, it is not reliable for quantification of work that appears outside of its methodology" (Evans 2013, 31).

3.5.4.2 Strand 2 results

Over 900 unique records were identified through the AIP with an even coverage across England. In practice, use of the AIP dataset identified few additional potential sites to the method described above. In total it identified 187 sites which potentially had Bronze Age settlement remains, 186 of which had been excavated 24 of which had Bronze Age settlement features that were associated with at least one radiocarbon date (Chapter 3.6).

3.5.5 Strand 3: Literature review

While the Heritage database AIP data collection methods are systematic, they both rely on the accurate recording of metadata according to the format discussed above. Unfortunately, issues with legacy data, where old records have been transferred from older computer systems or card indexes, meant that this was not always the case. As a result, many sites, particularly older or poorly recorded sites, might not be returned. While the prior strands have demonstrably produced many results, it was decided that an effort should be made to ensure all sites that are frequently referenced should also be included. By doing so, it was felt that the study is given the greatest chance of being able to revise current narratives, while maximizing the utility of the final project for the largest audience, by making it relatable to as many parties as possible.

Whilst this method is less rigorous, a standardised scheme continued to be followed to produce comparable results. In the first instance, this was limited to reading the title of every article listed within the contents of every major archaeological journal published after 1984, relating to each region during its study (e.g. *Cornish Archaeology, Proceedings of the Somerset Archaeological and Natural History Society, Wiltshire Archaeological and Natural History Magazine*). The summaries of any of these titles which indicated the possibility of including details on a relevant site, such as the mention of Bronze Age settlement, were then read. If this summary further indicated that the article discussed a potentially relevant site, the text was then fully reviewed and any sites meeting the study criteria recorded.

This strand was complemented by a review of all regional evaluations or subject specific monographs of the area (e.g. Bell, 2013, Rose 2004 and Webster 2008), with all sites mentioned within these being added to the database. Finally, the bibliographies of all articles or monographs identified through the above methodology were reviewed and selected following the same criteria as journal articles. This ensured that the project met current observations and well-known sites of the region.

Finally, every sites' records that were obtained were read in full, such that if Bronze Age settlement sites not recorded by the means above were described within these, they too would be added to the database.

3.5.5.1 Issues with this method

The key concern with this method was not the time taken, as would be the case if reading each article in full, but in overlooking sites in articles which were not titled to indicate any prehistoric settlement. In practice, this method is also less rigorous as it was not able to access every journal issue from the nation's major repositories, their being taken out or missing from the archives available in the time allowed. Of most value then was the regional research frameworks, which at least allowed a comparison of like for like surveys.

3.5.6 Summary

The project has had three means of identifying sites of relevance to the project; systematic searches of heritage databases in Britain; a review of grey literature records identified through the Archaeological Investigations Project; a coarse review of regional journal articles and a systematic review of regional research frameworks. Taken together, these represent a gazetteer of the nation's knowledge of archaeological sites up until January 2015, a representative sample of grey literature events up until 2010, a collection of sites of enough significance to be published beyond a simple report and a list of sites that define each regions' settlement record.

The method used to gather information for each of these strands is standardised and reproducible. This allows the results of the following analysis chapters to be independently verified. Each data source has a clear point from which information is not recorded. As such, if this study were to be repeated in future, with the aim of adding subsequent sites, it would be easy to supplement the record. This is not to say that the search record is without issues. There have been certain regions where it was not possible to obtain heritage data directly from their authority (Figure 3). These have been made clear, in addition to the reasons for not obtaining their data. These regions are somewhat noticeable in the distribution of all sites identified, however sites from these regions have been noted through the remaining two strands of data collection. It is difficult to quantify the number of sites from these records that may be lost due to data inaccuracies. However, in practice the majority of those sites identified were recognised through these means (see below).

Despite these issues, the method has been very effective in identifying potential Bronze Age settlement sites. While it is unlikely that such a review will reflect every single potential Bronze Age settlement site in the British Isles, the manner by which sites might have been missed by this methodology have been made clear.

Affecting each of these research strands is the overlying bias in archaeological recovery by region. This is defined by the amount of academic research paid to each region, with there being a notable bias to the areas around Wessex (Davies 2016; Brück 1997; Ellison 1975), and the amount of developer funded excavations with a bias towards south east England (Evans 2015). As such, the gazetteer of sites produced represents those archaeological sites that are known. Any interpretations made in the analyses below must be caveated with this acknowledgement. However, this is true of most archaeological studies, which deal with the known and can only estimate the unknown. The scale of the data recovered (see below) is such that a substantial number of sites would be required to alter any summary statistics and, as a result, it is possible to use the database constructively.

3.6 Refining the gazetteer

The method above resulted in a gazetteer of 22000 potential Bronze Age settlement sites in Britain (Figure 4 and Figure 5), representing the knowledge of the nation up until 2015. While not complete, this represents nearly all Bronze Age settlement sites that are likely to fit this study's definition of a settlement. However, this gazetteer also contains many sites of little direct relevance, including sites which may have been built and/or used in entirely the wrong period, or whose use was not that targeted by the study methodology. As such this gazetteer required refining to a shorter list of sites relevant to the research aims and objectives.

It would be impossible to read all the literature on each site in order to identify which sites had been radiocarbon dated. As such, a method was required to reduce the scope of material studied. This needed to be:

- Reproducible
- Achievable in the time period available
- Able to identify the criteria of interest

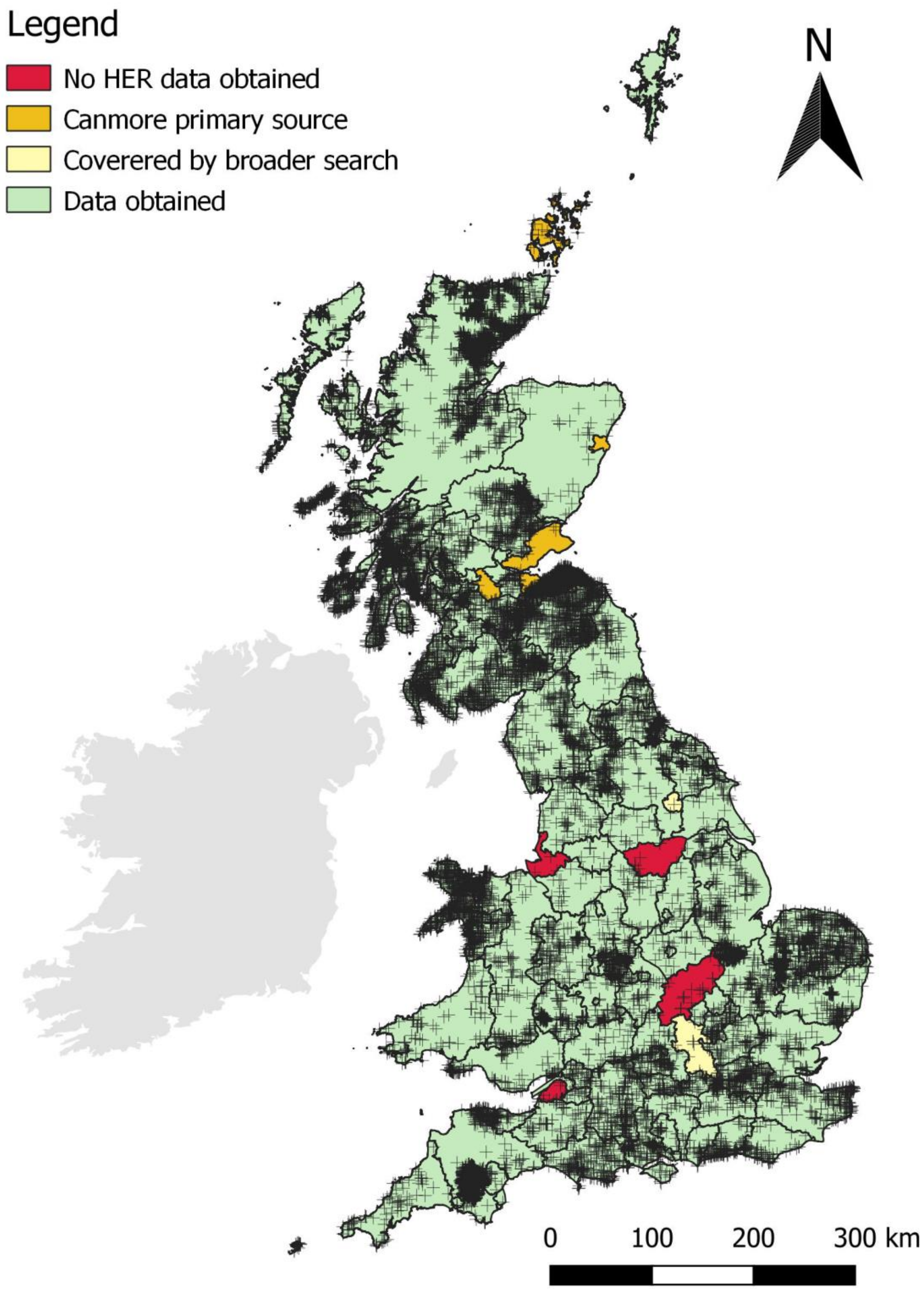

Figure 4 All 22015 sites returned during the data collection phase of the study. Each cross represents a site. See Figure 5 for a more digestible distribution map. Contains OS data © Crown copyright and database right 2019.

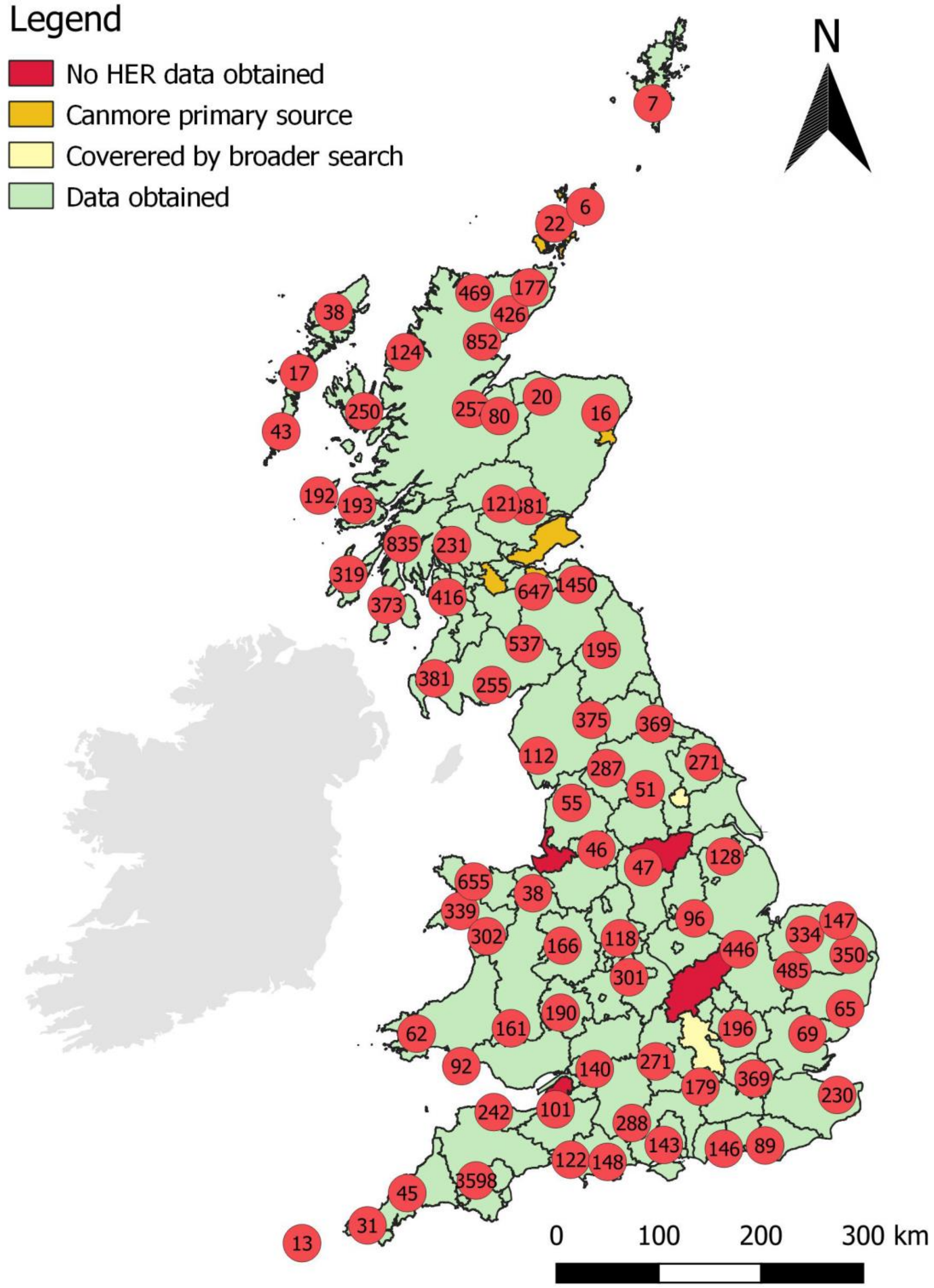

Figure 5 All 22015 sites returned during the data collection phase of the study grouped using the QGIS function point cluster. Note the circles do not represent the distance of each cluster merely their centre point. Contains OS data © Crown copyright and database right 2019.

In order to identify a means to do this, a pilot assessment of the data was carried out on records from the south west of England to determine a strategy to use for the entire study area. This involved studying all available information for each site identified within the gazetteer, with the exception of Dartmoor (see Chapter 3.6.2.2.1), using available archive material. Using the results of this, a method was decided upon, which is detailed below.

3.6.1 Method

The number of sites for the south west of England was far too great to review all available literature of each site. Additionally, many sites were simply those identified through non-invasive means and so dated solely through their form or were not dated by any physical means at all, which meant they were not guaranteed to be Bronze Age in date with certainty. As such, this list of potential Bronze Age settlement sites needed to be reduced to those that were highly likely to contain Bronze Age settlement features, which had been excavated and had been reliably dated. To achieve this, three stages of survey were carried out to identify relevant sites (Figure 6).

1. A broad evaluation of all summaries for material that might indicate Bronze Age settlement

The name, monument type details and short summary information of all 22000 records were reviewed for evidence that indicated a record was likely to be a Bronze Age settlement. The findings from this were recorded within a free text field and then keyed to indicate the likelihood that they were a Bronze Age settlement.

It was decided that any site listed as containing some form of known feature that might represent a settlement structure, ranging from as little as dispersed postholes but excluding sites such as enclosures and defended locations without settlement features within them, would be taken further forward in the gazetteer refining. This resulted in the database of 22000 sites being reduced to 6975 sites which were likely to represent a Bronze Age settlement.

2. Evaluation of all summaries for material that might indicate whether the 6975 potential Bronze Age settlement sites had been excavated

The name, monument type details, and long summary information for every one of the 6975 records was fully evaluated for evidence indicating the level of past investigation targeted on the potential settlement. Only those showing good evidence to indicate the site had some form of excavation taking place were taken forward to be included in the study. Good evidence was defined as the listing of an excavation report, details of intrusive investigation, or the recovery of information and artefacts which could only be obtained through excavation. This resulted in the database of 6975 sites being reduced to 1488 sites, which were likely to represent a Bronze Age settlement that had been excavated.

3. Evaluation of all summaries for material that might indicate whether the 1488 potential Bronze Age settlement sites that had been excavated showed evidence for radiocarbon dating for completion (Chapter 3.7.1).

Once the number of sites was limited to those useful to the study, it became possible to identify from the information already gathered which of those settlements contained radiocarbon dates. Not all summaries of sites contained information listing whether a site had been radiocarbon dated. However, those sites that did almost invariably would contextualise their radiocarbon results within their literature with other nearby sites. As such, it was possible to retroactively identify those sites which also had radiocarbon dates associated with Bronze Age structures. It was then possible to compare this dataset to an existing radiocarbon archive.

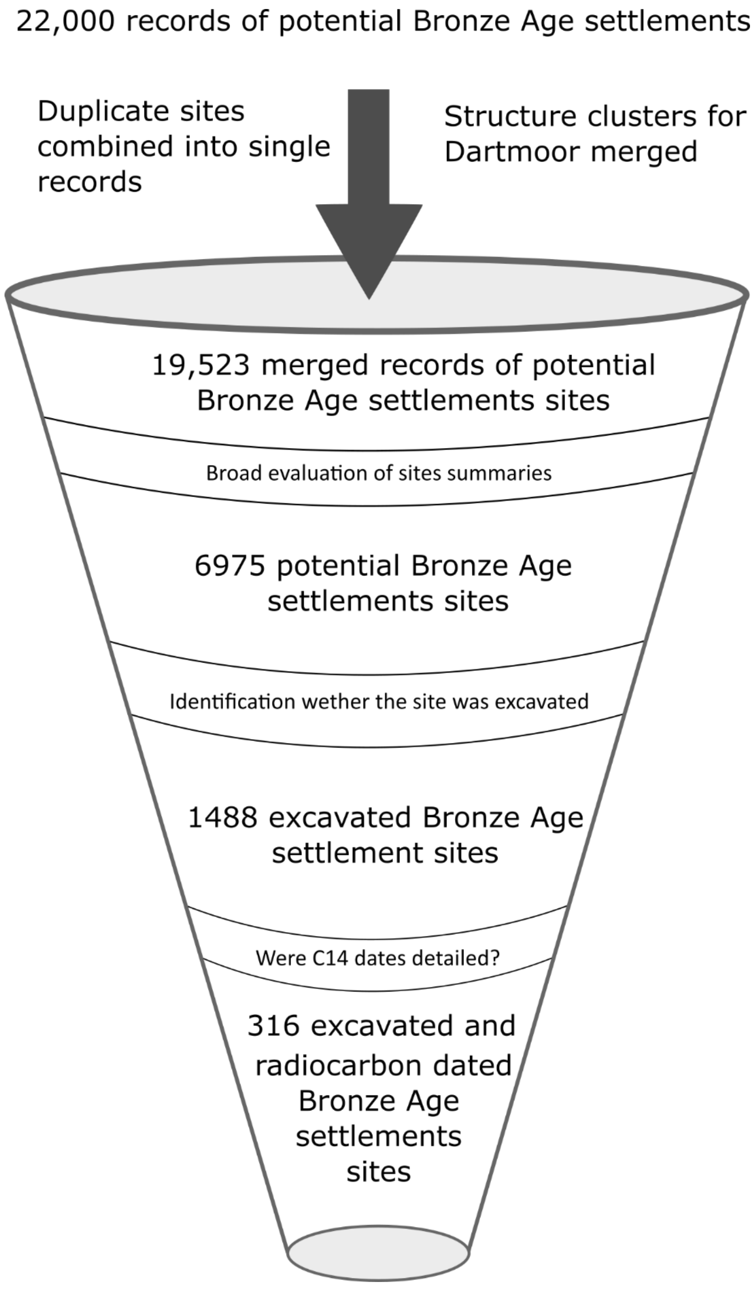

Figure 6 Infographic of the data refining process

3.6.2 Issues with the method

Of larger concern was the recognition and demonstration that, despite their best efforts, legacy issues with historic environment data lead to irregularly recorded sites. For example, some sites may include a brief summary of all features and periods of investigation within their record, while others might only include very short summaries of the overall appearance of the site.

3.6.2.1 Deciding what are settlements

Through the gazetteer refinement, it was not uncommon to encounter sites simply described as "settlements" e.g. prehistoric settlement site. At first glance, these sites may be relevant to the study, however, this term subsumes a wide variety of sites. These can include sites where only residual artefacts have been found which are thought to indicate occupation in the region; in others they may mean settlements with structures that this survey is targeting, yet they may be given the same term. As such, the study introduced a subjective numerical ranking system to determine how likely sites and structures were to truly present real Bronze Age settlements. Table 2 to Table 4 present the scoring system used in the study.

Within this system each settlement was graded independently on the likelihood of; the site containing a Bronze Age settlement feature, whether it had been excavated and whether it had an associated radiocarbon date associated with the site's Bronze Age activity. These scores were ranked to allow easy filtering of the database dependent on the user's criteria. In this study's case only those sites with a score of 0.5 for their site description were chosen for the main study. It should be noted that the numerical differences in these scores do not represent the actual probability of the site’s relevance, just their order. Any site which was identified as a settlement with no details of structures was given a lower score than other features.

Description	Score
Definite Bronze Age domestic structure (roundhouse, post-built structure)	1
House structure but some concern on its relevance (e.g. unexcavated, undated, reason to think it might be not Bronze Age) or not 100% sure it is Bronze Age	0.8
House structure but very little detail	0.79
Definite Bronze Age structure of some kind (palisade, Trough)	0.75
Structure of some kind but some concern on its relevance (e.g. unexcavated, undated, reason to think it might be not Bronze Age) or not 100% sure it is Bronze Age	0.72
Mentioned in text as settlement with good detail	0.7
Cited as settlement with little detail	0.65
Possible Bronze Age structure (postholes, pits, cave, hearth)	0.5
Cave site	0.49
Midden	0.45
BA defended site but no structures identified	0.4
BA enclosure site but no structures identified (e.g. ditch)	0.3
Bronze age occupation or settlement (just termed settlement, just termed occupation site)	0.25
Settlement horizon	0.24
Structure but not domestic	0.2
Burnt mound only	0.15
Occupation Site	0.1
Stone mound	0.05
Wosas unexcavated* used as a means of reducing the dataset quickly	0.025
Structure but definitely not BA	0.01
Duplicate record	-1
Find spot only	0
Cist	0
Flint scatter	0
Cairn	0

Table 2 The ranking system for determining how likely sites had Bronze Age settlement structures. Bronze Age settlement structures. Note that the scores are ranked such that categories most closely fitting those sites that were to be found are given a higher score, they do not represent any specific probability that they fit the criteria e.g. a “Cave site” ranked 0.49 is not 4% more likely than a midden site, ranked 0.45 to be a Bronze Age settlement.

Excavation criteria	Score
Definitely excavated	1
Probably excavated	0.75
Possibly unexcavated	0.5
Probably unexcavated Highland	0.35
Probably unexcavated	0.3
Unknown	0.25
Unexcavated	0.1
Non-invasive survey only	0.06
field walking	0.05
desk based assessment only	0
duplicate record or exclude as structure score indicates site is not relevant	-1

Table 3 The ranking system for determining how likely sites had excavated Bronze Age settlement structures.

Dating Score	Score
Direct Radiocarbon Date	1
Records say info taken for radiocarbon dating but none found	0.9
Written record from settlement	0.8
Material culture based date	0.75
Uncertain but excavated so assumed Material culture based date	0.7
Date on stratigraphic location	0.675
Date on proximity to material culture	0.65
Date on proximity/other criteria	0.6
Assumed date direct parallel (e.g. EBA site)	0.55
Assumed date (form)	0.5
Unjustified date	0.25
Location	0.2
Unknown	0.1
material found but lost so undated	0.05
Wosas unexcavated	0.025
Undated	0
duplicate record, criteria in another column = 0	-1
note if radiocarbon dates exist but do not date BA material then they are ignored	
this relates directly to the Bronze age material dated and does not represent dating of non-Bronze Age features	

Table 4 The ranking system for determining how likely sites had excavated radiocarbon dated associated with the site.

3.6.2.2 Scotland and Dartmoor issue

The above method was applied to the majority of heritage database results. However, over 50% of the 22,000 records first identified within the gazetteer were represented by just six Historic Environment Records whose area of study represented far less than 50% of the British Isles. Following a trial study of a sample of each of these records' data, it was felt that this number was prohibitively large to allow a study of these sites following the method outlined above, such that each record required its own bespoke solution, detailed below.

3.6.2.2.1 Dartmoor

Dartmoor has over 3500 sites listed within its HER that were identified through the study's data collection phase. This can be explained for several reasons. Dartmoor presents a unique upland landscape where many archaeological sites have not been destroyed by more recent agricultural activity (Fleming 2007 pp.1–5; Natural England 2014). Many of these sites are also made of stone, allowing their easy identification through non-invasive surveys, for example, Grimspound (Chapman 1996; Patterson & Fletcher 1996). Due to this preservation, each house structure is recorded as its own monument, even when part of a larger settlement complex such as at Shaugh Moor (Wainwright, Fleming & Smith 1979). As such, the number of sites is inflated compared to other regions. Similarly, the vast majority have been identified through non-invasive survey and lack any excavated evidence, such that they could not be confidently dated through any other means than their form, albeit the majority of sites identified by the HER were hut circles potentially relevant to the thesis and as such could not be ignored.

The solution to collecting and studying this material was pragmatic. It was first decided that the hut circles would need to be clustered into a manageable number of sites that could then be studied in more detail. This clustering would have to be automated, there being too many to cluster by eye in the time available and the data from the HER not proposing any such clusters. As such, an experiment was conducted using the DBSCAN Cluster module of QGIS. This module identifies clusters within point clouds within a set distance constraint defined by the user (QGIS-feature-tracker 2018). The settlement data were clustered with this module using different distance constraints (25m, 50m, 100m, 200m,) and it was then observed how representative those clusters produced reflected the evidence. It was found that setting a constraint of 100m appropriately divided the data into 1100 discrete bounded clusters (see Figure 7 through to Figure 10).

This process resulted in a suitably reduced number of sites which was felt to cluster those structures related to one another without overly grouping structures. In certain cases, as with the site of Grimspound, this resulted in houses outside immediate enclosures, which may be thought as being a separate cluster, within the same group, however the actual distance between these was so low as to make this an acceptable means to group these sites.

Once grouped, a key word search was applied to every structure's details for evidence suggesting the site had been excavated. This method found that only 46 sites showed evidence for having been excavated, which were then carried through to the next stage of analysis.

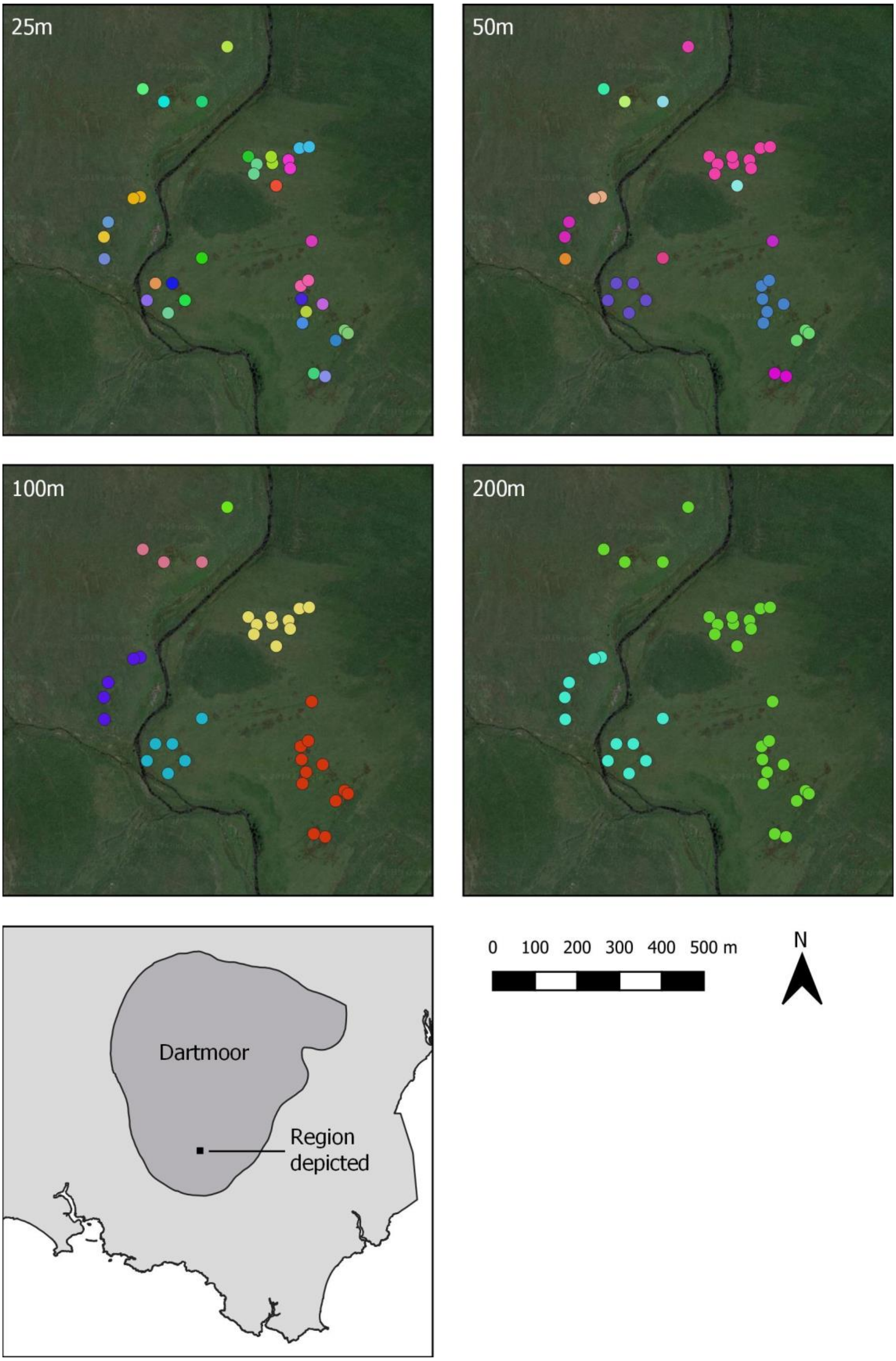

Figure 7 Results of the DBScan cluster experiment in the south of Dartmoor. Each colour represents a distinct cluster defined by the algorithm. Contains OS data © Crown copyright and database right 2019, Landsat/Copernicus satellite images provided by Google Earth.

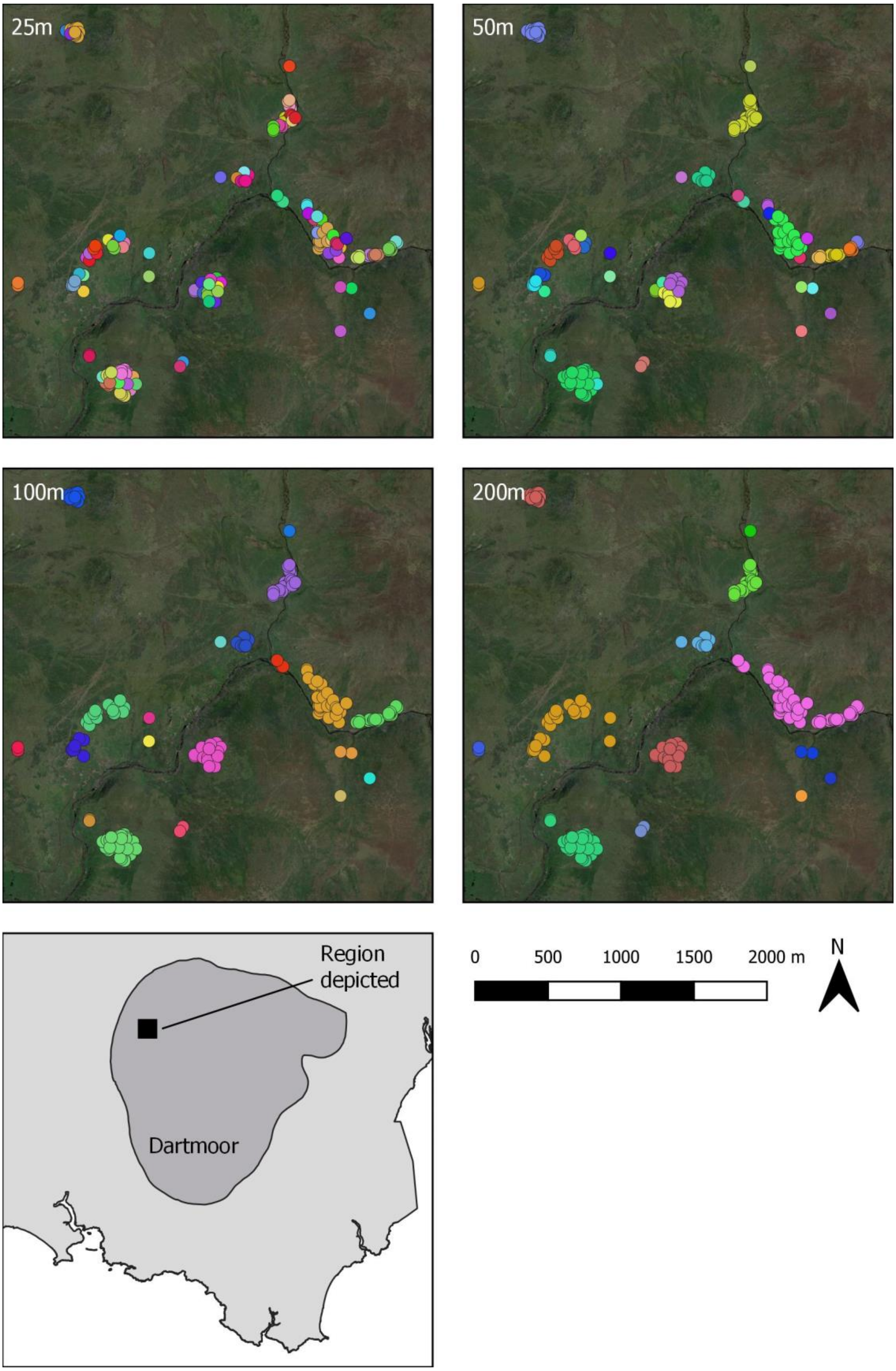

Figure 8 Results of the DBScan cluster experiment in the northwest of Dartmoor. Each colour represents a distinct cluster defined by the algorithm. Contains OS data © Crown copyright and database right 2019, Landsat/Copernicus satellite images provided by Google Earth.

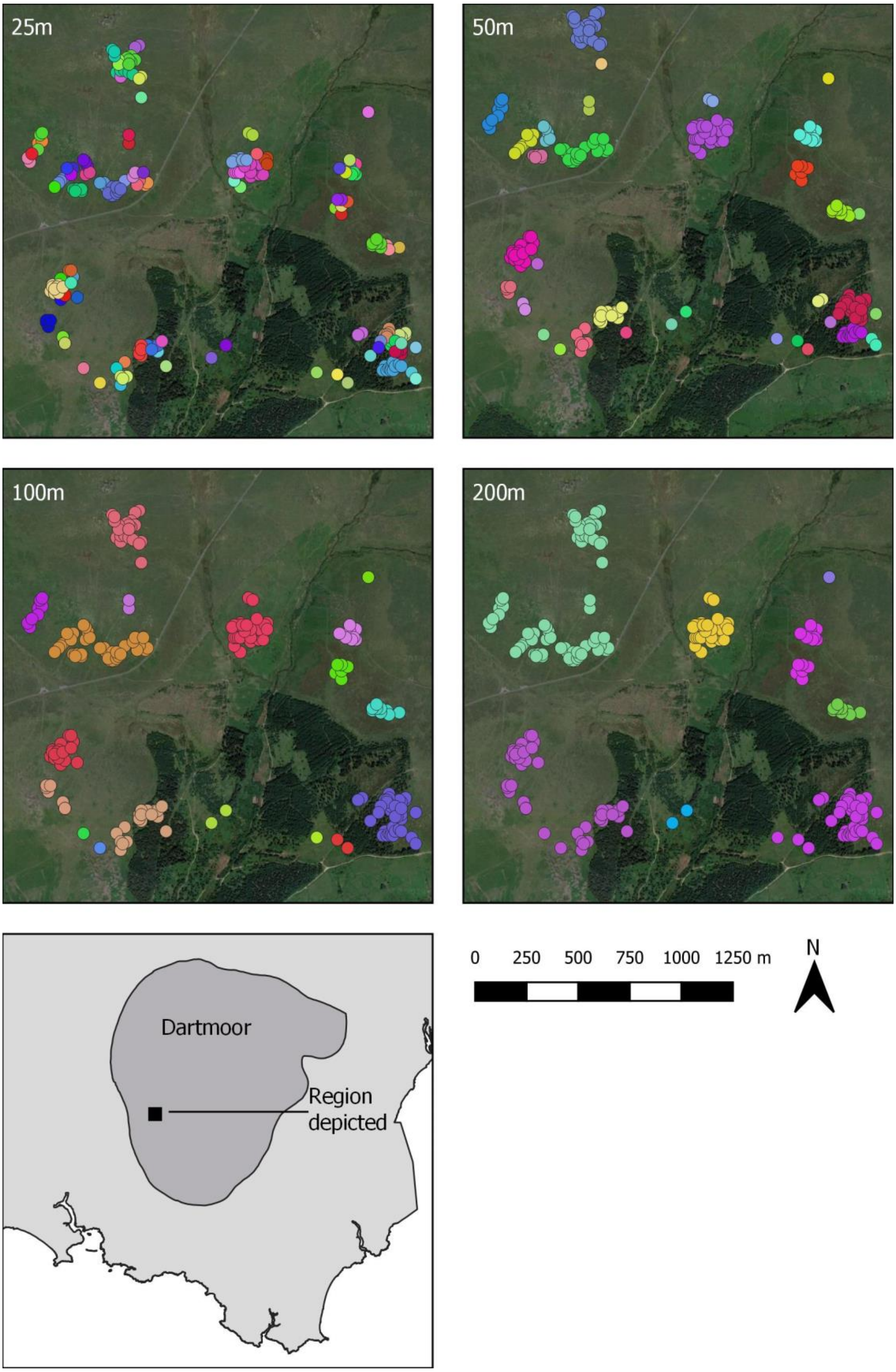

Figure 9 Results of the DBScan cluster experiment in the southwest of Dartmoor. Each colour represents a distinct cluster defined by the algorithm. Contains OS data © Crown copyright and database right 2019, Landsat/Copernicus satellite images provided by Google Earth.

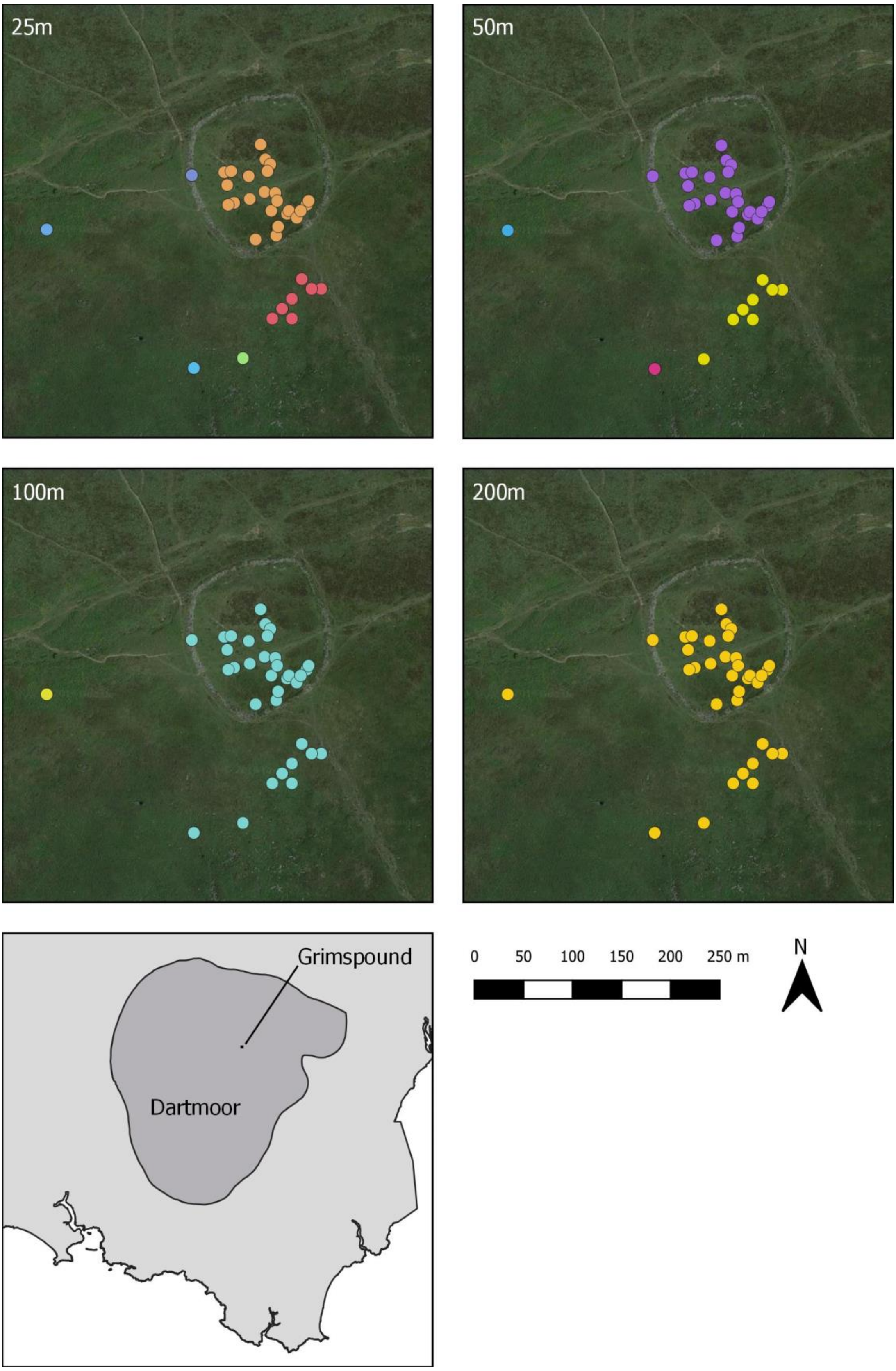

Figure 10 Results of the DBScan cluster experiment in the region around Grimspound settlement. Each colour represents a distinct cluster defined by the algorithm. Contains OS data © Crown copyright and database right 2019, Landsat/Copernicus satellite images provided by Google Earth.

The number of sites on Dartmoor required a pragmatic solution but there were limitations that should be recognised. Firstly, those clusters may not reflect the actual settlement clusters used during the Bronze Age, however, the only solution to solving this would be a concerted study to cluster this material, which is beyond the scope of the study. Secondly, not all sites that have been excavated necessarily include this information. This issue, however, is mitigated somewhat by strand 3 of the gazetteer and a thorough reading of the region’s local journal (The Proceedings of the Devon Archaeological Society).

3.6.2.2.2 Scotland

Three Scottish HERs, the West of Scotland Archaeology Service, Perth and Kinross and the Highland HER identified 6143 potential settlement sites through the study’s data collection phase. This high quantity of results can be in part explained in a similar vein to the high quantity of sites in Dartmoor, in that many areas of Scotland have not had their landscapes drastically altered by more recent agricultural activities, resulting in a high level of preservation. The use of stone in construction in many regions similarly allows for the easier identification of prehistoric sites. However, use of these databases was challenging as many lacked period filters, such that it was not possible to divide sites by Bronze Age only. Whilst this was problematic, and a manual review through all records within these sources being listed as “settlement” not being possible within the timeframe of a PhD, a solution was found in being able to use these. This involved searching for a list of key words indicating whether the site had been excavated, contained radiocarbon dates, or mentioned the term Bronze Age. By excluding those that did not contain this information a manageable number of records to search were identified.

While this method is not as comprehensive as those taken for other records, it was felt using this method and relying on several studies available allowed a swifter solution. The first of these (Pope 2015) listed all radiocarbon dated roundhouses within the north of Britain, including Scotland. This was deemed an appropriate scale of survey of roundhouses to be used for this research. Similarly, Mamwell's thesis of Neolithic and Bronze Age settlement in Orkney (2018) provided a detailed review of excavated and unexcavated settlements for the region. Using Pope and Mamwell's gazetteers combined with strands 2 and 3 of this project's gazetteer would produce suitable evidence for those radiocarbon dated sites in Scotland. It must be recognised then that this region has not been studied to the same extent, such that it is possible radiocarbon dated settlements in this region have been overlooked. However, when comparing the relative number of radiocarbon dated settlements in Scotland to Wales and England, the number of sites is broadly similar when adjusting for the areas of each region, such that this is unlikely (See Chapter 6.2.2).

3.6.3 Pivoting the study

By the nature of the study's data collection methodology, a dataset was produced which had not been directly envisioned at the start of the project. What had been targeted was a near comprehensive database Bronze Age structures associated with radiocarbon dates. The only means able to identify this list identified over 22,000 sites grouped into 19523 features (due to issues with those sites in Dartmoor) from which 1488 Bronze Age sites which were likely to contain Bronze Age architecture that had been excavated were known, although it was unknown whether these had been dated through radiocarbon dates or associated material culture.

Furthermore, it had also identified 6975 potential settlement sites that may have been Bronze Age but were not listed as having been excavated or showing any evidence for which data could be applied to their features other than their form.

The time taken to produce this dataset was also far greater than had first been envisioned, while a pilot assessment of the study's initial proposal in studying the features within a day's walk of a settlement site had at a similar time shown this to be impossible in its current form. As such, it was decided to assess the gazetteer on its strengths and weaknesses. These are described below.

Strengths:

- The database represents a near comprehensive survey of Bronze Age sites with domestic architecture across the whole of England, Scotland and Wales
- This gazetteer could identify whether these had been excavated or not
- This gazetteer could identify which were radiocarbon dated or not
- The number of sites studied was so great that if any were missed within the review, they would not overly impact upon the general statistics generated
- Data existed that summarised each settlement site for all 1488 sites
- It had a practical, but not comprehensive, literature selection identified for each of these sites

Weaknesses:

- Not all regions could be studied to the same extent

- Limited information was available to identify developer funded excavations in Wales and Scotland
- It did not list all the details of each site, or the form of the assemblage available
- Not all data from HERs was comparable
- Clearly some errors in the data remained, with some records having limited or incomplete site descriptions poor location data and limited bibliographies

3.6.4 Defining the study set

Due to these factors, it was decided to define the following datasets for the project:

- A list of all potential Bronze Age settlement sites with structures - going forward these are termed as the "potential settlement dataset" (n=6975).
- A near comprehensive list of all intrusively excavated or intensively studied sites with domestic structures (n=1488) that had in earlier research been dated to the Bronze Age. For the purposes of the study, going forward these are termed as the "coarse settlement dataset"
- A near comprehensive list of Bronze Age settlement sites (n=316), associated with a defined domestic structure that was associated with at least one radiocarbon date. For the purposes of the study going forward these are termed as the "high-resolution dataset".

This study's new assessment of later prehistoric settlement and society has been influenced by Ferrell's (1992, 15-17) contention that there is no use in delaying analysis until 'better data' are available, as this perpetuates the tendency to collect further data in a theoretical vacuum without an appropriate research agenda. The first step towards this is collating the data currently available, something that has never previously been attempted for the study area.

3.7 Incorporating existing databases

The methods of data collection and organisation used in this project have provided a clear, reproducible and regionally consistent means of identifying potential sites in Britain. The method may be adopted to almost any other form of archaeological site in Britain. However, as the study developed, numerous further datasets became known to the researcher, some of which had data relevant to its aims or provided a means of identifying further sites. As such, it was decided they needed to be included in the project. These are described below.

3.7.1 Radiocarbon data

The high-resolution database is intended to list the vast majority of Bronze Age settlement sites associated with a radiocarbon date. During data collection it was found that several projects had been attempting to collate radiocarbon data from across Britain (listed below). These being near comprehensive lists of radiocarbon dates of material in the country, it was thought that these would provide a further means of identifying sites with radiocarbon dates, in addition to the method set out above. As such, a method was devised to use this data that followed three stages:

1. Collation of a bespoke radiocarbon database for this project
2. Comparison for any matches between sites in the radiocarbon databases and those in the settlement database
3. Refining the radiocarbon data associated with each site

3.7.1.1 Collation of a bespoke radiocarbon database

Step 1 involved pooling together those datasets identified during data collection into a master database of Bronze Age radiocarbon dates.

The following radiocarbon databases were identified:

- Radiocarbon dates list curated by the author
- Canmore radiocarbon date list authored by Patrick Ashmore (Ashmore & Historic Scotland 2016)
- The National Museum of Wales' Wales and Borders radiocarbon database (Burrow & Williams 2016)
- The Council for British Archaeology's (CBA) Archaeological Site Index to Radiocarbon Dates from Great Britain and Ireland (Council For British Archaeology 2012)
- The associated radiocarbon dates for an article published by Bevan et al. 2017 estimated to represent 75% of those radiocarbon dates in Britain up until 2014. Although no methodology for calculating the proportion of dates identified is stated.

A database design was created using the CBA index as a template. Those dates from each database were then added. Any new fields recorded in a new project were added to the database, while duplicate readings were rationalised. This rationalising was made somewhat simple, due to every radiocarbon date having a unique lab-analysis ID that serves as an identifier. As such, only duplicates in this value needed searching for. Duplicate lab IDs with different radiocarbon details were left within the database if it was not possible to verify which the correct reading was. Each radiocarbon date was then recalibrated using using OxCal v 4.2 and the IntCal 13 curve (Ramsey 2009).

3.7.1.2 Comparison for any matches between sites in the radiocarbon databases and those in the settlement database

The combined lists of radiocarbon dates were then reduced to only those sites with at least one Bronze Age date, with those without being deemed unlikely to be of relevance to the study. This resulted in a list of 9504 dates from 498 sites across Britain (Appendix 1), yet these dates are not all related to Bronze Age settlement activity. Many, for example, date burials where no evidence of structures is present. As such, a means was devised on identifying which dates were likely to be relevant to the gazetteer. Firstly, all sites identified in the earliest stage of data collection (those 3500 sites that may have included a Bronze Age structure) were compared relatively to those 498 sites that were found to have a radiocarbon date within a geographic information system (GIS). Each site with a date's location was buffered by 1000m, with any sites from the settlement list then highlighted per date. 1000m was selected as the majority of grid references are recorded to six figures, or an area of 100m, by increasing the area search any location discrepancy is accounted for. This method produced a comparable list of sites per radiocarbon date of usually less than 3 sites, making it simple to quickly match appropriate dates to sites. Each settlement site had an associated name, as did each site with a radiocarbon date. As such, a "Fuzzy Match" using the Fuzzy Lookup Add-In for Microsoft Excel was used to identify any sites with similar names.

3.7.1.3 Refining the radiocarbon data associated with each site

In addition to identifying further radiocarbon dated Bronze Age settlement sites, this method allowed the details of those radiocarbon dates already recorded in existing databases to be exported and attached to their relevant settlement record within the primary database. This included information on the material dated, occasionally the feature dated, and the results gained from the analysis process. However, these did not record the relevance of these dates to the settlement structures use on the site. As such, all references relevant to these dates were searched and additional data recorded to allow the modelling of dates and their relevance to the structures found to be made explicitly (further details in Chapter 5).

3.7.2 Additional site corpora

3.7.3 Metalworking data

During the course of the data collection, a review of all non-ferrous metalworking evidence in Britain was published via the Archaeological Data Service (ADS) (Adams, Webley & Brück 2017). Not only does this list all sites with copper working by period, and so provides a useful comparison dataset for where metalworking occurs (see Chapter 7.4.3), it also listed further domestic sites, which by the nature of the evidence must have been excavated. As such, this dataset was compared to the coarse dataset of the thesis, with any matches identified having data merged from the metalworking corpus to the main dataset. The methodology for this is explained below.

3.7.4 A methodology for incorporating new sites efficiently into the database.

Through the course of the thesis' research a new method was identified for the swift combination of data from multiple sources. This issue has been recognised as one for all big data studies, especially those that utilise legacy datasets that may internally contain duplicate sites in addition to replicating data between databases (Bradbury, Davies, Jay, *et al.* 2016). As such, it was felt it would be valuable to detail this method here. It follows three principle stages:

1. Check the location of the site
2. Check the name of the site
3. Check the references cited for that site

3.7.4.1 Check the location of the site

Location data is one of the primary assets used to investigate duplicate sites. Every site identified within the main project database has a national grid reference and the accuracy of this location data allows the proximity between sites from the two datasets to be assessed. Any sites being particularly close can be suggested as potentially being a duplicate site whose data can supplement the original record, although it should also be recognised that they may also record a distinct phenomenon. Due to this, a process to assess the nearness of two different records is required as a means of finding duplicate sites. The process followed by this study is as follows:

1. Define the site's location accuracy
2. Perform a near search

Most GIS programs offer a “near” function. This identifies the nearest point to every point in a shapefile, the identifier of these nearest points and the distance between these points. As such, pairs of sites are produced. These pairs can then be limited by those that are within the distance of the accuracy of the point location, typically less than 100m, the end result being a list of potential duplicate sites which is far quicker to search than would otherwise be planned.

3. Perform a buffer search

The issue with the using the near function is that it only provides one potential duplicate site per site. A means of identifying more can be produced by buffering each site by its accuracy and then selecting those points within this distance.

3.7.4.2 Checking the names of sites

The majority of archaeological sites are given names which, once well published, remain in use. While these names are not always formatted correctly, a quick means of identifying duplicate sites is through checking for duplicate names between databases. Any exact matches can be quickly checked to see if these sites are duplicates. However, sites do not always have their names formatted identically. A method for identifying duplicates with similar names is provided by Excel’s “Fuzzy Match” algorithm, which produces a list of site names and a score of how similar these are per new site. Much like the buffering means described above, those listed are more limited and can be used to quickly identify whether a site has a potential duplicate or not.

3.7.4.3 Check the references cited for that site

If a list of sites also has a list of references e.g. (Adams, Webley & Brück 2017), it is possible to identify a list of sites who share bibliographic references. These lists are typically limited, allowing any duplicates to be quickly identified.

3.7.4.4 Final comment

Ideally, each of these checks should be carried out for swifter and more reliable duplicate site identification, however only one stage is required. In each of these methods, a potential list of duplicate sites is produced. In practice, this number of sites is usually limited to below ten sites, making a quick visual search possible of any duplicate list. However, if working with an even larger quantity of data this number might increase significantly. In this case, it is possible to suggest that by scoring each potential duplicate site according to each of the three criteria it will be possible to limit the number of potential sites significantly, by subjectively ranking the likelihood that they are duplicates. The only further comment to make is that the swiftest way to limit the amount of duplicate searching is to start with the largest internally consistent database, there being no duplicates within, and then to only compare new sites added to this.

3.8 Creating a database

This section provides an overview of the thesis' recording phase of analysis.

Any analysis of a dataset is determined by what that dataset records, which in itself is dependent on how it was collated. While this collation is ideally defined by research questions set out within a detailed project design, it is inevitable with legacy heritage database projects that the eccentricities of the study material requires adaptation to make it suitable for collation and recording, which subsequently effects the final analysis. This project relied on a large quantity of data for its core analysis, such that making this process clear was important both in framing the thesis' study but also making clear its limitations. It is hoped that by doing so, future projects may seek to re-use the database attached to the project.

From an early stage it was clear that the project would need to use a database to record the information gathered in the creation of the thesis' gazetteer. Further than this, the sheer number of sites to be studied and features within these required the use of a database to house the entirety of the project's data to allow for manageable and practical analysis. As such, a bespoke database was created. This was designed initially to record all those sites delivered by HERs, SMRs and UAD, but it was then adapted to suit the needs of the project. This section presents an overview through the creation of this database and the reasons behind choices and decisions made in its design and format.

3.8.1 Criteria

The database needed to meet the following criteria:

- It had to be able to record all heritage features returned in the data collection phase of the study
- It had to be simple to use
- It had to be flexible to any new recording needs identified over the project
- It had to record the key attributes of Bronze Age settlements
- It had to allow a quick comparison of features

- It should be able to accommodate data from many different sources in a way that allows meaningful comparisons to be made

3.8.2 Database design

The database was constructed using Microsoft Access 2013 (Chapter 3.9 shows the framework for this database). This records each settlement as an individual unit, which can have attributes defined for itself. Features within these settlements were then recorded within a suitable structure to allow for inter-site and intra-site analysis to be possible.

Following Pope (2003), separate phases have been recorded as separate structures only when there is evidence for rebuilding or redesign, therefore changes in orientation of the structure; repair and factors such as hearth renewal/repositioning are treated as part of the original structure.

3.8.3 Fields recorded

The thesis aims to study the appearance and use of Bronze Age settlement structures in Britain and their environs. To do so, decisions had to be made on what data would be recorded, as these would determine what might be assessed during the data analysis stage of the study.

Usefully for the project, there have been several projects recording later prehistoric settlement sites in Britain and Ireland whose data recorded high resolution information for structures (Ghey, Edwards, Johnston, *et al.* 2007; Ginn 2012, 2016; Pope 2003, 2015). In two of these, the researchers decided that all possible information available on any structure should be gathered and put into a database.

A recording system was designed around these details and also previously published studies recording the same phenomena, such that their data could be easily merged between these projects.

3.8.4 Keying data

The above have detailed the design of the database used for the core of this thesis' analysis. Determining how data should be keyed into the database was pivotal in enabling the dataset to be suitable to answer the project's research questions. With the design of the database, as outlined above, setting out the main fields of data required for analysis had to be entered into this design, to allow for statistical interrogation (e.g. Chapter 3.6). Before data entry began, a bibliography was created for each site using the data identified within the construction of the site gazetteer. It must be acknowledged that the information that was accessible affected the final results produced through the thesis, however the scale of the sites studied was such that any overall statistics were unlikely to change. Similarly, by making these sources clear it becomes possible for future exercises to supplement the project's database.

3.8.5 Data quality

Three major factors must be acknowledged for the impact they have on the quality of the data input into the database, which were outside of the control of the author to assess and determine. Firstly, those structures and findings made could only be detected for such features that survive into the archaeological record. This means the database presents only those sites and features that survived until being identified archaeologically and excavated, not the complete record of all settlement structures that were truly in existence throughout the Bronze Age.

Secondly it relies on only those sites that survive in the archaeological record that have been discovered. This issue is exacerbated by the fact that research intensity (be it through targeted research excavations, developer led archaeological interventions or non-invasive surveys) has not been uniform across the country. The issues around recovery bias in this form are numerous (Robbins 2013; and see Green, Gosden, Cooper, *et al.* 2017 for an attempt at mapping many of these in one project) and beyond quantification by this thesis but it is worth recognising that this has a "snowball" effect with regions with known phenomena more readily targeted for excavation and research than those understudied regions such as Cumbria (Green, Gosden, Cooper, *et al.* 2017 p.254).

Finally, this database relies on trusting the interpretations and statements made by archaeologists who evaluated and excavated the sites to be correct. It is impossible to re-examine excavated sites, therefore, to feasibly conduct this study, the statements and figures provided in reports and literature was accepted as correct, unless proven otherwise by the author.

3.8.6 Categorisation issues

All data deemed relevant by the field set out within the sources gathered were added to the database. During data inputting, effort was made to limit those details recorded to a limited lexicon of terms to allow easy comparison in the data analysis stage of the study. If no information was identified for a particular field, this field was left blank, rather than identifying the field as having no information. It was necessary to include how this information was keyed, as this also affected the level of analysis possible.

3.8.6.1 Multiple interpretations

At times the features of a site are unclear and so have been interpreted in multiple ways as at Irby, Wirral (Philpott & Adams 2010) which was undecided whether a feature was either two separate houses or just one double ring house. In these instances only one interpretation has been recorded (to prevent duplicating the counting of houses/mispresenting their size) which has been selected based on what I feel was most likely. Anyone wishing to use these can re-read the reports and provide their own interpretation if necessary.

3.8.6.2 Site level

3.8.6.2.1 Period

A site's temporal location is one of the primary characteristics required to appropriately understand its record. As such, it was decided that recording this information would be valuable for all sites, as part of the coarse and high-resolution dataset. Forming a schema for this classification required several explicit decisions to be made, as follows:

3.8.6.2.1.1 Decision one – what should be dated

Numerous sites were recorded which contained activity occurring before and after the Bronze Age settlement phases. It was decided that the period description should not record this activity and only relate to the period during which the settlement had been used. For example, a site with a Middle Bronze Age (c. 1600-

1150 cal BC) field system and then a Late Bronze Age (c. 1150-800 cal BC) settlement structure would be given the term LBA.

If a site was used over multiple periods, this was indicated by listing all those with a hyphen. For example, a site with structures dating to the Early Bronze Age (c. 2400-1600 cal BC) and the Middle Bronze Age (c. 1600-1150 cal BC) would be recorded as EBA-MBA. If there appeared to be multiple phases of independent settlement these would be recorded as such. For example, a site with structures dating to the Early Bronze Age (c. 2400-1600 cal BC) and then Late Bronze Age (c. 1150-800 cal BC) would be recorded as EBA, LBA.

3.8.6.2.1.2 Decision two - chronological schema

Numerous Bronze Age chronological schema exist for British material culture (see Roberts, Uckelmann & Brandherm 2013 for a good summary). Similarly, this study has been able to identify five phases in the settlement record through the radiocarbon record (see Chapter 5.4). A decision was required then as to which schema should be used and for which dataset.

Most settlement sites that have been dated relatively are done so through either ceramic chronology or the form of the settlement itself. These chronologies most closely reflect the three-fold division of the Bronze Age, such that those in the coarse dataset with a relative date were assigned to a period based on these criteria. It was decided that all coarse sites would be placed within the three-age schema known and that a second category would be recorded for all those sites with radiocarbon dates according to this study's own record. Further details on this schema are detailed in Chapter 5.

Ceramic form	Date range	Bronze Age period	Reference
Beaker	2400 BC – 1750 BC	EBA	(Sheridan 2007; Sheridan, Larsson & Parker Pearson 2007)
Food Vessel	2200 BC – 1800 BC	EBA	(Wilkin 2013)
Collared	2050 BC – 1500 BC	EBA	(Law 2009)
Cordoned	1800 BC – 1400 BC	EBA-MBA	(Sheridan 2003; Sheridan, Larsson & Parker Pearson 2007)
Trevisker Ware	1800-1300	EBA-MBA	(Nowakowski 2012; ApSimon, Greenfield, Biek, *et al.* 1972; Parker Pearson 1990)
Deverel-Rimbury	1750 BC – 1000 BC	MBA	(Woodward 2009)
Post Deverel-Rimbury	1000 BC – 800 BC	LBA/EIA	(Brudenell 2012)

Table 5 Ceramic chronology for the Bronze Age in Britain.

3.8.6.2.2 Location

As fundamental as temporal location was geographical location, in order to enable the investigation of potential variations in settlement and their distributions in different geographic areas in Britain. The majority of sites identified through HERs record this as a national grid reference, typically at six figures (100m accuracy) (English Heritage 2002). The locations of both the coarse dataset and high-resolution data were all independently verified through accessing their supporting publications and their centre points' resolution increased, where possible. It should be noted that this location data does rely on the published location being accurate. These centre points represent the approximate centre of any settlement cluster, where multiple houses were found or the centre of the house structure, if only one structure was identified. By obtaining this location value it was possible to assess the distribution of sites and also extract further data on each site's location using pre-existing geographic datasets. The strengths, limitations and values of these datasets are discussed in Chapter 5.

3.8.6.2.3 Feature classification

Features of the settlement were recorded. These were defined at the beginning of the study as being of possible interest in comparison (see research questions in Chapter 1.5.1, discussion themes in Chapter 1.5.2 and research themes discussed in Chapter 2.6.1) as it was carried out and included:

- Evidence for field systems
- Burials
- Trackways
- Size of settlement
- Metalworking
- Whether information had been published on environmental detail or animal bones
- Years of excavation
- Whether the site showed any signs of formal abandonment as recorded within its literature

Each of these fields was recorded as free text, although a consistent vocabulary was used in order to allow re-formulation of the data in a final analysis stage without limiting the information to values that might not accurately reflect the site's conditions. In each of these cases, the information recorded was directly contemporary to the use of the settlement. Exceptions to this were limited to field systems, trackways and burials where it was thought that recording of such evidence so long as it dated to the Bronze Age regardless of its temporal relationship to the settlement would be of relevance to the settlement analysis.

3.8.6.3 House level

3.8.6.3.1 Period

In addition to each site being given a temporal location, each structure was also classified according to the same schema as set out above. In addition, the evidence for this date classification was also recorded. If a structure was not attributed a date in any source identified for that site, the structure was left undated. This was because it may be possible that these structures are contemporary to those found across the site, however, numerous sites have been identified that contain Neolithic, Iron Age and Roman structures in close proximity (for example, Mucking North Ring). As such, it was decided a greater reliability could be placed on the statistics if this information was excluded.

3.8.6.3.2 House form

No standard typology exists for Bronze Age structures in Britain. As such, the component features of each house were recorded individually. Further details on this scheme are discussed in Chapter 6.

3.8.6.3.3 Dimensions

Structure size has been used previously to understand the change in use of space over time such that recording the size of structures was also important to investigate.

Measurements taken from plans are naturally fallible because of the high margin of error in measuring features depicted at such a small scale. It was decided that measurements would be taken relying primarily on the figures quoted within texts rather than acquiring measurements of these from plans. The reasons for this are, firstly, the possibility that measurements taken from plans may be warped in the scanning process, which can lead to inaccurate distortions. Secondly, drawings produced at small scales have a high margin of error for measuring features depicted due to their small size as illustrated, and lastly the number of features identified would make any such measurements too time consuming to allow for any other form of analysis within the timescale of this research project.

Due to these issues, a certain margin of error is unavoidable, however by remaining consistent in the measurement required, all measurement data should at least be relative. To this end, if multiple values were quoted, the diameter of a structure is taken as the maximum internal diameter of a structure from the visible internal outer wall feature.

3.8.6.4 Finds

There was not sufficient time within the study to record the entire artefact assemblage of each site studied in the high-resolution data set, however, it was recognised that these have a valuable role to play in understanding the use of settlement sites. As such, it was decided that each assemblage would be recorded in limited detail in direct relevance to the settlement site. This was carried out through a non-relational method of recording finds observations that could be identified either with a structure or a settlement. Further detail of this method is described within Chapter 7.

3.8.7 Limitations

The data keyed within this database is only that from the literature obtained. While attempts were made to include all relevant existing data relating to Bronze Age settlement in Britain, the study is ultimately based upon the information that was available and obtained by the author. As such, it is certain that further information could be added to this database that may further supplement the record. As such, any interpretation of the general statistics must be cautious in overstating the universality of their results. This said, the number of observations is far greater than those seen in comparable thesis projects and is of sufficient size that for any of the analyses, a substantial body of evidence would need to be supplemented to alter the general statistics in a meaningful way (see for instance the discussions within Chapters 4.6.1, 5.7.2 and 7.2.3 and in particular discussions within Chapter 6).

The data also relies solely on the results and interpretations held within this literature, as time would not allow a thorough reinvestigation of all the sites identified, as has occurred in some past studies of specific sites as at Itford Hill (Ellison 1978), Shearplace Hill (Avery & Close-Brooks 1970) and Reading Buisness Park (Davies 2016 A3.2).

Furthermore, the data collated only represents those areas that have been excavated. Initial attempts were made to assess the area of settlements excavated in order to measure the totality of each site’s excavation, however, this was too irregularly reported to provide any meaningful statistic. As such, it should be recognised that the extent of settlement sites is likely to be underestimated due to the limited nature of some investigations.

3.8.8 Data assessment

With the project's aims set out and a database created, it became possible to assess that data gathered in order to answer those research questions identified. At this point in the research project, the decision was made to only conduct analyses that focussed on the thesis' core research questions.

These questions being relatively simple, the majority of the answers could be identified through simple statistical analysis. This thesis places the majority of its weight on quantitative, rather than qualitative, analysis seeing the use of specific examples as a means of demonstrating the overall trends seen in the database at a human level. Qualitative driven analyses are reserved primarily for the thesis's discussion (Chapter 7) and conclusion (Chapter 8).

3.9 The database structure

The scale of this dataset is large for a thesis project. The project has recorded over 130 different fields of information from over 19,000 sites. The high-resolution record lists 316 sites, each with a large degree of supporting data. From these 316 sites over 2000 features have been recorded, again with their own supporting data. Further information has been recorded from those 1488 excavated Bronze Age settlement sites and the 6975 potential sites. These datasets are themselves supported by a radiocarbon index of over 9000 records (included) and a burial database of over 4000 records (not included). The bibliography consists of over 2400 unique records. In total 1,203,755 fields of information have been recorded for this project that are supplied within the thesis' supporting database (Appendix 1).

Much of the project's time has been spent in the database's creation, such that the database in itself is seen as a primary output from the project, in addition to being a means with which to answer those research questions identified above.

Such a scale of data requires the use of a relational database package.

The data is divided into two primary datasheets:

MacroSite: represents those details recorded for each potential Bronze Age settlement site identified by the study including details on its data source, my rating of its probability of containing a Bronze Age settlement as understood by the study, its location and nearby archaeological features.

House Details: represents those details recorded for potential structural features found at each of the potential Bronze Age settlements sites including details on their form, size and temporal location.

In addition to these sheets are:

Bibliography: represents those sources identified by the study that provide details on each settlement site and its features.

C14: represents the radiocarbon database collated during the thesis. This records all dates identified regardless of whether they date a Bronze Age feature or not.

Each of these files has been supplied as an Excel worksheet which may easily be imported to a relational database package. The data that this thesis assessed and that the database recorded is in a very simple relational design that may be inputted into any relational database package. Doing so allows any of the analyses within the thesis to be easily reconstructed.

The model for this design is depicted in Figure 11. The House Details, C14 and bibliography tables are each linked by a “many to one relationship” to the MacroSite table, there being multiple records in these three tables that link to a single settlement site. These links to do not enforce referential integrity, the result of which is that if one field of a joined pair is edited, the other will not change. While this allows flexibility in assigning dates to features, it does require caution if making sweeping changes.

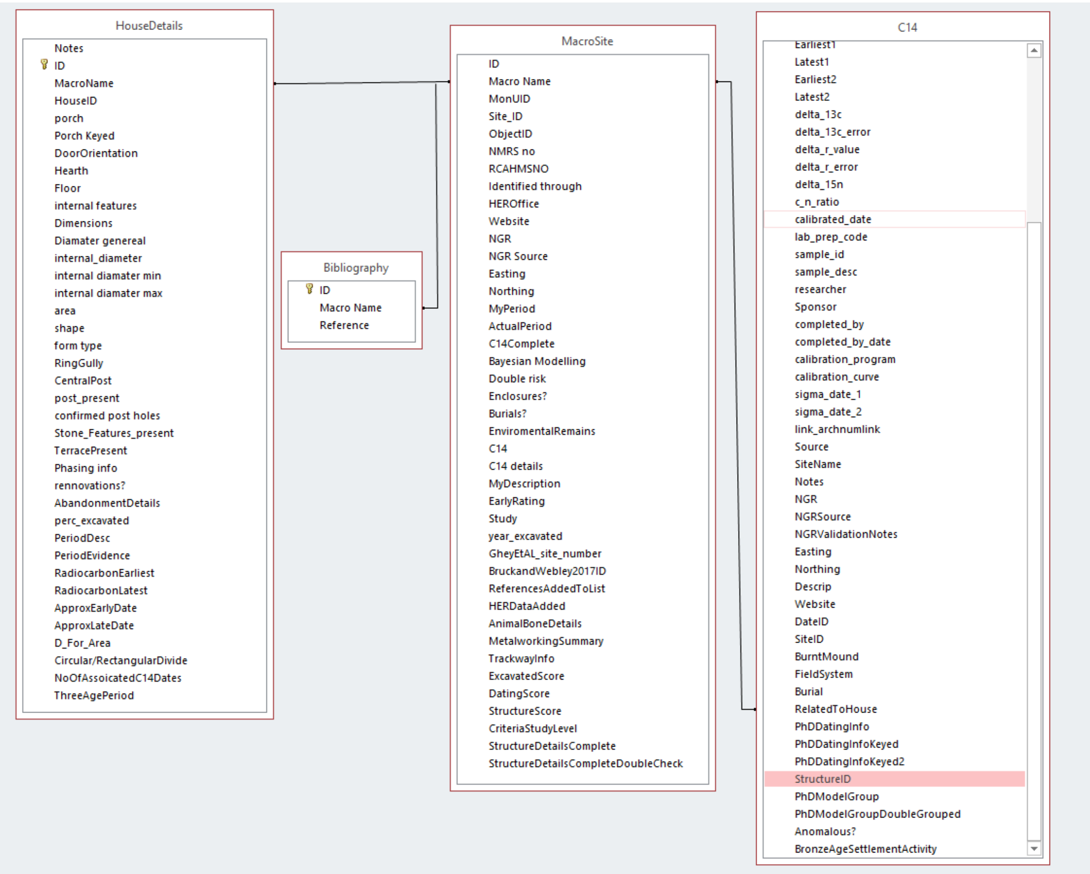

Figure 11 The relational design models used for the supporting database. Each link to the Macro Site table is a many to one relationship.

While not depicted in Figure 11, it is also possible to link those radiocarbon dates identified directly to individual structures by adding a second many to one relationship between the StructureID field within C14 and the House ID field within the House Details table. Note that this is only able to identify those dates which have a known relationship to a structure. Radiocarbon dates that have been obtained from a settlement but whose relationship to a structural feature had not been identified will not be returned through such a query.

Metadata describing all the fields' record, their recording details and the type of field are included on the disk under the file MetaDataTables.

3.10 Summary

This chapter began by setting out the theoretical understanding on which the thesis has been built. This recognises that archaeology should be centred on discerning human action and that the structuring of space is an effective way of doing so. Furthermore, settlements are a particularly useful medium in which to do this. This chapter recognised that such analysis can be conducted within settlements, between settlements and beyond the physical bounds of those settlements by incorporating their relationship/s to their landscape setting. The period chosen to be studied is spread over 1600 years, such that it is suitable to assess the record not simply as a whole but over time, thereby allowing a study of how human action changed over time. The chapter then set out that there is value in simply collecting data in a consistent and reproducible manner and then keying this data to allow simple querying of the resultant database.

With the theoretical assumptions for the thesis made clear, the chapter then made explicit the definitions used within the thesis.

In order to meet the project's aims, I opted for study of settlement and landscape of Bronze Age settlements in England, Scotland and Wales. As there are no national syntheses of this data it was decided to collate a new gazetteer of potential Bronze Age settlement sites and to key information from a sample of this database to allow analysis of Bronze Age settlement sites and structures, form (Chapter 4), intensity of use over time (Chapter 5) and distribution (Chapter 6) followed by a qualitative assessment of the activities that occurred at these sites (Chapter 7).

I would recognise that this section could discuss the theory of settlement far further, the field being incredibly advanced, however it is my view that as the archaeological record currently stands there is currently more value to be had in the collation of a baseline study with relatively simple descriptions of the patterns this dataset presents rather than a series of attempts to test certain theories or methods on each individual settlement (Chapter 3.2.2). Such studies work on a far smaller scale and have been shown in Chapter 2 to have been the primary mode of study for almost three decades (Chapter 2.7.1).

The literature review in Chapter 2 has identified that the only national summaries of Bronze Age settlement structures in Britain that exist rely on citing a few well known case study sites and that no effort has been made to study these phenomena consistently across the entire country, to the extent that simple questions of the record, such as "how many Bronze Age roundhouses have been identified in Britain?" are not possible to identify through the literature. As such, a dataset had to be produced that listed all Bronze Age settlement structures associated with a radiocarbon date. It was decided that the best means for understanding this was through large scale data acquisition and analysis using a custom method that would be repeatable. This method produced a sizeable quantity of data that had to be reduced to only those sites of relevance to the study, the method of which produced several datasets not first envisioned by the thesis. This has resulted in a dataset of the majority of possible Bronze Age settlement sites in Britain (the potential dataset), those that have been -excavated (the coarse dataset) and those that have been radiocarbon dated (the high-resolution dataset). The later dataset also includes data on the features found within each site following established studies of prehistoric architecture.

As such the thesis has met its first objective:

Objective 1. To design, create and enter data into a comprehensive database of Bronze Age settlement sites in England, Scotland and Wales whose occupation has been radiocarbon dated.

It is the data within this database that forms the analytical core of the thesis.

Throughout the chapter has tried to identify the bias and issues in the production of this dataset that may effect the results presented in the analysis chapters. It has also made the method clear in such a way as that it may be reproduced in future, for example for any sites recorded after 2014/15. With this chapter now complete and the creation of the database explained it is now possible to evaluate this dataset in order to answer the research questions set out in Chapter 1.

Chapter 4: *What did Bronze Age settlements look like?* A study of the use and shape of domestic architecture and features

This chapter aims to examine the form of Bronze Age domestic structures found within settlement sites in England, Scotland and Wales, using existing records of excavated structural features such as postholes, base walls and foundations. This study focusses only on the remains of structures that survive in the archaeological record (See Chapter 3.3.4). By doing so it meets this project's second objective, "to characterise the architecture of Bronze Age settlement sites in Britain".

It seeks to answer the following research questions:

RQ 1. Based on the surviving features of Bronze Age structures (postholes, walls, foundations etc.), what is the range of domestic structures used within settlements during the Bronze Age in Britain? Specifically:

RQ 1.1 How do settlement structures vary in their shape?

RQ 1.2 How do settlement structures vary in their size?

RQ 1.3 How do settlement structures vary in their architectural features?

RQ 2. Can a formal typology be prepared for architectural features in the Bronze Age? Specifically:

RQ 2.1 How do Bronze Age settlement structures change over time?

RQ 2.2 To what extent are the forms of structures seen as regionally specific?

The chapter primarily uses the high-resolution dataset created in the project's data collection stage (Chapter 3.6.4). It will demonstrate that there is a high degree of variability in the form of domestic structures but few, if any, architectural features that are truly regionally specific. It will demonstrate that the variability in domestic structures is not chronologically specific, thus undermining any typological schema.

4.1 The high-resolution dataset

A total of 316 settlement sites were identified which had evidence for Bronze Age settlement structures, which had been excavated and were associated with a radiocarbon date (Chapter 3.6.4). In this study, the indicators for settlement which were recorded encompassed the surviving remains of structures, such as roundhouses, four posters or rectangular post-built structures. Each structure was recorded as its own feature, with any associated traits, such as internal features, entrances or signs of abandonment practices. It should be noted that some settlement sites contained evidence for only probable and possible structures. In these instances, such as when structures were visible as groups or isolated occurrences of pits, postholes or hearths, they were also recorded as their own feature.

Through this process, a total of 2265 settlement features were identified from 310 sites. A total of 1884 of these features could be dated to a specific time period, 1657 of which came from a period that lay within or crossed into the Bronze Age. Of these 1657 Bronze Age features, 1376 features from 262 sites could be classed as a permanent structure, as defined by the criteria in Chapter 3.3.4. A total of 1085 of these permanent structures could be dated to the Bronze Age, 406 of which were dated directly or indirectly using radiocarbon data. It is these data that form the analytical core of this chapter (Figure 12).

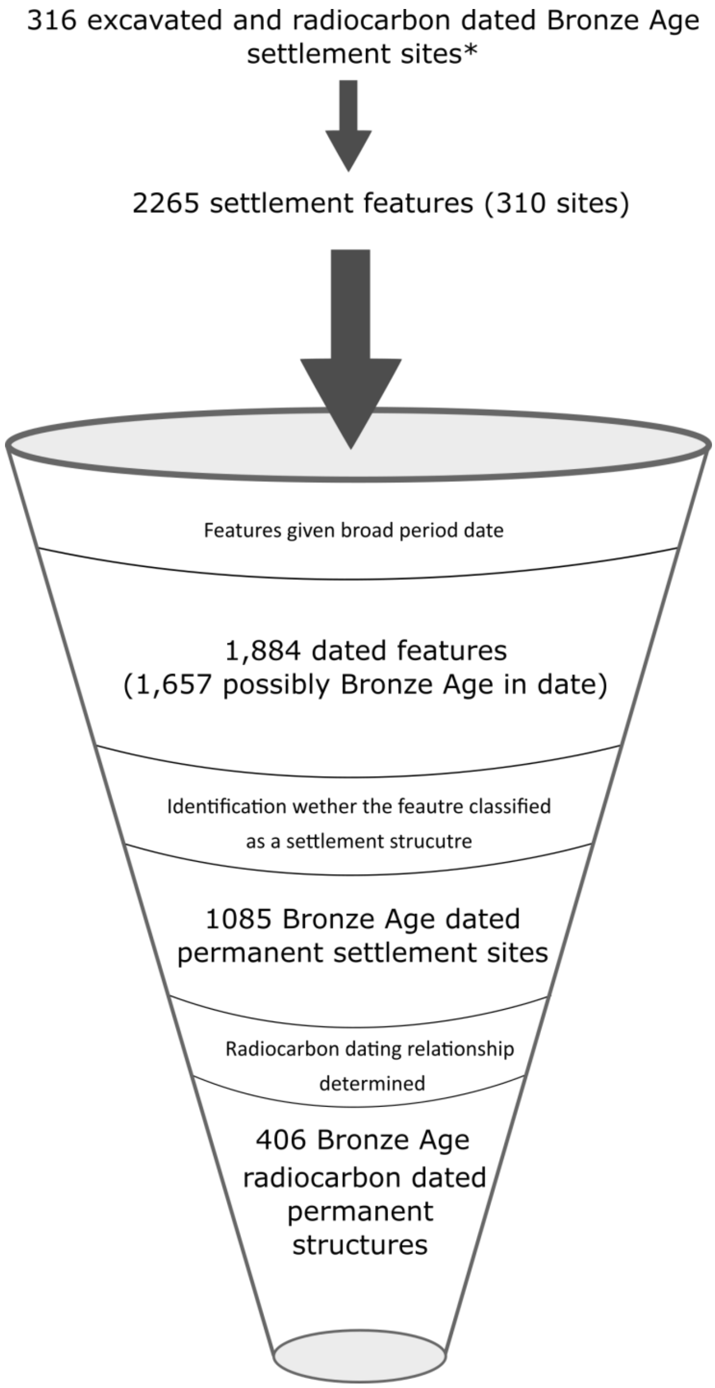

*Figure 12 Infographic of the features selected for analysis in this chapter (*follows on from Figure 6)*

Several typologies of Bronze Age architecture have been postulated (Avery & Close-Brooks 1970; Davies 2016; Guilbert 1981; Jobey & Tait 1966; Jones & Quinnell 2011; Musson 1970; Pope 2015). However, those that do exist have been produced within regionally specific summaries, such that they are likely to overlook similarities and differences in architecture across large geographic distances or oversimplify the complexities within the architectural record (see Chapter 2). It has also been suggested that the form of structures should not be understood too rigidly, especially with regards to comparisons and frameworks based upon specific type sites (see Chapter 2), as variations in form can be seen even at a settlement level. As such, it was decided to record the traits of architectural features and study each of these in isolation (see Chapter 3). Different architectural features were recorded within the project database, making it possible to interpret the types and numbers of different sub-classes of architectural features present on different sites, for example, four posters and roundhouses, of different shapes. The features were then analysed together to provide a geographically balanced discussion of the structures used during the Bronze Age, as this has not been the focus of more recent studies. As such, the shape of Bronze Age domestic structures is first discussed, then the size of these structures, followed by their architectural form.

4.2 What is the shape of Bronze Age architecture?

The study dataset can be quickly divided based on the overall shape of those structures recorded. Of the 1085 domestic structures which could be dated to the Bronze Age from the high-resolution dataset, 1035 structures had their shape recorded. Of these, 836 (77%) were rounded in form, their being circular, sub-circular, oval or sub-oval in form. Of the 1035 structures that had their shape recorded 193 (19%) structures demonstrated a quadrilateral form, being either square, rectangular or sub-rectangular (Table 6). The dominance of rounded architecture is striking, albeit long recognised. However, both shapes show a degree of variability in their form, size, construction method, internal features and aspects of design. While some of these traits are shared or are similar between rectangular and circular structures, there is a far greater variability in the traits seen by rounded architecture, such that form will be discussed separately.

Row Labels	Count	%
Rounded	836	77%
Quadrilateral architecture	191	18%
Other	8	1%
Not recorded	50	5%
Grand Total	1085	100%

Table 6 The proportion of those Bronze Age structures general shape

4.3 Circular structures

4.3.1 Circular architecture size

Within reports of Bronze Age settlements, the size of house structures is listed in one of two ways, either as a measurement of the structure's internal area (typically in square metres), or a measurement of the structure's diameter. Both are used as a means of comparing the available floor space of these structures. Pope (2003, 65) has noted that the diameter of any given structure can vary as much as 0.16 m simply through the different methods chosen by excavators of measuring the outside or inside of a post hole (*ibid*). This level of error has only minor effects on surface area for structures with a small diameter. For example, a small roundhouse with a diameter of 3m surface area may be increased by only 0.8m^2 (a percentage increase in area of c.11%). However, this effect is magnified, the greater the diameter of the structure, although the proportion of surface area added to the structure's floor space is lower. For example, a roundhouse with a diameter of 7m will have its floor space increased by 3.4 m^2 (a percentage increase in area of c.5%) if 0.16m wider in diameter, whilst a roundhouse with a diameter of 11m may be increased by 8.9 m^2 (a percentage increase in area of c.3%) (see Table 7). As such, it is vital to be clear as to how measurements are understood.

Diameter (m)	Diameter (m) + 0.16m	Area (m^2)	Increased area (m^2)	% increase
3	3.16	7.07	7.84	11%
4	4.16	12.00	12.98	8%
5	5.16	25.00	26.63	7%
6	6.16	45.00	47.43	5%
7	7.16	73.50	76.90	5%
8	8.16	112.00	116.52	4%
9	9.16	162.00	167.81	4%
10	10.16	225.00	232.26	3%
11	11.16	302.50	311.36	3%

Table 7 The effects of underestimating a roundhouse's area by 0.16m

Within this analysis, the diameter of a structure is understood as the internal diameter marked by the interior edge of any wall structure. This is most notable for those stone-built roundhouses whose walls can add metres to a structure's final diameter. When ring-gullies or secondary outer rings were interpreted as forming part of the structure, the internal diameter is understood as the outer edge of these features.

The number of houses was too great to allow original measurements from plans to be independently recorded, such that those values quoted within each site's text were relied upon. As it has been shown above, roundhouses are not always exactly circular and, in these instances, it is not uncommon for reports to provide two measurements, for both the long and the short axes. These have been recorded but, in order to allow comparison, they were then used to provide a mean diameter figure from which their area was calculated. If a report did not provide two measurements for a structure's diameter, circularity was assumed to make analysis possible. It is not uncommon for portions of the outer wall feature to be incomplete, in these instances reports estimate the diameter by following the curvature of the surviving feature(s). These interpretations were accepted to allow for analysis.

Pope's (2003, 65) suggested error is compounded by relying on those diameters quoted within texts, such that a certain margin of error is unavoidable and had to be accepted, as it was impossible to confirm measurements from excavated sites. This stated, the number of measurements recorded is high enough that it is unlikely that the trends will be too altered, as long as no significance is placed on variations of less than 1m. It is instead informative whether there is strong linear trend or bi/tri-modal distribution trend.

There has been the suggestion that many single post ring structures may have had larger diameters than is indicated by their post ring (Avery & Close-Brooks 1970; Drewett 1979a; Musson 1970). In particular, those with identified porches may have had a second outer ring which had been lost through taphonomic effects. In these instances, the maximum diameter of a structure may be estimated using this porch structure as representing the outer limit of the structure. However, such maximum diameters are irregularly recorded and rely on the porch not extending further than this maximum diameter. As such, internal diameters were only recorded for those visible architectural features, not those conjectured without archaeological features, such as postholes, to support them.

4.3.1.1 Size measurement statistics

From the 834 circular structures 567 (68%) had their diameter detailed within the accessed literature. The sizes of these circular structures' diameters range from as little as 2m-2.125m at West Burra (Hedges 1986) and Graig Fechan (Manley 1984) to as much as 20m at Itford Hill (Burstow, Holleyman & Helbaek 1958; Ellison 1978) and Brook House Farm (Fairburn, Carruthers, Fairburn, *et al.* 2002). These extremes are rare, the average size being 7.34m with 50% of these structures being between 5.5 and 8.5m wide (Table 8). The majority of structures (90%) have diameters ranging between 3.8 and 12m (Figure 13).

Rounded sizes	Diameter (m)	Area (m^2)
Average	7.3	46.92
Min	2	3.14
Max	20	314.16
1/4 quartile	5.5	23.76
3/4 quartile	8.5	56.75
Median	7	38.48

Table 8 Average roundhouse areas taken from the high-resolution dataset of this study

4.3.1.2 Settlement sizes across Britain

It does not appear that there is any regional bias for, or against, larger or smaller structures (Figure 15). Particularly small structures (those with a size range less than 5% of those structures studied) and particularly large structures (those with a size range greater than 5% of those structures studied) are found across almost all regions in Britain. Those regions that do lack these smallest or largest structures do contain at least one structure in the bottom or upper quartile of the dataset.

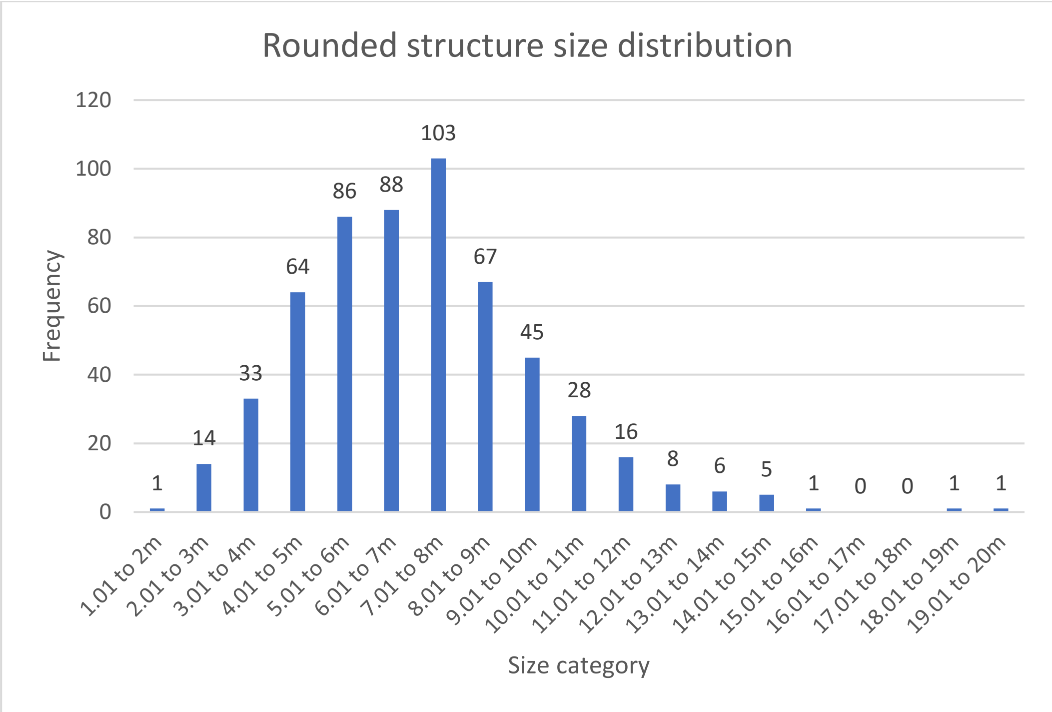

Figure 13 Histogram of the size of roundhouses identified from the high resolution dataset of this study

Pope (2015, 178) has identified that, across the Bronze Age in northern Britain, those sites found on the uplands are consistently smaller than those found in lowland contexts with their average internal area being 1/5th smaller than those of the lowlands (*ibid*). This appears to hold true in the findings of this study, albeit to a smaller degree when studying the entirety of Britain (Figure 14). The results of this study suggest this decline in average area occurs quite visibly above 150m, at which point the average area of those structures is approximately 9/10^{ths} the size of those found below this height. Some caution should be placed on the significance of such a difference, there being far fewer settlement structures found in the uplands of Britain when compared to the lowlands (see Chapter 6.5.1). When plotting the location height above sea level of settlement structures versus their diameter, it becomes clear that, while upland structures are generally smaller than many examples of lowland structures, their distribution is similar to the main body of lowland structures. The smaller size of these structures might therefore be simply due to the lower number of sites excavated in these regions or the lack of particularly large structures (see Figure 14**Error! Reference source not found.**).

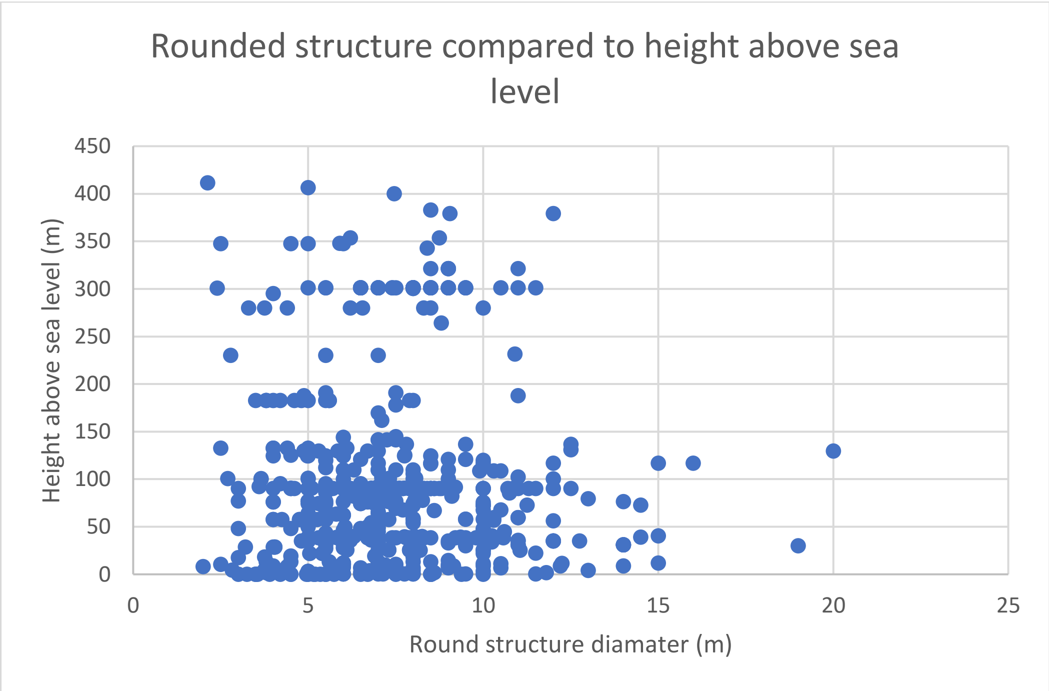

Figure 14 The distribution of roundhouses by different sizes compared to their heights above sea level. X axis shows a roundhouse's height above sea level (metres), Y axis shows roundhouse diameter

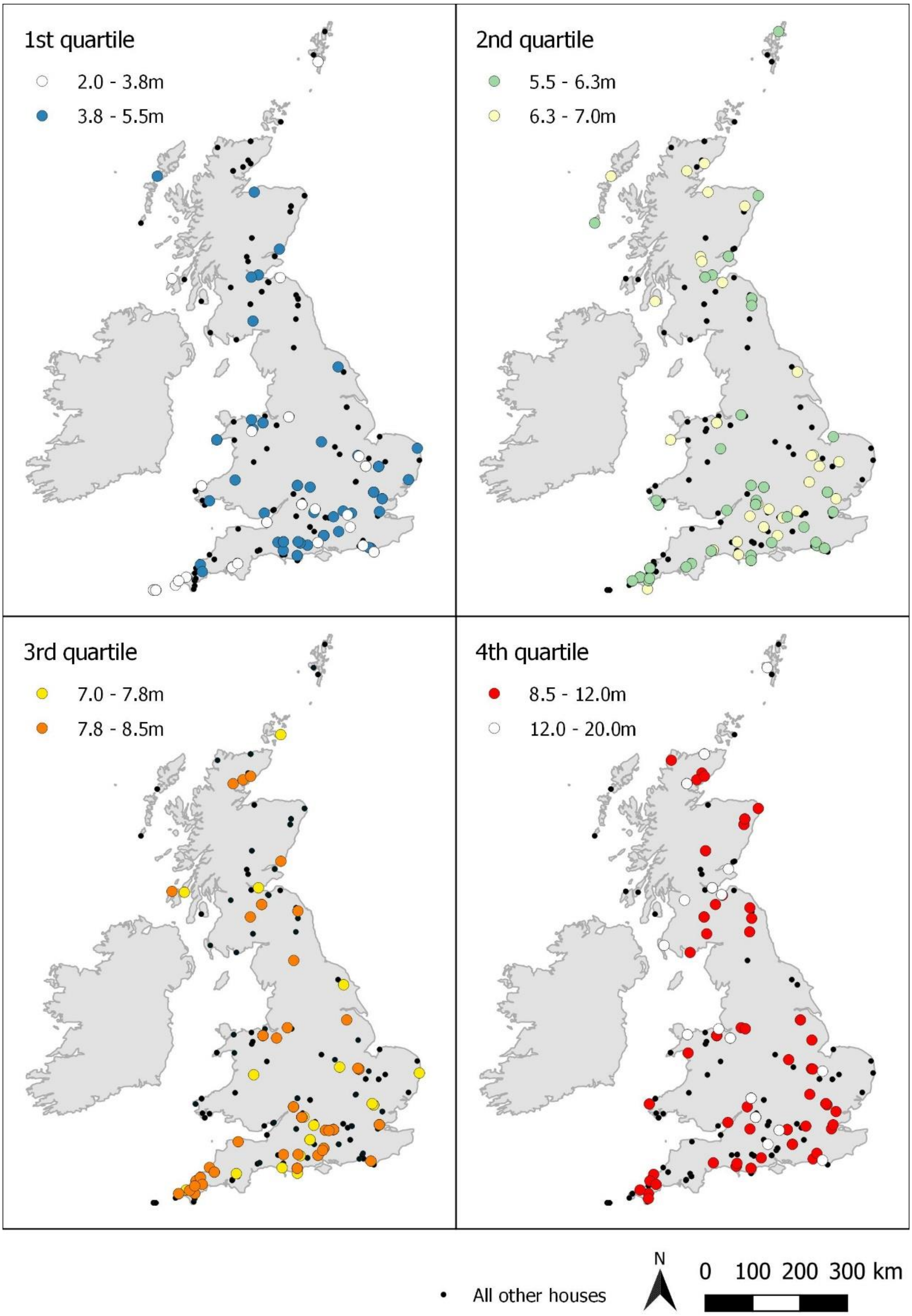

Figure 15 Roundhouse diameters and their distribution across Britain. Black dots indicate roundhouses of the other sizes and are placed to demonstrate the wide distribution of all sizes across Britain. Top left: the smallest roundhouses. Top right: small-medium roundhouses. Bottom left: medium-large roundhouses. Bottom right: large roundhouses. Contains OS data © Crown copyright and database right 2019.

4.3.1.3 Size changes over time

It has also been possible to compare the size of roundhouses over time. In previous studies this has been done in one of two ways, which are replicated here to allow comparison and discussion.

4.3.1.3.1 Ginn's (2012) method

Ginn studied the size of Bronze Age roundhouses in Ireland over time by comparing the size of 150 structures plotted against the median of the available radiocarbon dating evidence for each structure. In doing so, she chose to use only those dates with the longest range when multiple radiocarbon dates were available for individual structures, not the date ranges modelled.

This study is able to replicate this method. To do so it plots the average date of 176 structures associated with at least one radiocarbon date using all dates available, regardless of the material specified. These are plotted against the estimated internal areas of each structure (Figure 16). It should be noted that to do so, and to remain comparable to Ginn (2012), unmodelled radiocarbon data have been used. Using only a single median date for each structure may mean that the date chosen may not accurately reflect the exact period of the structure's occupation if its probability curve is not evenly distributed. In practice there also many other considerations and limitations in the representative of radiocarbon dates for the occupation phase of a settlement (see Chapter 5.4.2). As such, and as with studying change in house size, minor variations should not be seen as significant.

The resultant graph of this analysis reveals a slight increase in house size over time, similar to Ginn's (2012, 164, 2016, 101) results. However, bearing in mind the potential margins of error in the raw data, the change over time is minimal enough as to be insignificant. Instead the data indicates that small and large round structures were present at all periods of the Bronze Age (see Figure 16).

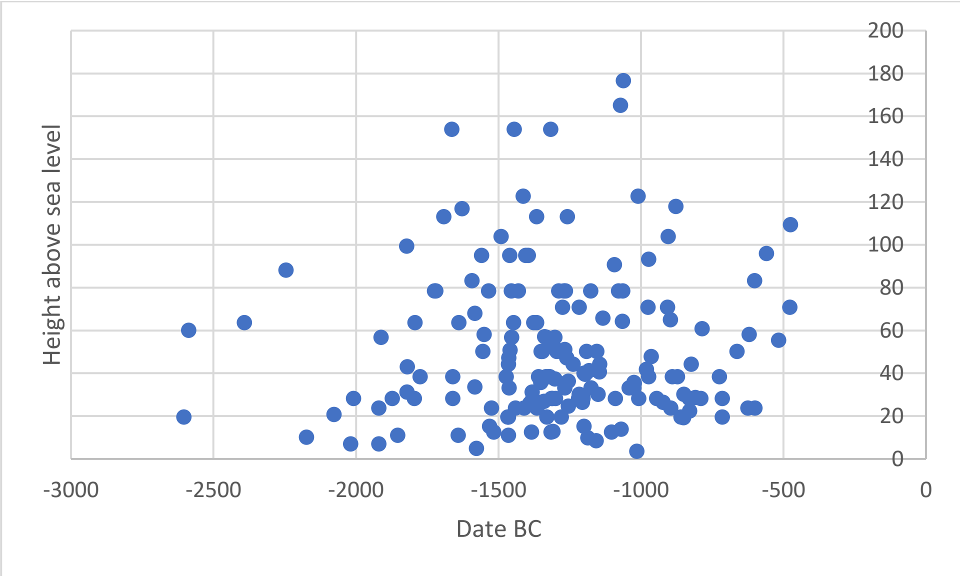

Figure 16 A presentation of the surface area of structures (X axis, in square metres) through time (Y axis, in years from -3000 BC to 0)

4.3.1.3.2 Sites' (2015) method

In Sites' (2015) study of settlement architecture in southern Britain and Denmark, the area of structures was compared by grouping each structure into one of three commonly used periods; the Middle Bronze Age, Late Bronze Age and Early Iron Age (2015). Each structure was assigned to one of these periods that most suitably reflected the material culture or radiocarbon dates associated with that structure.

This thesis' data studies a slightly different period of time (c.2400-800 cal BC). However, it can follow the same period classification by grouping sites by the tripartite division of this period into the Early, Middle and Late Bronze Age. 144 roundhouses from the high-resolution dataset were able to be classified according to this schema using the available radiocarbon dating. A further 281 structures could be classified into this schema through further means (see Chapter 3).

On average, Early Bronze Age houses have less floor space than those in the Middle Bronze Age, while Middle Bronze Age houses have smaller surface areas than Late Bronze Age houses (Table 9 to Table 11). However, the significance of an increase in area of a few metres per roundhouse is debatable if considering the potential margin of error. Further investigation would be needed, not within the scope of this project, to determine how much of an impact on the communities an enlarged living space would have brought. More saliently, it is clear that the larger houses recorded in this study are present in all periods, and the maximum house size for the Early Bronze Age being not dissimilar to those in the Middle and Late Bronze Age, which suggests that there were not such drastic changes throughout these periods (Figure 17 to Figure 19).

Both methods therefore present complementary methods that indicate there is no simple correlation between house size and the progression of the Bronze Age. There may be a gradual increase in the average diameter of Bronze Age roundhouses approaching that seen for the Iron Age, although this not particularly strong. Instead, what is clear is that the size ranges show a large degree of crossover with the size ranges quoted for the Iron Age by Sites (2015 p.142). Therefore, a significant finding of this analysis is that roundhouse size should not be a means used on its own to date prehistoric roundhouses (contra: Gardner, Savory & Williams 1964; Jobey & Tait 1966; Parsons 1961; Radford 1953).

All structures	BA	EBA	EBA-MBA	MBA	MBA-LBA	LBA	LBA-IA
Number of structures	16	35	20	111	113	170	98
Average surface area (m²)	39.1	38.6	46.2	45.8	43.4	48.0	55.1
StDev	19.5	37.4	31.4	29.3	44.0	27.9	33.6
Max	78.5	165.1	116.9	153.9	314.2	176.7	283.5

Table 9 Size of those roundhouses within the high resolution dataset divided by time using radiocarbon dating and associated artefacts

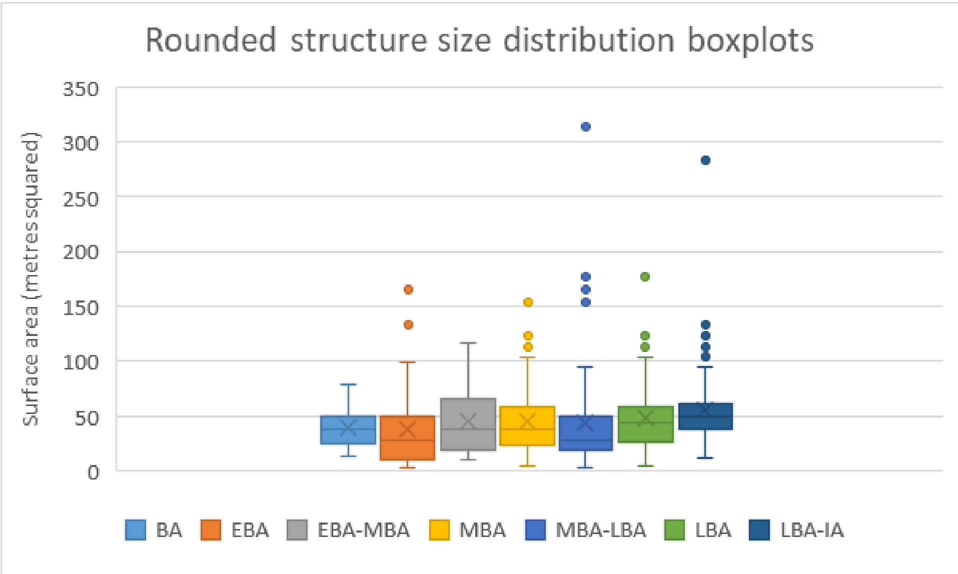

Figure 17 Boxplots displaying the size of those roundhouses within the high resolution dataset divided by time using radiocarbon dating and associated artefacts

C14	BA	EBA	EBA-MBA	MBA	MBA-LBA	LBA	LBA-IA
Number of structures	12	22	16	68	57	52	13
Average surface area (m²)	34.1	44.2	49.2	50.1	44.8	55.1	74.1
StDev	15.7	34.2	34.1	32.2	48.7	36.5	70.9
Max	63.6	132.7	116.9	153.9	314.2	176.7	283.5

Table 10 Size of those roundhouses within the high resolution dataset divided by time using only radiocarbon dating

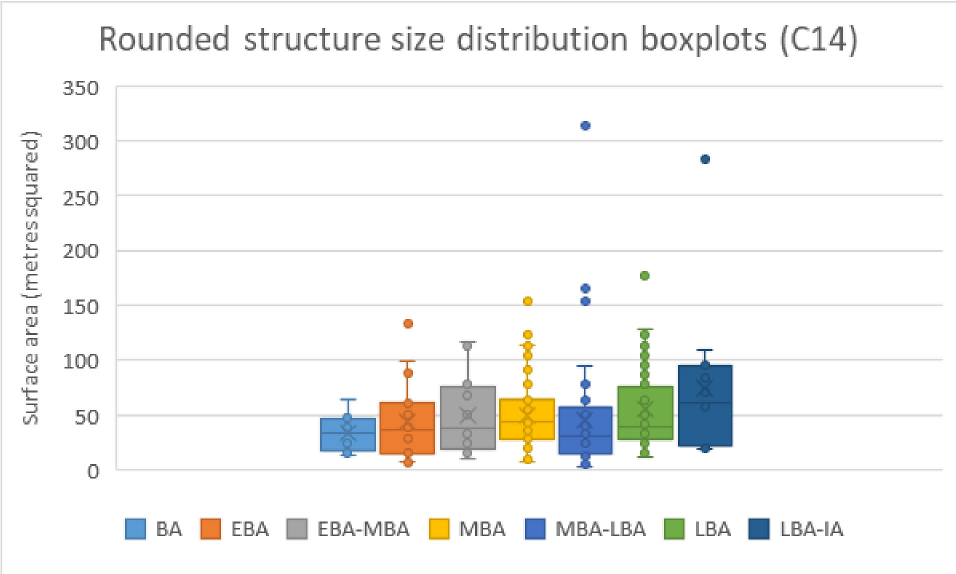

Figure 18 Boxplots displaying the size of those roundhouses within the high resolution dataset divided by time using radiocarbon dating only

Other	BA	EBA	EBA-MBA	MBA	MBA-LBA	LBA	LBA-IA
Number of structures	4	13	4	43	56	118	85
Average surface area (m^2)	54.0	29.3	33.9	38.9	41.9	44.9	52.2
StDev	24.4	42.1	13.5	22.6	39.2	22.7	22.8
Max	78.5	165.1	44.2	95.0	176.7	103.9	132.7

Table 11 Size of those roundhouses within the high resolution dataset divided by time using only associated artefacts

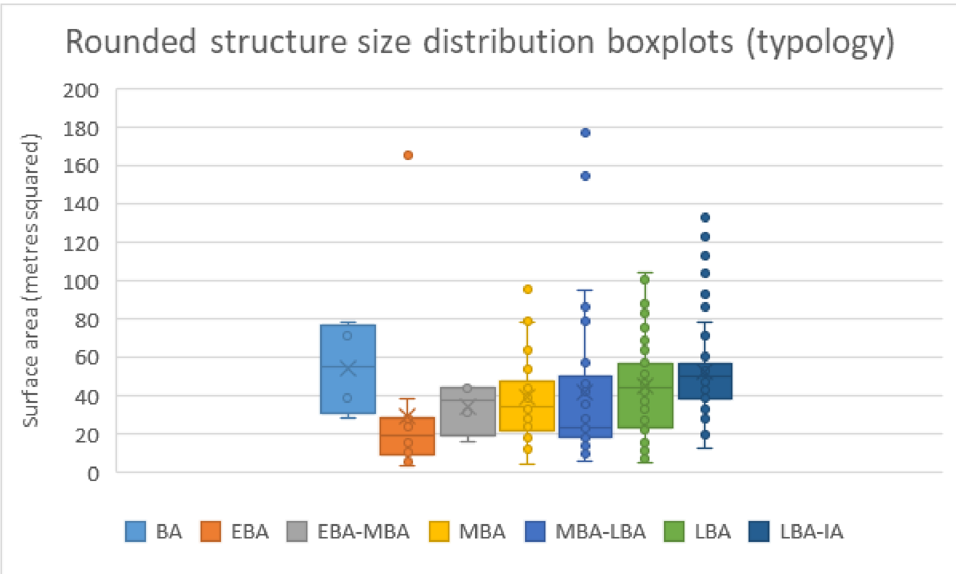

Figure 19 Boxplots displaying the size of those roundhouses within the high resolution dataset divided by time using only associated artefacts

4.3.2 Construction method

A standardised ground plan, based on the seminal excavations at Black Patch in Sussex (Figure 20), has long endured as the prototype of a Bronze Age roundhouse, particularly within the visual reconstructions of these settlements (see Musson 1970; Rahtz & ApSimon 1962; Reynolds 1982 for schematic plans; and Burstow, Holleyman & Helbaek 1958; Collard, Darvill, Watts, *et al.* 2006; Garner, Allen, Wenban-Smith, *et al.* 2007; Kelly, Conway, Williams, *et al.* 1988; Ladle & Woodward 2009; Rudling 2002 for illustrated reconstructions). This form depicts roundhouses consisting of regularly spaced walls made of either timber or stone, often surrounding a hearth, yet the uniformity of settlement seen within these reconstructions belies a large degree of variability in the construction method of these houses, their structural materials and their features.

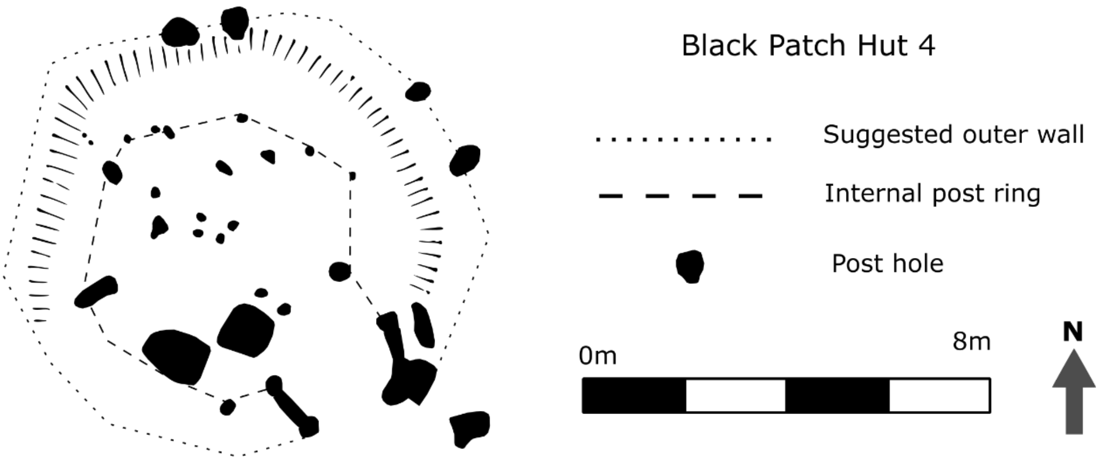

Figure 20 Ground plan of Hut 3 from Black Patch, Sussex (traced from Drewett 1979 p.337)

4.3.2.1 Post rings

4.3.2.1.1 Description

These are those features visible on excavation sites as a ring of post holes that were used for the vertical timbers that formed the structural supports of the main housing structure (Figure 21 and Figure 22). These posts are thought to have supported a sloping thatch roof which may or may not have reached the ground surface. Experimental reconstructions of this house form have found that this roof lacked any form of chimney (Reynolds 1979). The outer walls of these circular structures are typically assumed to be wattle and daub, although other suggestions have included weaved willows or prefabricated panels being fixed between the posts (Pope 2015, 163), which would have meant that these structures were not round but instead somewhat polygonal in shape.

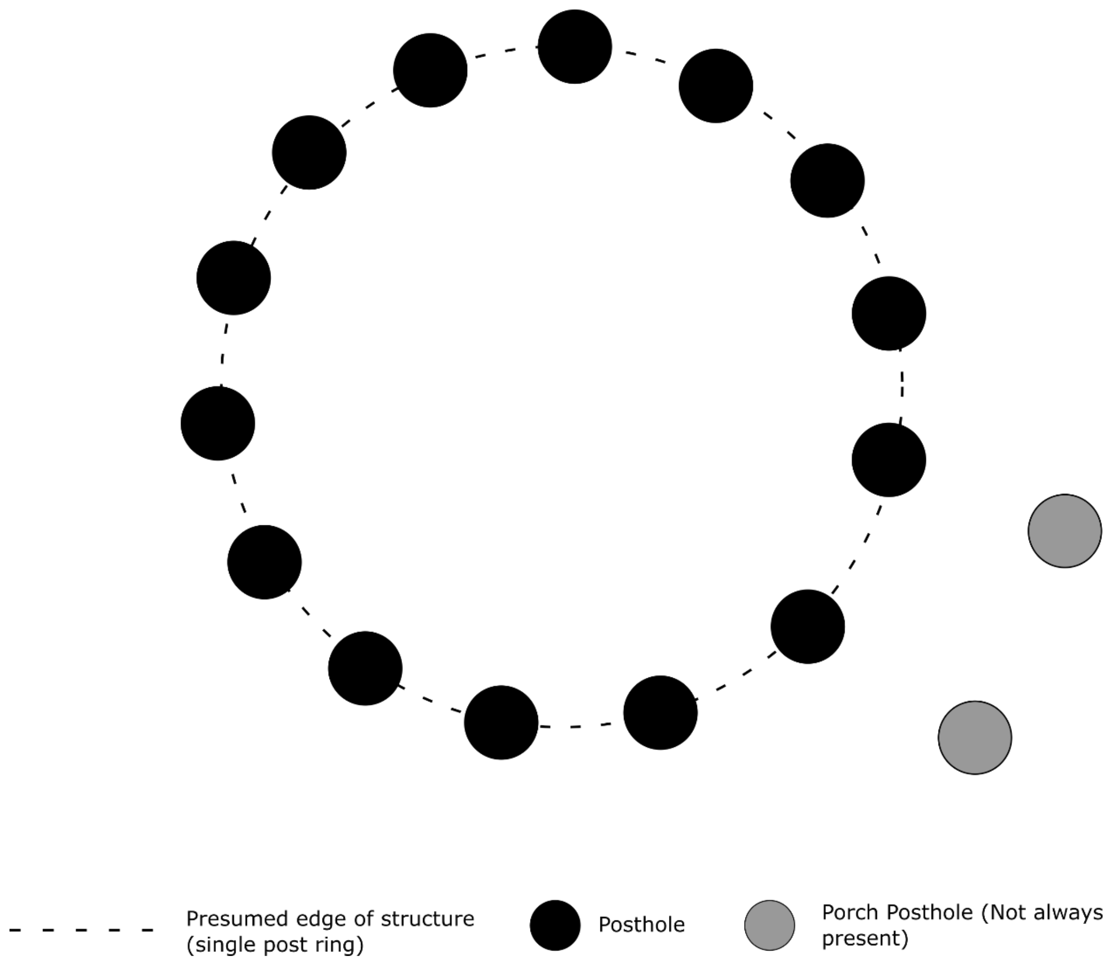

Figure 21 Schematic plan of a simple post ring structure with a visible porch

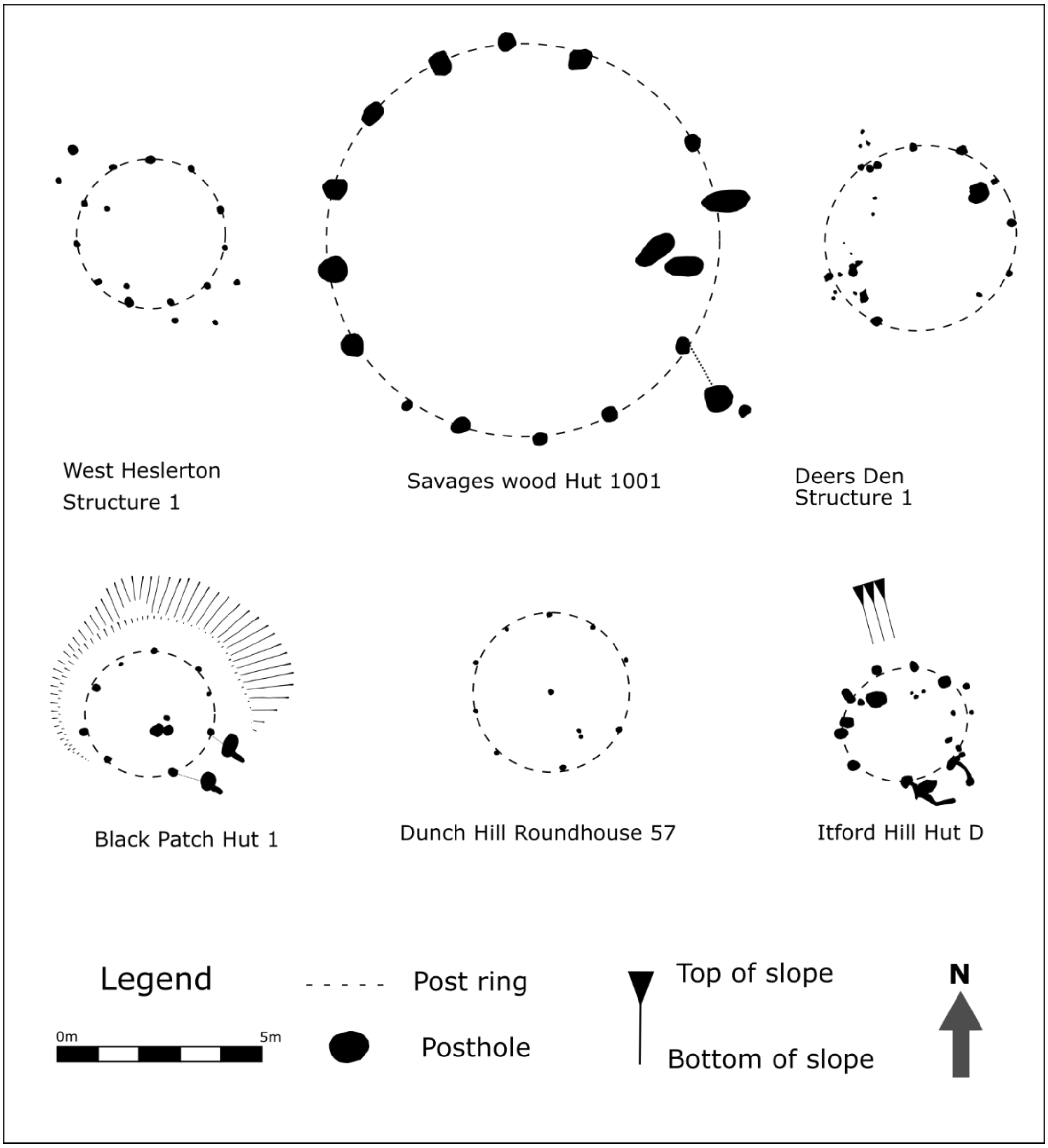

Figure 22 Plan of simple post ring structures (traced from Powlesland, Haughton & Hanson 1986 p.136; Erskine 1995 p.219; Alexander 2000 p.23; Drewett, Ellison, Cartwright, et al. *1982 p.329; Andrews 2006 p.56; Burstow, Holleyman & Helbaek 1958 p.176 respectively)*

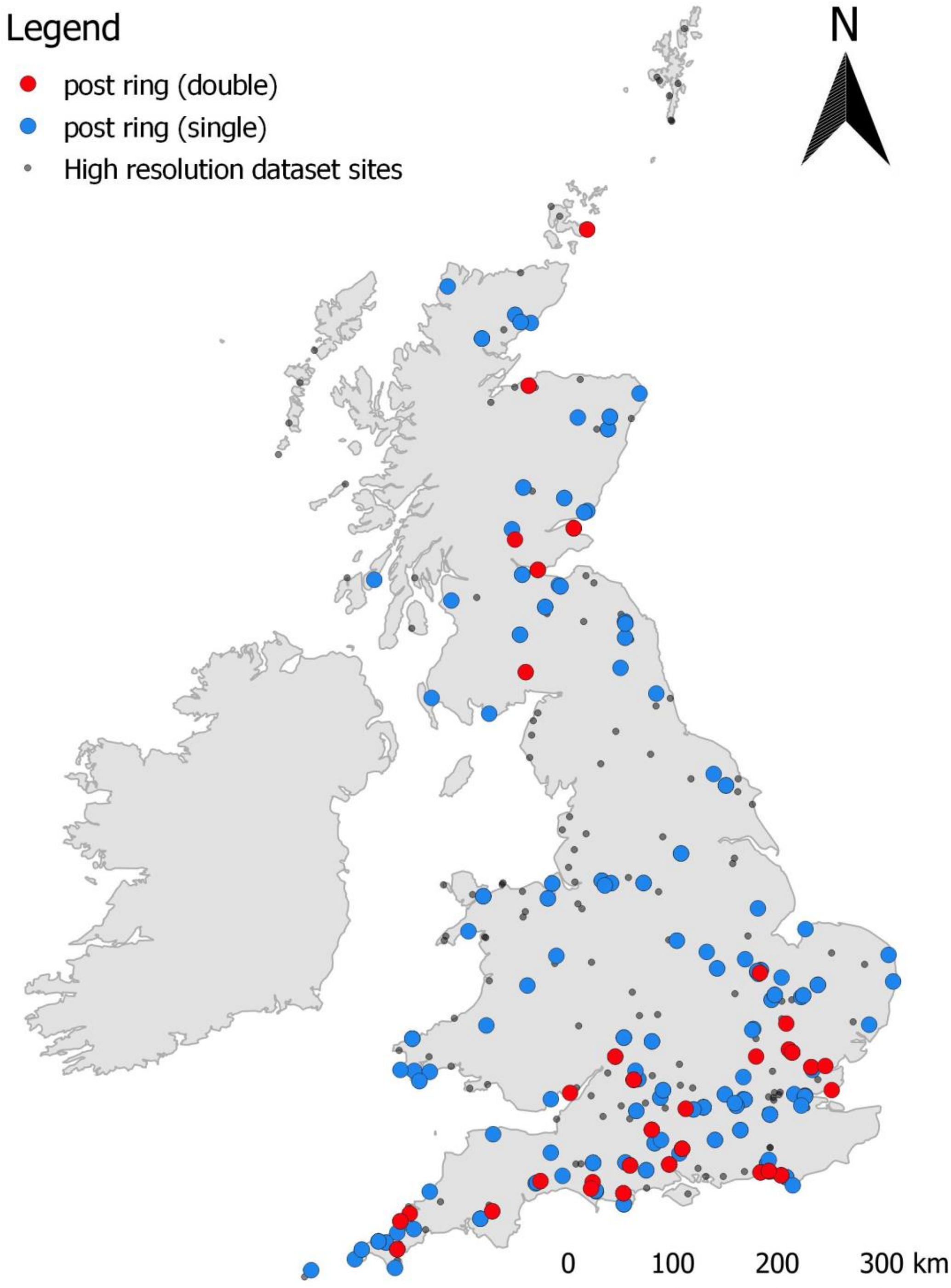

Figure 23 The distribution of those Bronze Age settlement structures identified within the high-resolution database that included a post ring as part of their structure. Contains OS data © Crown copyright and database right 2019.

4.3.2.1.2 Quantity

586 of the 836 structures (70%) contained a post ring. In 498 of these cases (85% of 586) only a single post ring was identified, 492 of which represented the structure's

outer feature. In 313 of these cases, the single post ring appears to be the only structural feature from which the roundhouse was made, there being no further post rings, ring grooves, or banks with which to support the wall and roof.

4.3.2.1.3 Distribution

The 492 single post ring structures are found across the entirety of Britain (Figure 23) but are found in their highest density in the Wessex region and around the Thames Valley. There is a notable dearth of this form of structure in the north west of England.

4.3.2.1.4 Size

383 of the 492 structures had their dimensions recorded (Figure 24). These range in diameter from 2.5 to 20m with their average size being 7.3m. 50% of these structures are between 5.5 and 8.5 m wide and the majority (90%) of structures have diameters ranging between 4m and 11.5m.

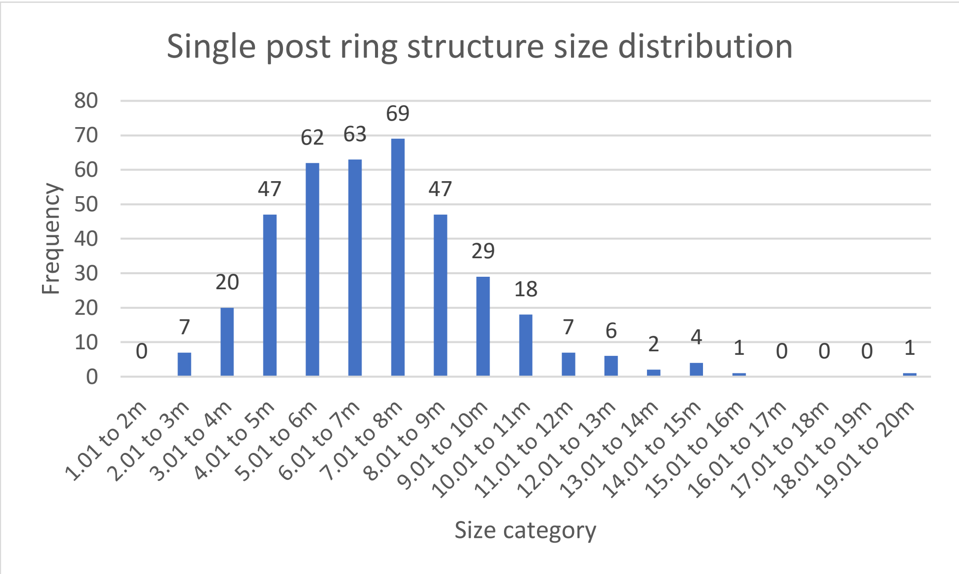

Figure 24 Histogram of the size of single post ring roundhouses identified from the high resolution dataset of this study

4.3.2.1.5 Chronology

125 of these structures were directly associated with a radiocarbon date (Table 12). The remaining structures were dated through other means (for example, pottery or proximity to a dated structure – see Chapter 3 for criteria).

If studying all those structures that have a provisional date applied, in addition to those radiocarbon-dated structures, there are far more post ring structures in the Late Bronze Age (n=190), showing that there was an exponential increase in the number of structures as the Bronze Age progressed (Table 12).

Period	Frequency
BA	21
EBA	28
EBA-MBA	18
MBA	105
MBA-LBA	93
LBA	174
LBA-IA	53

Table 12 Chronological distribution of Bronze Age post ring structures

A provisional model of 119 of the structures associated with Bronze Age radiocarbon dates was created within OxCal (Figure 25). The model produced may represent the relative intensity, understood as how often these structures were used, of this structures construction over time (see Chapter 5). The result of this analysis was a summed probability distribution showing a peak of activity in the Middle Bronze Age. However, this model is intended solely to provide further context to the results above. As such, it lacks a full acknowledgment of the material quality and modelling of dates. Such full and appropriate analysis is reserved for Chapter 5.

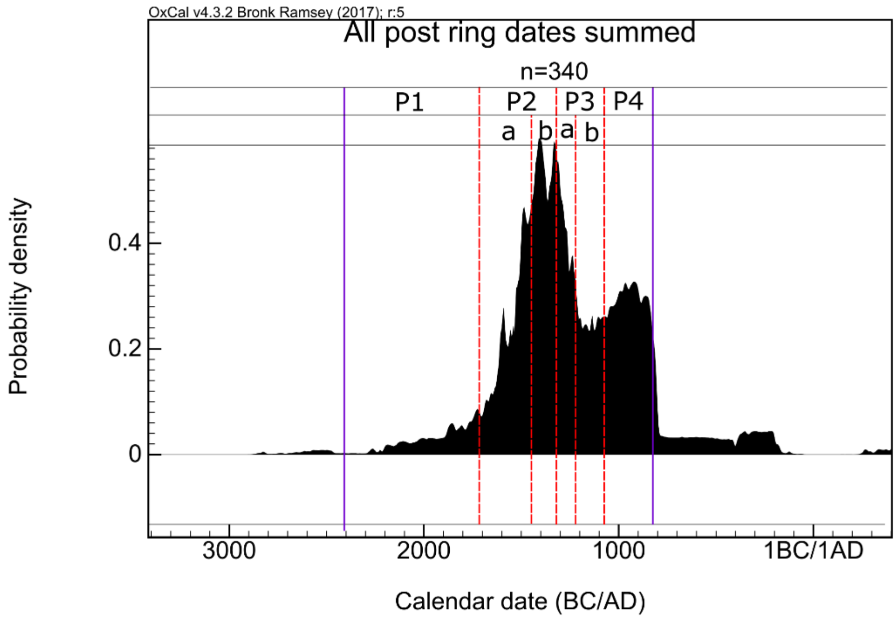

Figure 25 A summed probability distribution graph of all Bronze Age radiocarbon dates directly associated with post rings in Britain. This is overlaid by a proposed chronological model, the detail of which is explained within Chapter 5

4.3.2.2 Double post rings

4.3.2.2.1 Description

It has long been recognised that what may appear to be simple post ring structures may in fact be the remnants of more developed structures involving an outer wall (Musson 1970). In the case of these buildings, the ring of post holes were still designed to hold the roof structure. However, they were then surrounded by a separate concentric wall approximately 1-2m away from the inner post holes, which are archaeologically visible as either a ditch cut into the topsoil or a second outer ring of typically smaller post holes. This outer ring is understood to represent a more meagre earth-cut foundation that supported the sloping roof. These are sometimes revealed either through an outer ring of posts which can range from being quite ephemeral to more pronounced on some sites, or through resting on a terrace (Figure 26 and Figure 27).

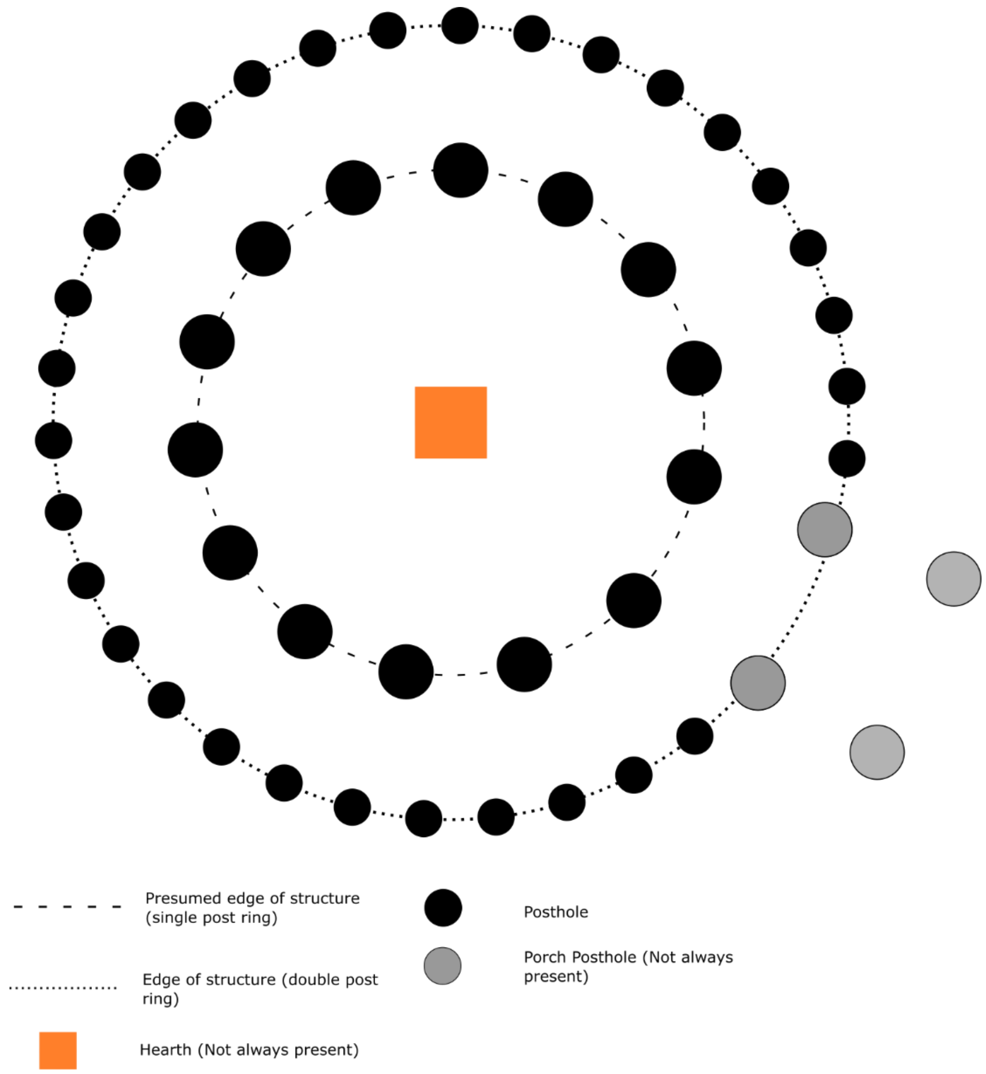

Figure 26 Schematic plan of a double post ring structure with a visible porch

4.3.2.2.2 Quantity

578 of the 834 structures (69%) contained a post ring. In 50 of these cases (8.5% of 578), double post rings were identified. In 31 of these cases the double post ring appears to be the only structural feature from which the roundhouse was made, there being no further ring grooves or banks with which to support the wall and roof. This number may be extended by a further 133 if considering those single post ring roundhouses with porches that might have actually been double ring roundhouses.

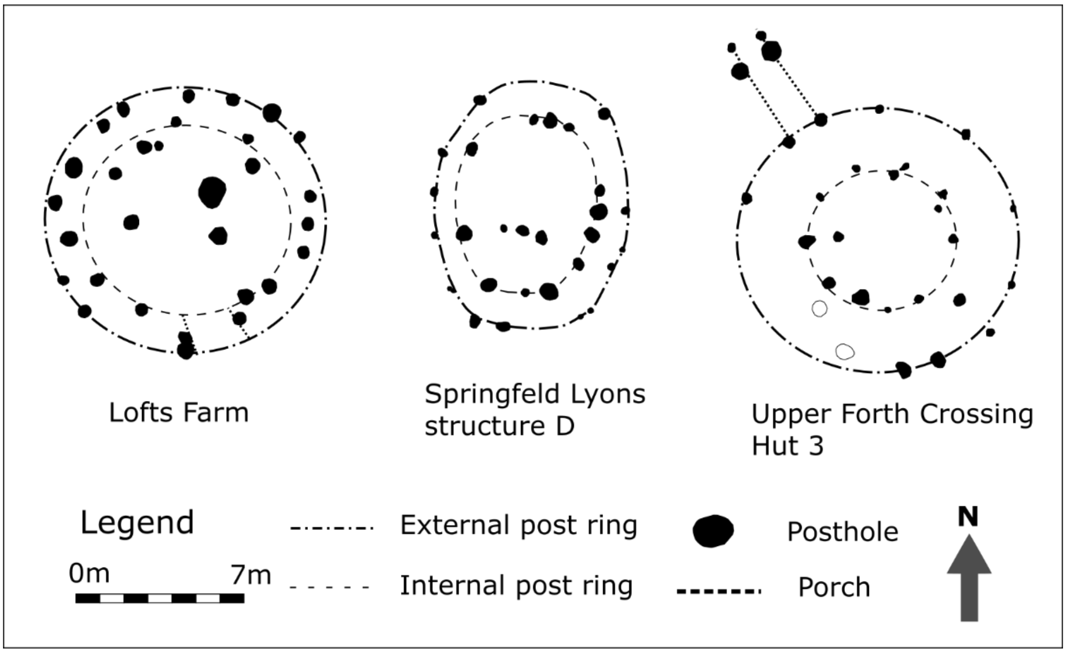

Figure 27 Plan of double post ring structures (Brown 1988 p.257; Brown & Medlycott 2013 p.39; Jones, Sheridan & Franklin 2018 p.57)

4.3.2.2.3 Distribution

Double post rings are most commonly found in the south of Britain and appear to be quite absent from northern England and Wales, although a limited number have been identified in Scotland (Figure 28).

4.3.2.2.4 Size

Of the 49 double post ring roundhouses identified, 38 had their dimensions recorded (Figure 29). Those potential double ring roundhouses made up of single post rings and porches were excluded due to the ambiguities of identifying their actual diameter.

Double post ring roundhouses range in diameter from 5m to 12.5m, with their average size being 8.2m. 50% of these structures were between 6.95m and 9.4m wide and the majority of structures (90%) have diameters ranging between 5.5m and 11.3m.

Figure 28 The distribution of those Bronze Age settlement structures identified within the high-resolution database where a double post ring of postholes could be confirmed. Contains OS data © Crown copyright and database right 2019.

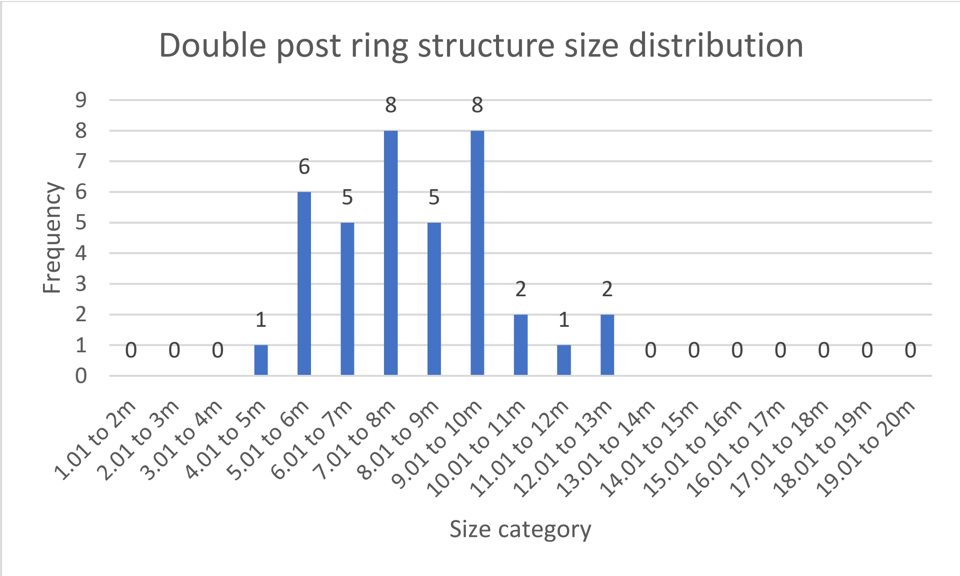

Figure 29 Histogram of the size of double post ring roundhouses identified from the high resolution dataset of this study

4.3.2.2.5 Chronology

21 of these structures were directly associated with a radiocarbon date (Table 13), the remaining 28 being dated through other means. With so few being directly associated with radiocarbon dates, caution should be placed on any trend or scheme indicating the appearance of this structure type over time. This understood, those that have directly associated radiocarbon dates are predominantly Middle to Late Bronze Age and are most numerous in the Middle Bronze Age. When studying all the sites that are dated, however, there is a clear increase in the number of double ringed roundhouses towards the Late Bronze Age.

Period	Frequency (C14 only)	Frequency (all)
BA	2	3
EBA	1	1
EBA-MBA	2	3
MBA	5	11
MBA-LBA	7	13
LBA	4	16
LBA-IA	0	2

Table 13 Chronological distribution of Bronze Age double post ring structures

4.3.2.3 Ring grooves

4.3.2.3.1 Description

Ring grooves were suggested as a development from the use of post holes within ring gullies (Feachem 1965), and ring groove roundhouses have long been associated with the Iron Age. They have only recently been seen as a Bronze Age phenomenon (Pope 2015). These structures are defined by the presence of circular ditches which may be differentiated by interior or exterior ring gullies (discussed below) by their near vertical edges (Figure 30 and Figure 31). The purpose of these grooves was to hold and support the placement of both vertical timbers and screens that would form the exterior wall of the roundhouses and they have been suggested as being easier to dig with the tools available in the Bronze Age than separate post holes (Pope 2015).

4.3.2.3.2 Quantity

34 of the 834 structures (4%) showed evidence for a probable ring groove. In only seven instances it was not possible to confirm the presence of any other structural features, however this low percentage, the high number of sites with post ring and ring groove (n=27) suggests they may have originally existed.

4.3.2.3.3 Distribution

Ring grooves are found particularly in the north of Britain, with only two structures of this form being identified south of Birmingham, and one further structure just east of the Birmingham. They are particularly common in southern Scotland (Figure 32).

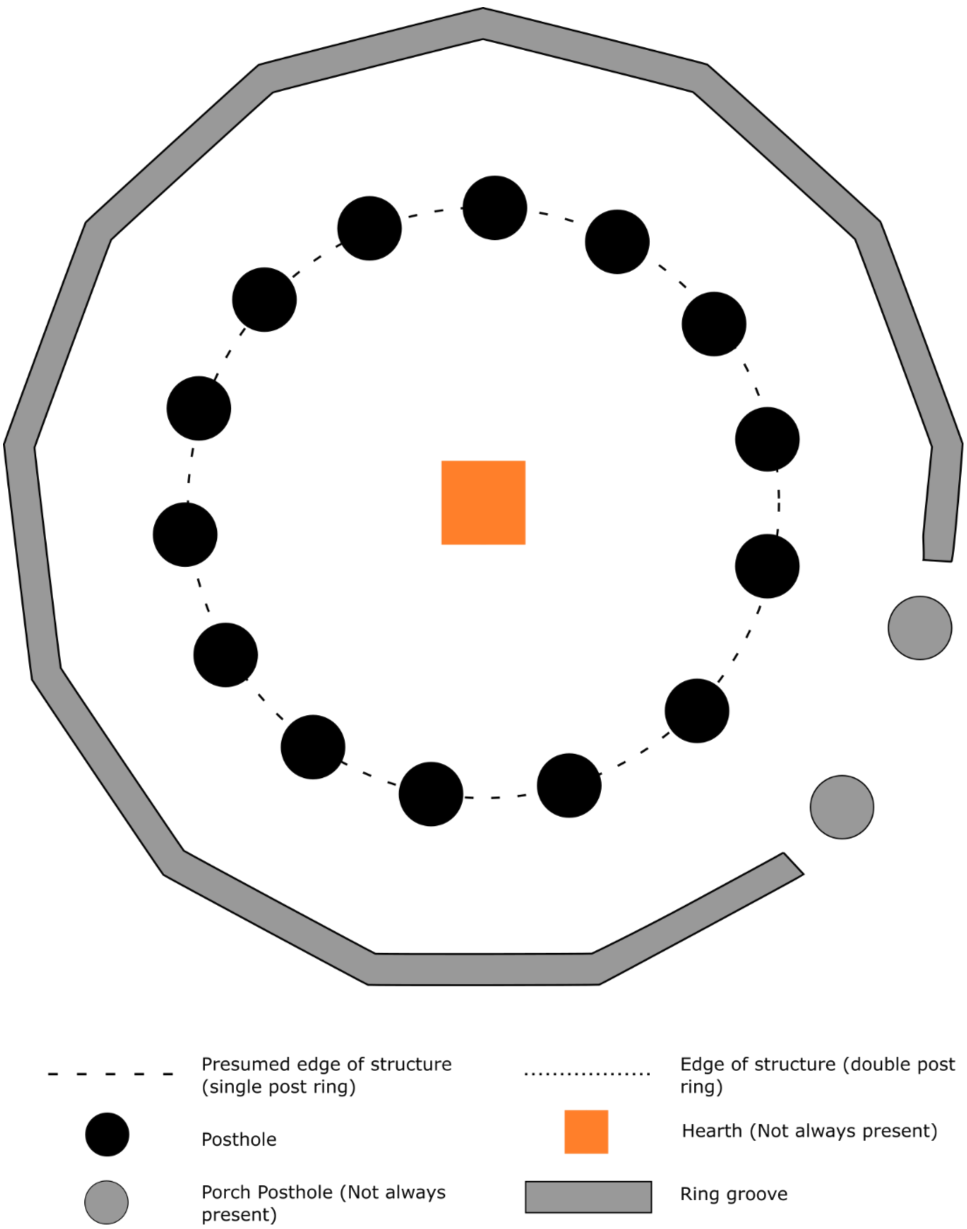

Figure 30 Schematic plan of a ring groove structure

4.3.2.3.4 Size

28 of these structures had their dimensions recorded (Figure 33). These range in size from 4.5m to 19m, with their average size being 10.29m. 50% of these structures are between 8.94m and 11.3m and the majority of the structures (90%) have diameters ranging between 6.83m and 14.3m.

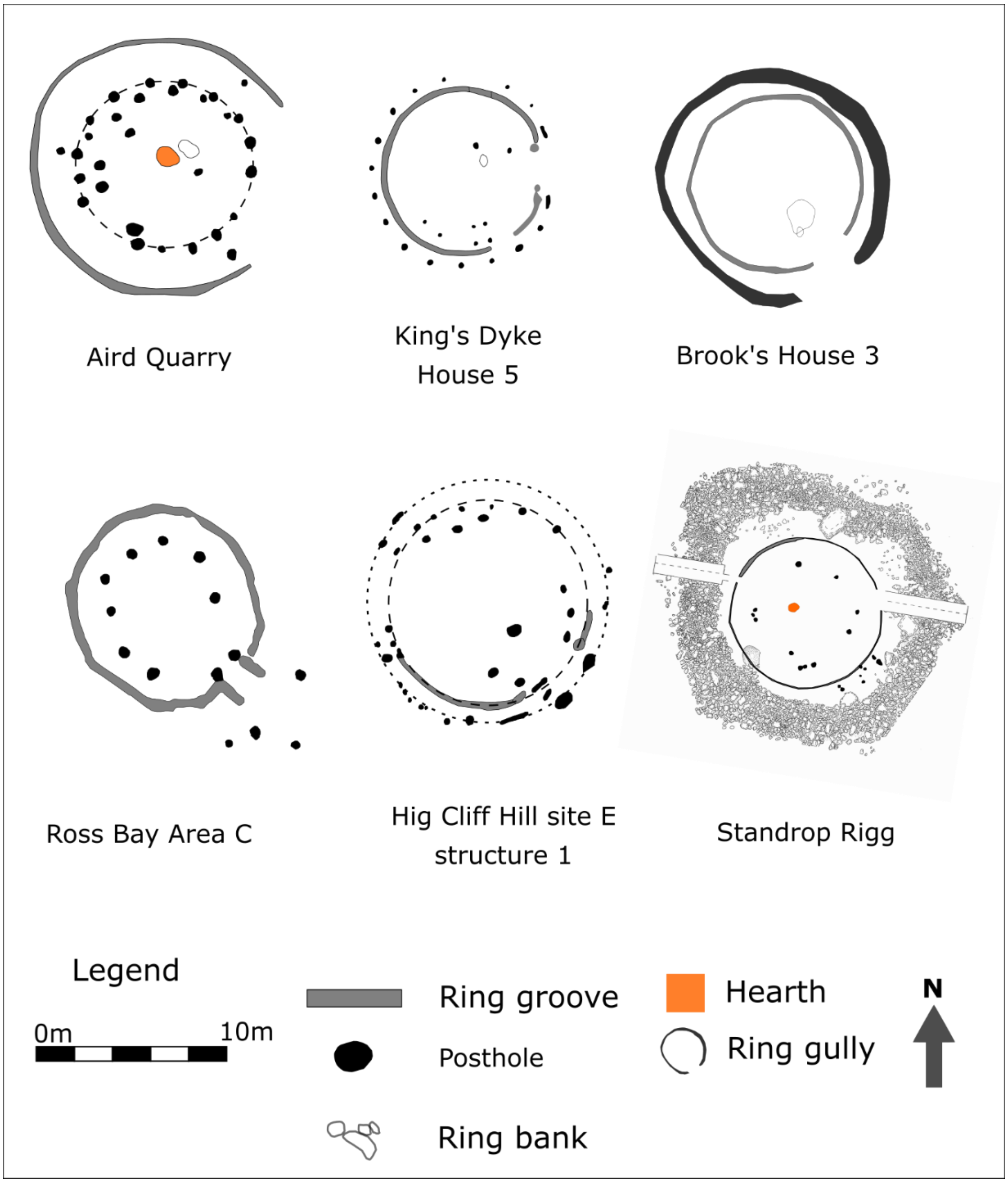

Figure 31 Plan of ring groove structures (Cook 2006 p.14; Knight 1999 p.26; Fairburn, Carruthers, Fairburn, et al. *2002 p.14; Ronan & Higgins 2005 p.54; Ellison, Rahtz, Ensom,* et al. *1987 p.242; Jobey 1983 p.8)*

Figure 32 The distribution of those Bronze Age settlement structures identified within the high-resolution database where a ring groove could be identified. Contains OS data © Crown copyright and database right 2019.

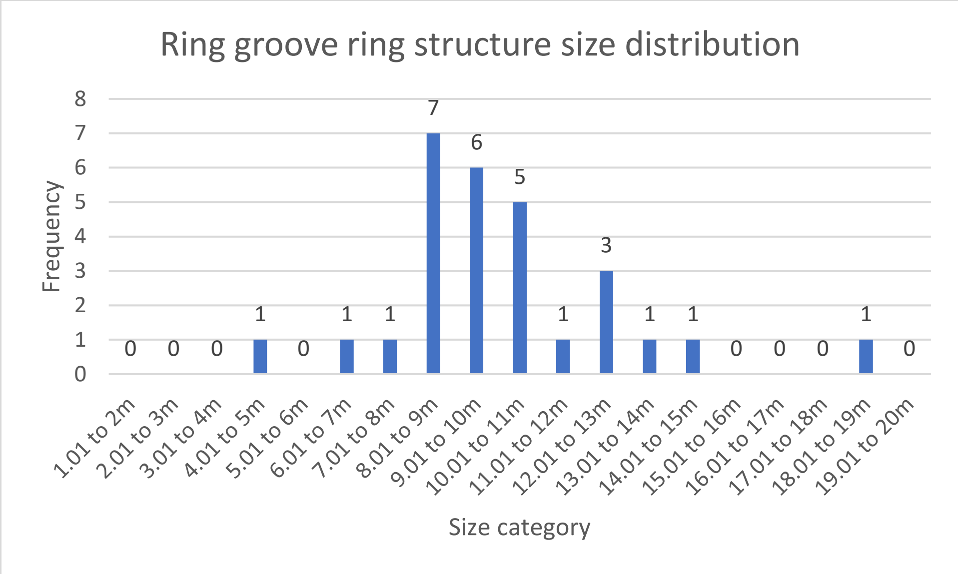

Figure 33 Histogram of the size of ring groove roundhouses identified from the high-resolution dataset of this study

4.3.2.3.5 Chronology

25 of these structures were associated with a radiocarbon date, the remaining 9 being dated through other means (Table 14). This understood, those that have directly associated radiocarbon dates are predominantly Middle to Late Bronze Age and are most numerate in the Middle Bronze Age. This remains true when studying all dated ring groove roundhouse sites.

Period	Frequency (C14 only)	Frequency (all)
BA	1	1
EBA	3	3
EBA-MBA	4	4
MBA	7	9
MBA-LBA	6	7
LBA	3	7
LBA-IA	2	3

Table 14 Chronological distribution of Bronze Age ring groove structures

4.3.2.4 Stone architecture

The structural forms above are primarily timber-based constructions, however 161 of the 853 structures displayed stone architectural features which can now be discussed.

4.3.2.4.1 Ring banks

4.3.2.4.1.1 Description

Ring bank structures have been particularly recognised in the north of Britain in this study. These structures are characterised by an often irregular and low-lying bank of earth, turf and stone typically 1-1.6m wide (Figure 35 and Figure 38). The character of these has meant they are somewhat more visible in the landscape than simple post ring roundhouses, although it is not uncommon for excavations of platforms to reveal far larger structures than might at first be visible. The wall would serve to re-distribute some of the load of the roof for the structure to the ground and also to support internal screens built in the forms detailed above (Drewett 1979, Musson 1970).

4.3.2.4.1.2 Quantity

40 of the 843 structures (70%) were described as ring banks within their reports. Further to this, a further six structures have been described as stone kerbed. While these kerbs need not be as substantial in width or height as the ring banks, as defined by Pope (2003), their function has been interpreted as similar, such that the analysis below treats these phenomena together.

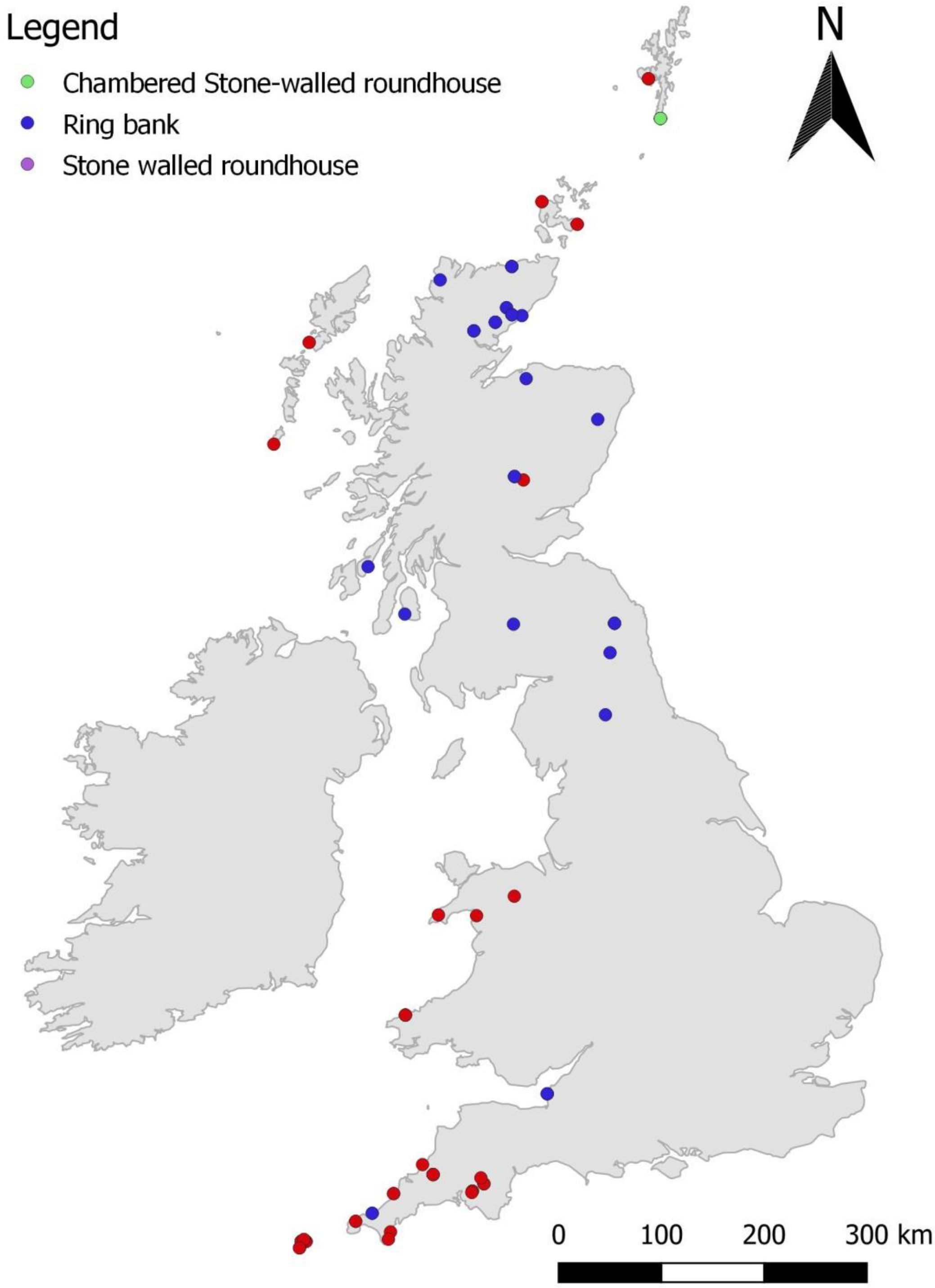

Figure 34 The distribution of those Bronze Age settlement structures with stone features, within the high-resolution database. Contains OS data © Crown copyright and database right 2019.

In only 18 instances it has not been possible to confirm the presence of any other structural features, however, this low percentage, the high number of sites with post rings, and the form of this architectural trait suggests those sites without further features identified, such as a post ring, may originally have had this traits.

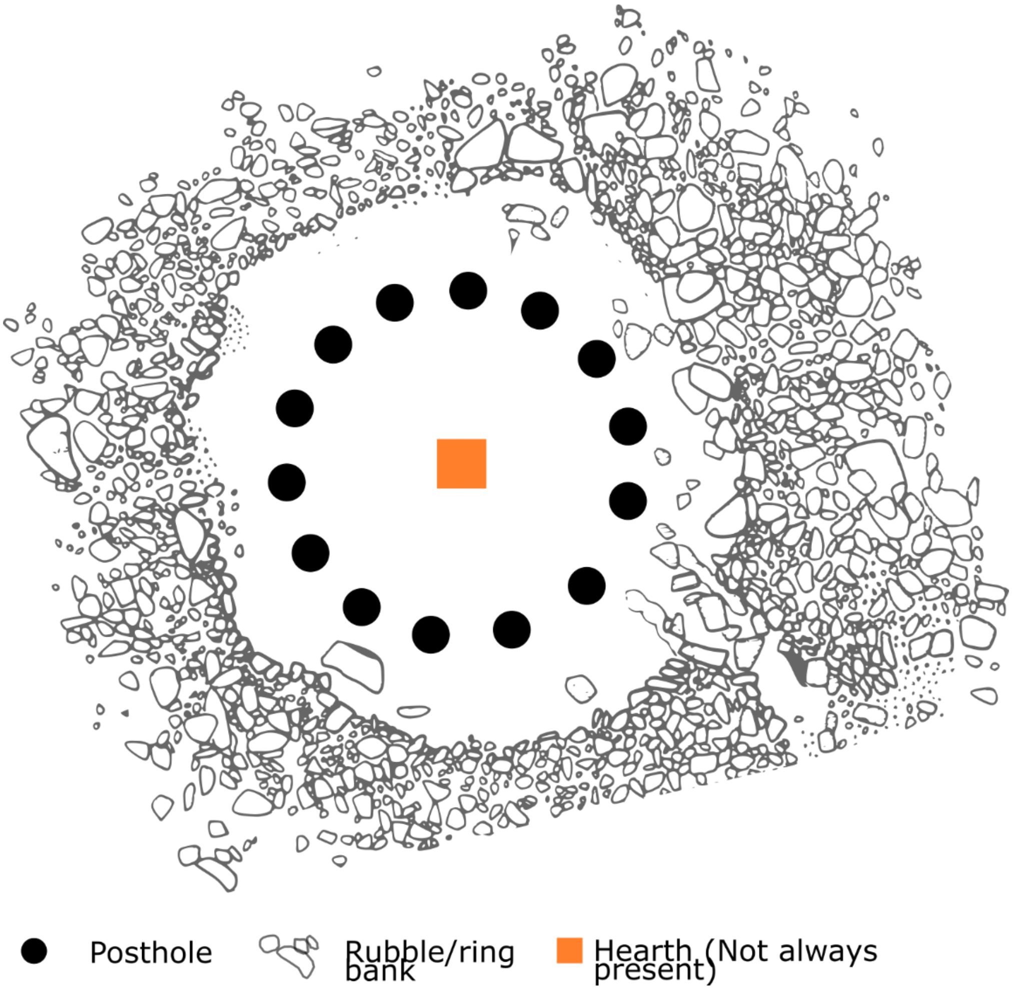

Figure 35 Schematic plan of a ring bank structure

4.3.2.4.1.3 Size

29 of these structures had their dimensions recorded (Figure 36). These range in size from 2.83m to 16m with their average size being 8.85m. 50% of these structures are between 7m and 10.0m and the majority of structures (90%) are between 2.8m and 116.0m.

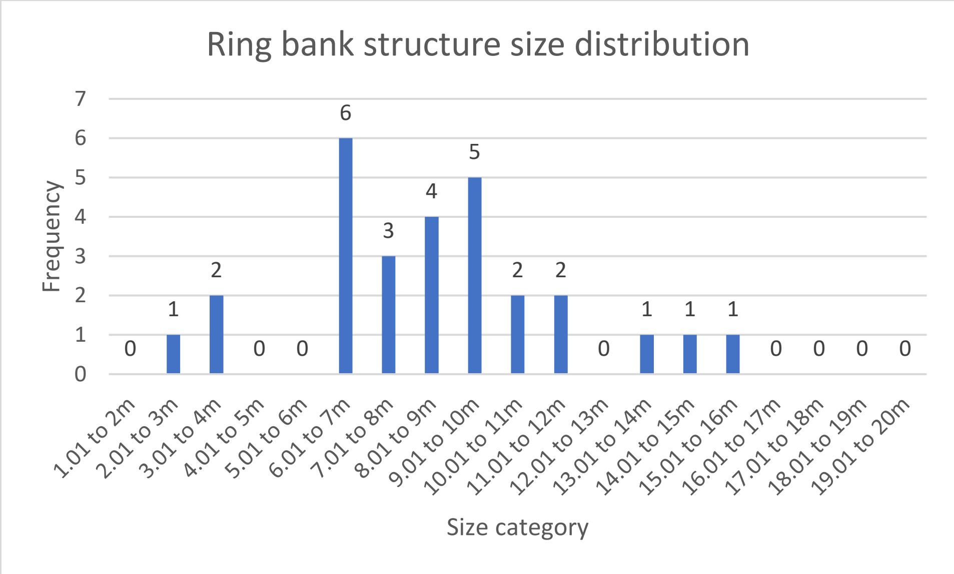

Figure 36 Histogram of the size of ring bank roundhouses identified from the high-resolution dataset of this study

4.3.2.4.1.4 Distribution

This type is largely found in the north of Britain (Figure 34). However, this may be somewhat the effect of differential typological schema. When identifying ring banks solely through the presence of a diffuse retaining wall, it is possible to suggest that multiple structures in Britain fit these criteria, however, many of these would be termed stone-walled roundhouses within their relevant reports.

4.3.2.4.1.5 Chronology

25 of these structures were directly associated with a radiocarbon date and a further 21 were dated through other means (Table 15). They were constructed across the entirety of the Bronze Age, although they are most common in the Middle Bronze Age; a pattern which remains true if including those sites that were dated through means other than radiocarbon dating.

Period	Frequency (C14 only)	Frequency (all)
BA	2	8
EBA	2	3
EBA-MBA	3	3
MBA	13	19
MBA-LBA	8	8
LBA	1	2
LBA-IA	1	3

Table 15 Chronological distribution of Bronze Age ring bank structures

4.3.2.4.2 Stone-walled roundhouses

4.3.2.4.2.1 Description

Regardless of the above discussion, those sites built with stone, but not termed ring banks, are typically stone-walled roundhouses. For the purposes of this thesis, the distinction between these two forms is the presence of a wall which shows definite evidence for facing on at least one side of its walls and probable evidence for facing on its remaining side.

4.3.2.4.2.2 Quantity

115 of the structures were described as stone-walled roundhouses within their reports (70%). In 93 of these cases, there were no further features identified from which the roundhouse was made, there being no further ring grooves or postholes with which to support the wall and roof.

4.3.2.4.2.3 Size

From the 115 stone-walled structures, 43 had their dimensions recorded (Figure 37). These range in size from 2.125m to 14.5m, with their average size being 6.3m. 50% of these structures are between 4.0m and 7.8m and the majority of structures (90%) are between 2.125m and 14.5m.

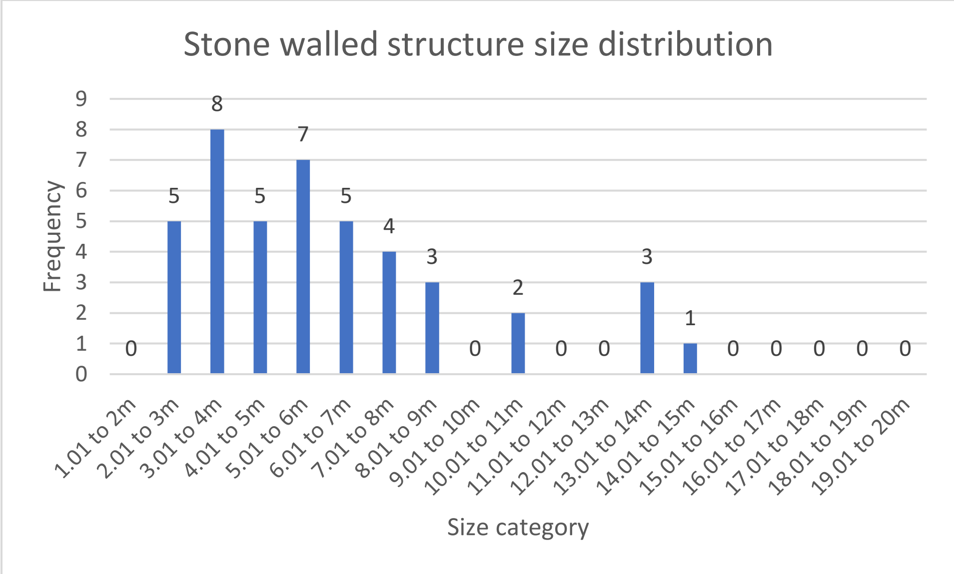

Figure 37 Histogram of the size of stone walled roundhouses identified from the high-resolution dataset of this study

4.3.2.4.2.4 Distribution

These structures appear to show a very regionally specific distribution (Figure 34). They are found across Scotland, particularly in the Highlands but also on the Western Isles and regions of Orkney and Shetland. They are also found in the uplands of Wales while, in the south west of Britain, they are common from the Isles of Scilly to the eastern edges of Exmoor and Dartmoor. The settlement of Brean Down in North Somerset, while being east of these regions, shares characteristics in these structures to similar forms found in the regions of Wales and the far south west, but this isolated site alone does not represent the spatial extension of this form's use.

4.3.2.4.2.5 Chronology

26 of these structures were directly associated with a radiocarbon date and a further 88 were dated through other means (Table 16). Only two of these structures might be suggested as being Early Bronze Age in date, the remaining

sites most tightly clustering in the Middle Bronze Age. Only 12 were found to be potentially Late Bronze Age in date.

Period	Frequency (C14 only)	Frequency (all)
BA	8	12
EBA	2	11
EBA-MBA	3	4
MBA	8	9
MBA-LBA	16	66
LBA	2	6
LBA-IA	2	6

Table 16 Chronological distribution of Bronze Age stone-walled structures

4.3.2.5 Terraces, hollows and scoops

4.3.2.5.1 Description

During the pilot study (see Chapter 3), a form of building, termed the sunken floor building, was identified within the literature review of the south west of Britain. Initially it was thought to define an independent form of structure, their being described as regionally specific. However, as with ring banks, it soon became apparent that the features of these structures, namely the sunken floor, or the presence of a stone kerb, might also be described within the reports of further structures.

Similarly, within Pope's (2003) review of northern architecture, the platform settlement described may also be interpreted as a terraced structure not dissimilar to those structures in the south of Britain, more commonly termed post ring roundhouses, which themselves were terraced. As such, it was decided that these features should be recorded solely by their architectural features, rather than as an architecturally defined type. To do this, it becomes necessary to discuss those structures built within hollows and those that were partially formed by the terracing into the hillside. For the means of this study, a hollow is defined as an area of floor showing a lower ground surface level than a contemporary surface outside the structure. It is differentiated from a ring gully by virtue of its continuity (Figure 38) into the vast majority of the structure. Terracing was defined simply as evidence for when part of the hillslope was evidently cut away in order to form a more level platform upon which to build. It should be noted that neither of these traits are mutually exclusive to any other.

4.3.2.5.2 Quantity

92 of the 834 structures (11%) were described as containing an interior hollow within their reports. Architectural features found surrounding hollows included post rings (70), stone kerbs or walls (13) and ring gullies (15).

4.3.2.5.3 Distribution

They are found across Britain with particular densities in Cornwall and west Devon, where sunken floored roundhouses have been identified (Gossip & Jones 2008; Jones & Quinnell 2011), near to the south coast in the counties of Dorset, Hampshire, and Sussex, the uplands of Wales, and regions across Scotland (Figure 39).

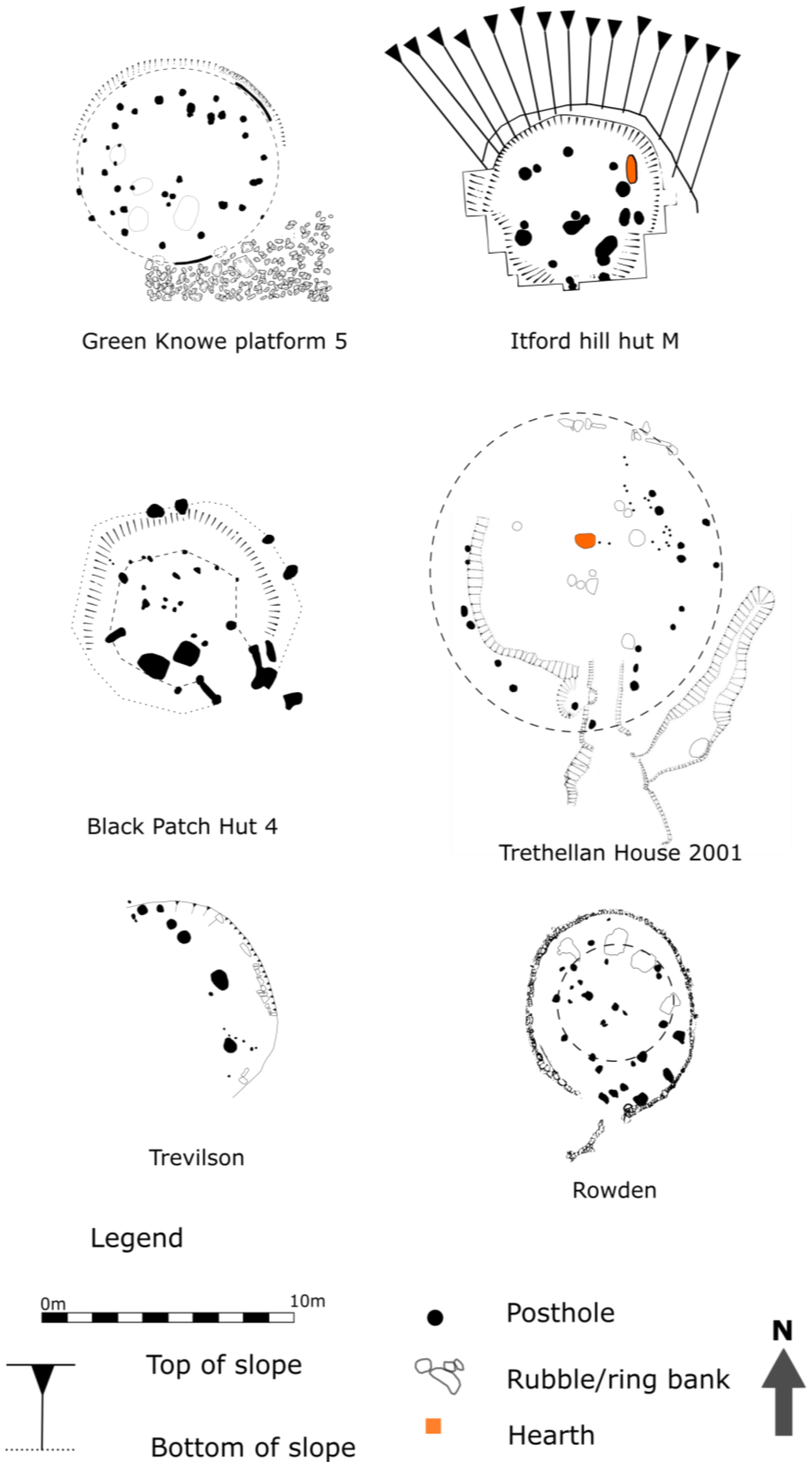

Figure 38 Terraced rounded structures (traced from Jobey 1978 p.81; Burstow, Holleyman & Helbaek 1958 p.186; Drewett 1982 p.337; Jones & Taylor 2004 p.26; Nowakowski 1991 p.16; Woodward 1991 p.43)

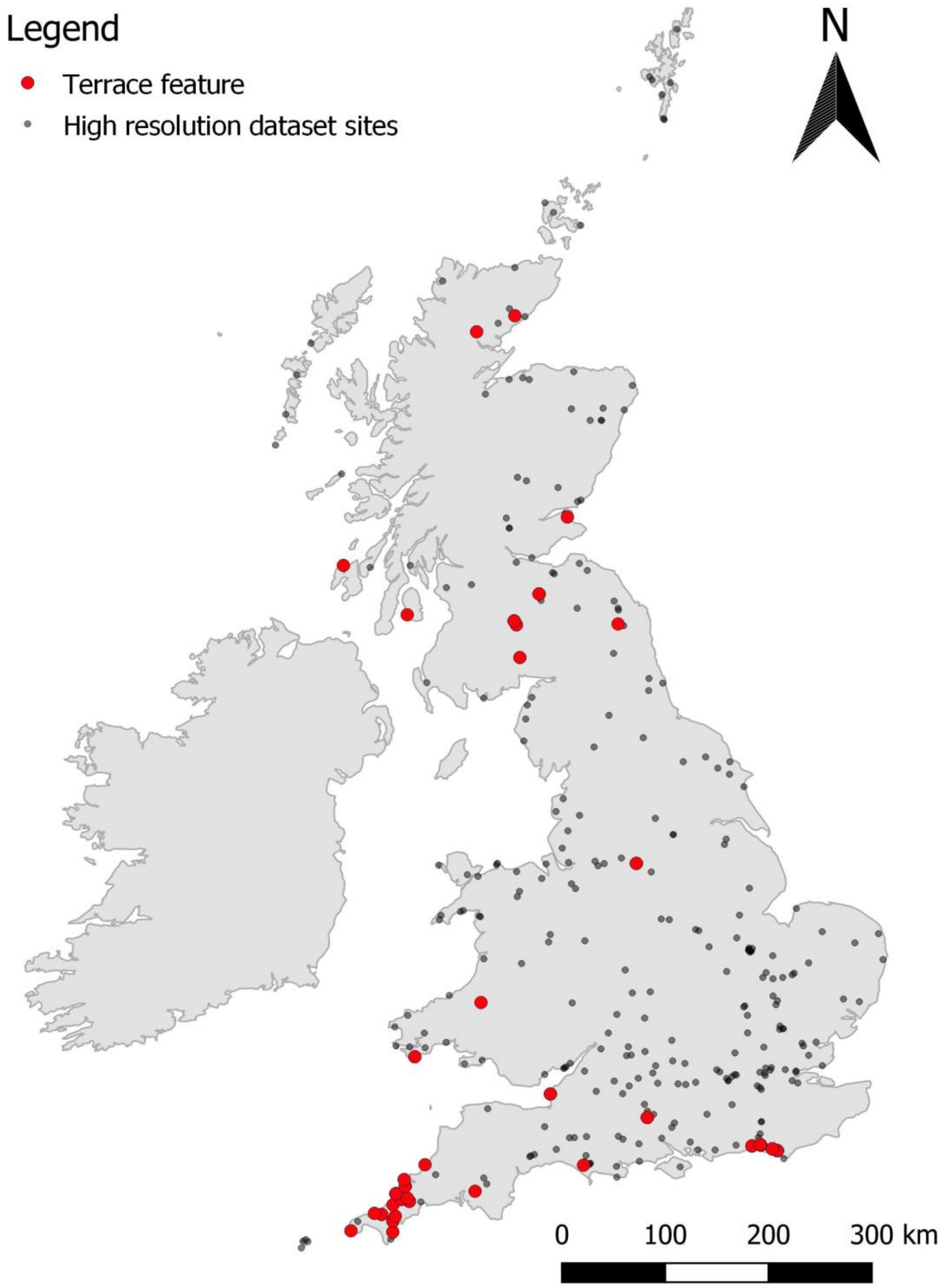

Figure 39 The distribution of those Bronze Age settlement structures with terraced features, within the high-resolution database. Contains OS data © Crown copyright and database right 2019.

4.3.2.5.4 Chronology

Over the Bronze Age they are most common in the Middle Bronze Age (n=23) and Middle to Late Bronze Age (n=41), although few have been identified dating to the Late Bronze Age (n=6) (Table 17).

Period	Frequency (C14 only)	Frequency (all)
BA	2	3
EBA	7	11
EBA-MBA	6	6
MBA	18	23
MBA-LBA	15	41
LBA	2	6
LBA-IA	0	2

Table 17 Chronological distribution of terracing features on Bronze Age structures

4.3.2.6 Other forms of settlement structures

There are several examples of highly regional architectural forms that typically comprise just a few sites (Figure 40). These include U-shaped Early Bronze Age structures such as that at Northton (Simpson, Murphy & Gregory 2006), irregularly shaped Early Bronze Age structures as found at Sennen (Jones, Taylor & Sturgess 2012) and Oversley Farm (Garner, Allen, Wenban-Smith, *et al.* 2007) and those structures made of stone walls typically found in the northern regions of Scotland and chambered stone walled roundhouses found in the north of Scotland (Calder 1949, 1955; Barcham 1978). Due to their small numbers and restricted distributions, these have not been evaluated in the same way as the architectural forms above (a good review is now published by Gibson 2019) but are included in the analyses below where appropriate.

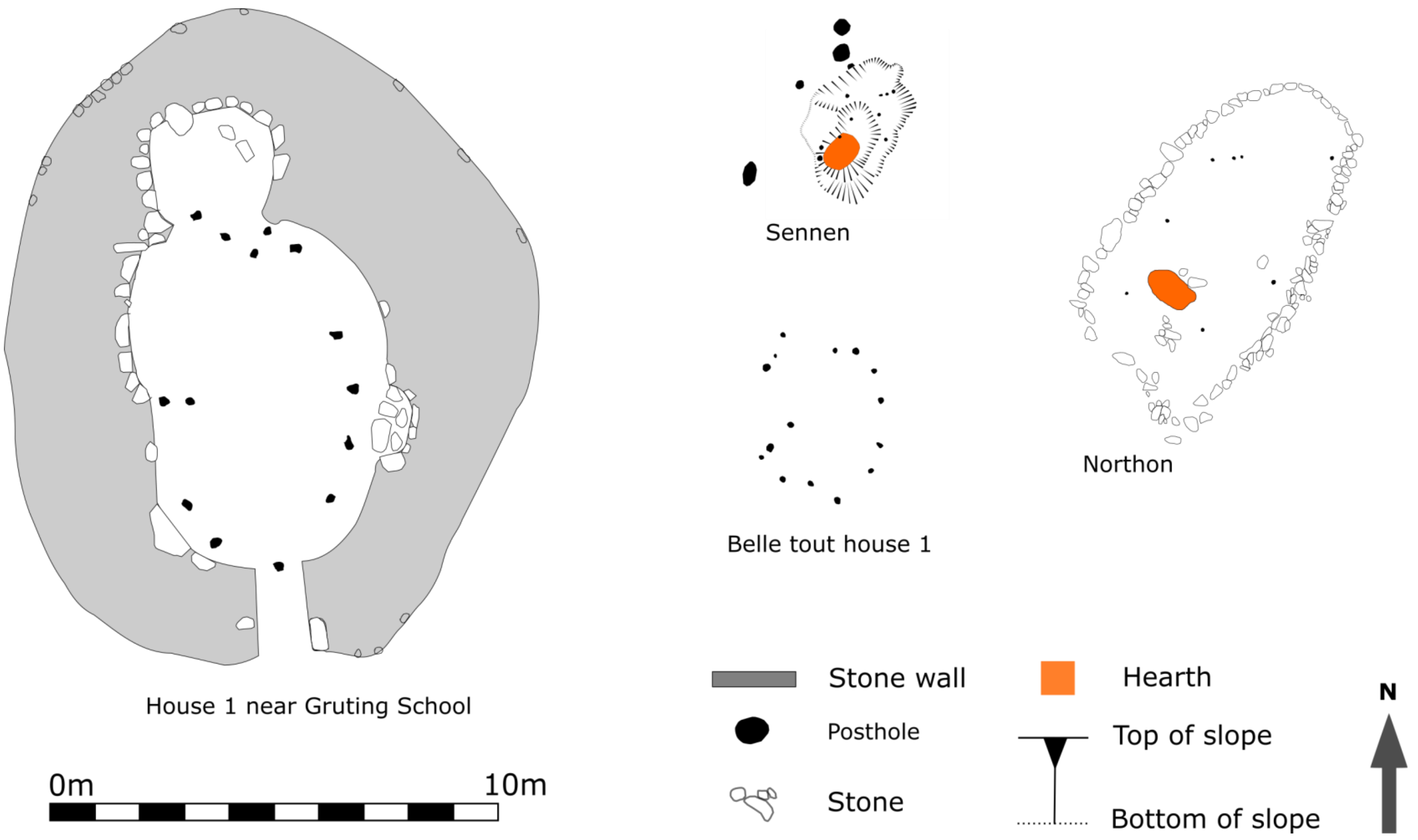

Figure 40 Early Bronze Age irregular structures. Note a recent publication of beaker structures (Gibson 2019 Figures 17.3-17.9) provides a particularly good range of example illustrations of these structures (traced from Calder 1955 p.345; Jones, Taylor & Sturgess 2012 p.10; Bradley 1970 p.322; Simpson 1971 p.137)

4.3.3 Roundhouse features discussion

The section above has described the most substantial and common architectural traits of Bronze Age circular architecture and their combinations. In addition to these, there are other features occasionally recorded of these sites that are significant to their purpose and adaption during their use which will now be discussed.

4.3.3.1 Ring gullies

4.3.3.1.1 Description

Perhaps the largest surviving architectural feature not already discussed from Bronze Age structures are those earthworks cut into ground, termed here as gullies. These features are understood by the study as earthwork features whose evidence indicate they were circular in form, as many of those recovered are truncated and so do not form a complete circuit. The purposes suggested for these features are numerous. Those that define the exterior of a structure are primarily interpreted as drainage gullies aimed at redirecting any run off water from either the structure's roof or the terrace it may be built into (Webster 2007 p.138). Some have been suggested as being the result of stalling cattle within the hut circle's interior (Harding 2004 pp.68–71; Cook & Dunbar 2008 pp.331–333). Others are seen as representing the outer gully of the post-built structure which formed an additional support for the structure's rooms.

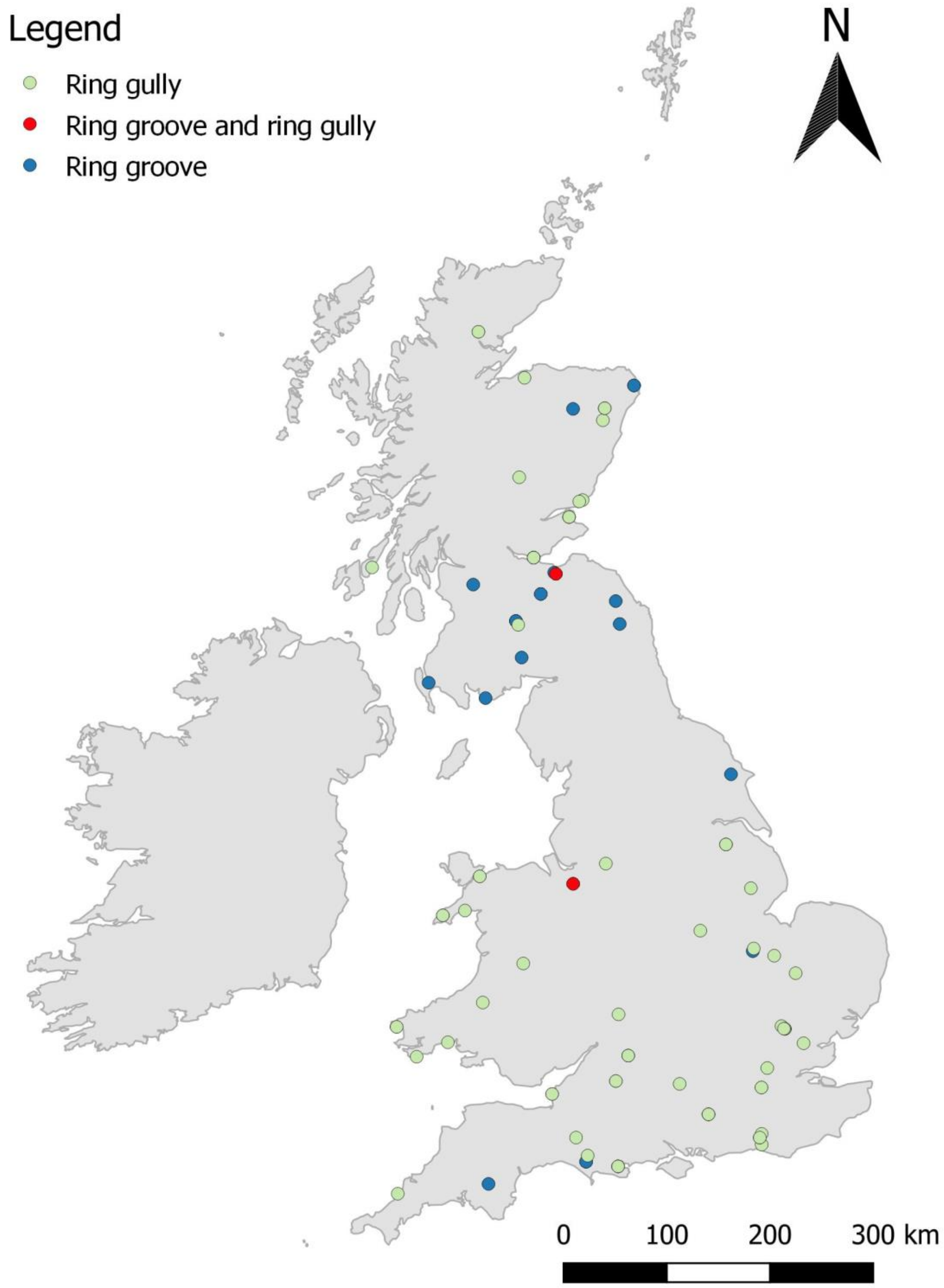

Figure 41 The distribution of those Bronze Age settlement structures with gully features, within the high-resolution database. Contains OS data © Crown copyright and database right 2019.

4.3.3.1.2 Quantity

116 structures displayed evidence for ring gullies. These gullies include those 34 ring grooves discussed above but also ring gullies placed within structures, placed outside structures and those which only ran for part of the structure.

4.3.3.1.3 Distribution

Unlike ring grooves, ring gully features have been found across the entirety of England, Scotland and Wales and are notably not absent in areas where ring grooves are present (Figure 41). Presumably, on these sites they served a different function.

4.3.3.1.4 Chronology

64 of these features are associated with structures with known radiocarbon dates (Table 18). The remaining 56 ring gullies have been dated by association with the structures they are related to. These data indicate that most gullies can be found in Middle and Late Bronze Age structures, although it is notable that their distribution mirrors that of the summed probability distribution graphs of

Period	Frequency (C14 only)	Frequency (all)
BA	1	5
EBA	8	9
EBA-MBA	8	8
MBA	20	35
MBA-LBA	15	23
LBA	12	21
LBA-IA	9	15

Table 18 Chronological distribution of gully features on Bronze Age structures

Chapter 5 (Figure 55 to Figure 67).This may suggest then that the presence of these features is not chronologically sensitive but evenly used across time with the features being added appropriate to the needs of their occupants and the availability of materials at that site.

4.3.3.2 Settlement entrances and doorways

4.3.3.2.1 Description

Entrances have become one of the primary structural features to have been theorised in archaeological study (see Chapter 2). In particular, the preference for an eastern orientation for building entrances in prehistory has been often cited (Oswald 1997; Pearson 1999) and discussed. As such, the project recorded the presence or absence for evidence of entrances within Bronze Age structures.

In certain cases, these entrances are fairly pronounced and clear (such as a stone-walled roundhouse with a single well paved entrance), however, in others the presence and location are not as well defined. Typically, entrances are identified through the presence of either a well-defined porch made up of post holes or seen as the paved gap within a stone wall, or by the presence of paired post holes of a larger size and development within the post ring of a structure than their contemporaries. Occasionally, porches are also suggested to be evidenced by the presence of paired gullies or the absence of a porch in a partially excavated structure.

As such, it was decided to record the form of porch identified, alongside a subjective determination of the confidence placed in this interpretation within the report by the researcher, and then its orientation to the nearest 22.5 degrees. The orientation of structures entrances was identified for 362 Bronze Age settlement structures. The results of this analysis present a consistent record that the vast majority of structures were oriented to the south east (Figure 42). This orientation is seen in the same quantities throughout the Bronze Age.

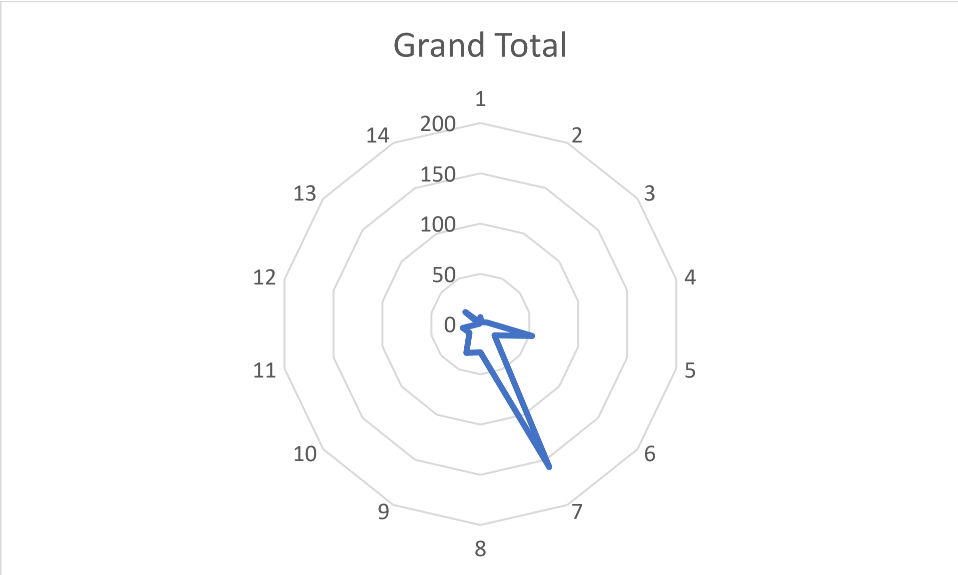

Figure 42 The numbers of settlement structures identified from the high-resolution dataset facing each cardinal direction, where such information has been stated in literature within the study database

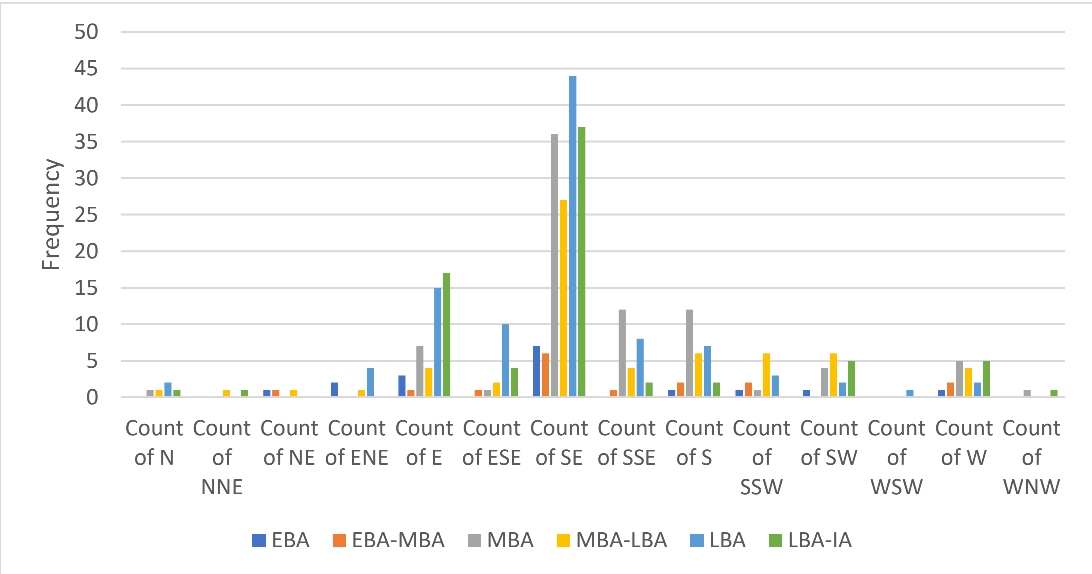

Figure 43 Those doorway orientations where identified divided by period. The results of this analysis show a universal preference for a south eastern aspect with slightly more diversity in the Late Bronze Age

The orientation of structures entrances was identified for 356 Bronze Age settlement structures. As has been frequently identified, these show an overwhelming dominance for a south eastern aspect. Furthermore, this aspect maintains its prominence proportionally in Early, Middle and Late Bronze Age structures. These results overwhelmingly support earlier assertions on the south eastern aspect of Bronze Age structures (Figure 42 and Figure 43). They also support that while this was the norm other orientations would also be used if necessary. While these results are clear and unlikely to change without far more structures being identified, I would personally raise the observation that during data recording it was common for houses with a south eastern aspect to be noted and those with a differing orientation not to be mentioned. As this study was only able to use those data published and at times lacked plans, it may therefore be that such an aspect is disproportionally favoured.

All confidently identified porched entrances were found on structures described as rounded. The elaboration of entranceways, through features such as porches, paving, reinforced postholes, or the inclusion of other nearby features were identified for 221 structures (Table 19).

Date range	extended	extended?	Features around entrance	passage entrance	paved	Reinforced entrance	Grand Total
BA	5						5
EBA	8			1			9
EBA-MBA	7		1		1		9
MBA	51		3		1	4	59
MBA-LBA	26	3			3	1	33
LBA	62	2				6	70
LBA-IA	4	30			1	1	36
Grand Total	163	35	4	1	6	12	221

Table 19 Numbers of structural features found in Bronze Age settlement structures identified from the high-resolution dataset

The majority of these elaborations (198) are extended porches, typically made up of four post holes but sometimes more, which were usually larger than those seen within the structure (if any) extending from the primary core of the structure. These extended porches have been identified with post ring structures (185) both of single ring (141) and double forms (19), ring grooves (10), stone walled roundhouses (6) and ring banks (13). They have similarly been found across all regions of England, Scotland and Wales.

Early studies of porches suggested these structures might have a structural function to help prevent lateral stress to the house. However, experimental reconstructions at Balkesbury House have supported alternate interpretations that suggest the porch must be separate from the cone and cylinder (Avery & Close-Brooks 1969; Hill 1984). At this site it was found that if this was not the case, the porch roof became saturated and heavy, such that the structure was unable to cope and failed after three years (Reynolds 1979, 41; 1988, 13).

Other forms of entrance include those porches which, while not extended from the structure, are reinforced by larger posts or replacement posts, those porches marked by additional features such as fence lines, ditches or passages. Only 14 sites showed evidence for more than one porch, usually as the result of remodelling the architecture of that structure, as at House 2 of Bestwall quarry (Ladle & Woodward 2009 p.72), although the sites at Newton Mearns (Toolis 2005) and potentially Thwing (Manby 1978) are notable for their double porches placed opposite to each which may have been in use contemporaneously.

4.3.3.3 Hearths

Barring the entrance structure into a building, there has yet to be any architectural evidence identified for the natural lighting of Bronze Age structures. While artificial lighting may have been provided, potentially by vessels such as accessory cups (Copper 2017; Hallam 2015), the hearths of these structures were likely to have been of great importance. Because of this, the presence of any hearths within house structures were recorded, while attempts were also made to record evidence for hearths outside of these structures. It quickly became clear that the contemporaneity of these features could not be indicated. It was decided that these would not be recorded to avoid any misrepresentation of activity that may be temporally distinct from the structures studied.

Only 126 structures of 1085 (12%) structures (both rounded and rectangular) have potential features that may have been hearths intended for use within that structure. The form of these hearths varies only somewhat slightly; the majority are recorded as fire darkened pits, these are often mentioned as being placed centrally (60) of these structures, although it is not uncommon for the exact location to be poorly recorded. This said, many structures certainly were recorded as being off-centre or near the structure's entrance, demonstrating that these features need not be central within these structures. Most notable in this regard are the oven features at Trethellan Farm (Nowakowski 1991) and Gwithian (Quinnell, Nowakowski, Lawson-Jones, *et al.* 2008), that were placed adjacent to the walls of these structures.

4.3.3.3.1 Distribution

Hearths have been identified in all forms of Bronze Age structures, including post ring structures (93), ring groove or ring gully structures (36) and stone walled structured or ring bank structures (24). Structures need not have had one hearth as seen at MBA House X, Bestwall Quarry, Dorset (Ladle & Woodward 2009), Building 5, Nornour (Butcher 1978), Cornwall, and Building 5 at Cheviot Quarry (Johnson, Waddington, Baker, *et al.* 2008), although it is rare for multiple hearths to be observed. Unsurprisingly, there appears to be no geographical predisposition to the presence or absence of hearths within Bronze Age structures (Figure 44).

4.3.3.4 Central posts

The earliest discussions of Bronze Age structures had assumed that they could be differentiated from Iron Age structures due to their small size and less developed architecture (see Chapter 2). In practice, this led to reconstructions of Bronze Age structures that were less developed. One such trait thought to indicate this was the presence of a central post hole which would form one of the primary means for supporting the roof's structures. As such, evidence for these central post holes was recorded during the data recording stage of this research, to investigate whether the dataset showed this statement was true. Free text notes were made in the database on any and all post hole or pit features that were placed near to the centre of the structure, along with details of whether these posts were off-centre or not.

Figure 44 The distribution of those Bronze Age settlement structures with hearths, within the high-resolution database. Contains OS data © Crown copyright and database right 2019.

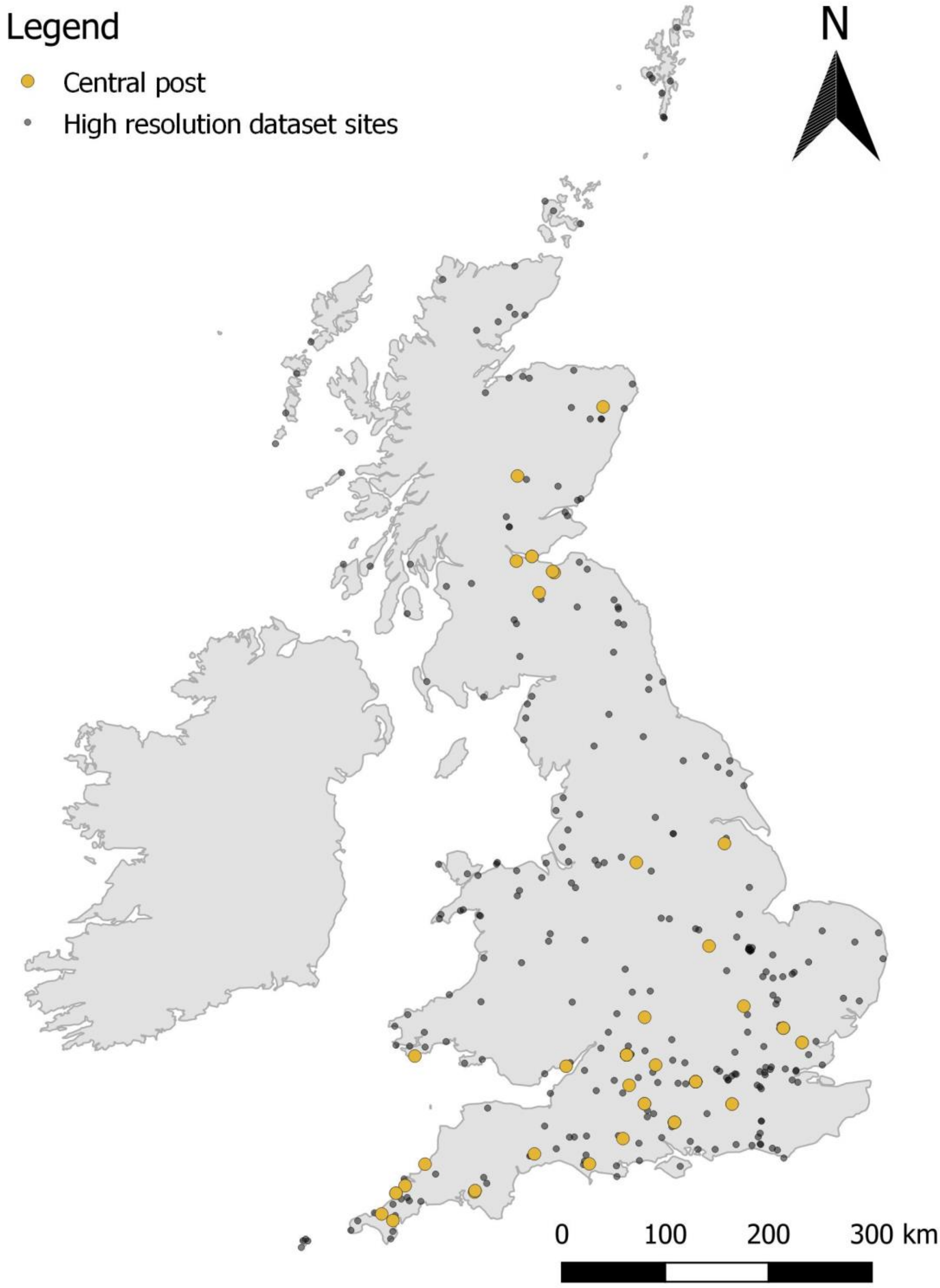

Figure 45 The distribution of those Bronze Age settlement structures with central posts, within the high-resolution database. Contains OS data © Crown copyright and database right 2019.

From the 836 structures in the high-resolution dataset, only 62 central posts were identified. It was found that these features were conspicuously absent in the region north of Leeds and south of Edinburgh, but barring these regions, structures with central post holes were identified across the entirely of Britain.

16 structures with central post holes were directly associated with a radiocarbon date and a further 35 were dated through other means. Whilst too small in number to provide confident assertions on the dating of these features, it is clear that structures with central post holes were constructed across the entirety of the Bronze Age in Britain. This is only made clearer when studying those sites dated through other means. As such, it does not appear that the presence or absence of central post holes is chronologically defined. While there may be a regional bias against the use of central posts in northern England and southern Scotland, this may instead be due to the low number of sites recorded in this region.

The dataset was also analysed to determine whether central post structures were smaller than those without, and it was found that structure size did not appear to be pre-determined by the presence or absence of a central post. The average size of structures with a post hole was found to be 7.15m, with a maximum size of 14.5m. Furthermore, 43 of the 51 structures were identified in single post ring structures, although 6 double post ring structures were also identified with these features. Two were found in stone walled roundhouses, and one was identified within a ring bank structure. The appearance of central post holes within structures with adequate structural support (there being two post rings) highlights how the presence of a post hole within the centre of the structure need not be solely interpreted as a primarily structural feature. Indeed, there are numerous case studies of these having a more symbolic role. Post holes and pits found elsewhere within structures not forming part of the ring structure are invariably interpreted as representing the remnants of some internal fittings, furniture or internal division. It is these that this chapter will now discuss.

4.3.3.5 Pits, post holes and abandonment

The last frequently identified feature found within Bronze Age structures are pits and post holes. Within reports, the distinction between these two features is often quite arbitrary. The size and shape of the feature is often used to determine whether it would be more likely to have been used as post hole or stake hole rather than a pit. While suitable for smaller circular features, it is not uncommon for post holes to approach the size of pits. This is especially true if originally dug from an angle or if the post hole was the subject of replacement, leading to a form that may appear sufficiently irregular to be appear similarly to a pit. As such, these features were assessed together.

166 structures had internal features recorded within them. Of these 135 had evidence for internal pits or post holes. 37 of which only had post holes, 59 of which only identified pits and 39 which identified both. Architectural features found surrounding these features include post rings (70), stone kerbs or walls (13) and ring gullies (15). Internal post holes have been interpreted as interior divisions as at Bosiliack, Cornwall (Jones 2013b p.141), further supports for architectural features as at Shaugh Moor, Devon (Wainwright, Smith, Balaam, *et al.* 1980 p.117), and as storage pits as at Rowden, Dorset (Woodward 1991 p.45). However, in the majority of circumstances little interpretation for these features is suggested beyond being related to the interior use of the structure as at Dunch Hill (Andrews 2006 p.75),

Wiltshire. It is notable that despite over 1000 structures being identified, only 15% of the corpus have had internal features of this form identified.

Similarly, if the presence of hearths is included, only 20% (n=220) of structures have had readily identifiable internal features within Bronze Age structures. Together with the often-limited artefact assemblage from these sites, the interior of Bronze Age settlement structures often appears sterile. In the last two decades, explanations for this have often been based on the formal and structured abandonment of settlements. For example, studies of settlement sites in Cornwall recognised that the abandonment of structures could be identified and, in some instances, took quite a varied approach (Nowakowski 2001; Webley 2007). It was beyond the scope of this study to identify or refute structured abandonment of structures, this requiring extensive re-analysis of each structure's archaeological remains. However, it is able to raise the case study sites of Bestwall Quarry (Ladle & Woodward 2009), Lairg (McCullagh & Tipping 1998), Hartshill (Collard, Darvill, Watts, *et al.* 2006) and Hatton Farm (Gray & Suddaby 2010), each of which show the various opportunities in the rites of structure abandonment. This study supports the suggestion that many structues were formally abandoned by demonstrating the lack of internal features, combined with the typically low number of artefacts, particularly when compared to the large refuse middens seen in the Latest Bronze Age (Lawson 2000). These are then indicative that the majority of Bronze Age structures may have undergone the same level of ritual abandonment. This is only brought further into contrast with the site of Must Farm (Knight, Ballantyne, Zeki, *et al.* 2019; Must Farm 2019) where numerous forms of furniture, equipment and domestic pottery assemblage have been found on a large scale due to the sudden nature of the settlement's destruction by fire.

4.4 Quadrilateral structures

4.4.1 Square and rectangular architecture sizes

As with circular houses, it is possible to estimate the size of quadrilateral (square and rectangular) architecture using their floor plans, with the caveats that those areas will not represent any space gained by a second floor (if present) or any part of the structure that may be unidentified if, for example, it is outside the bounds of excavation and left unidentified. For these structures, measurements were recorded for both their long and the short axes if detailed within a site report. Much as with sub-circular architecture, these two measurements represent the largest length and largest width of a structure. These were then used to calculate the structures' surface area. As with circular architecture, the floor space was understood to be that area internal to the structure, such that if a structure was made of stone, measurements were taken from the inner face of that wall. As with circular architecture, drainage gullies were taken to form part of the structure and so the long and short axes measurements were taken from these if they were present.

104 of those 193 quadrilateral structures had width and length measurements stated in literature. The surface area of these structures range from as little as 0.5 square metres to as much as 122.3 square metres. These extremes, however, are rare and the average surface area was only 16.4m^2 (Figure 46 and Figure 47).

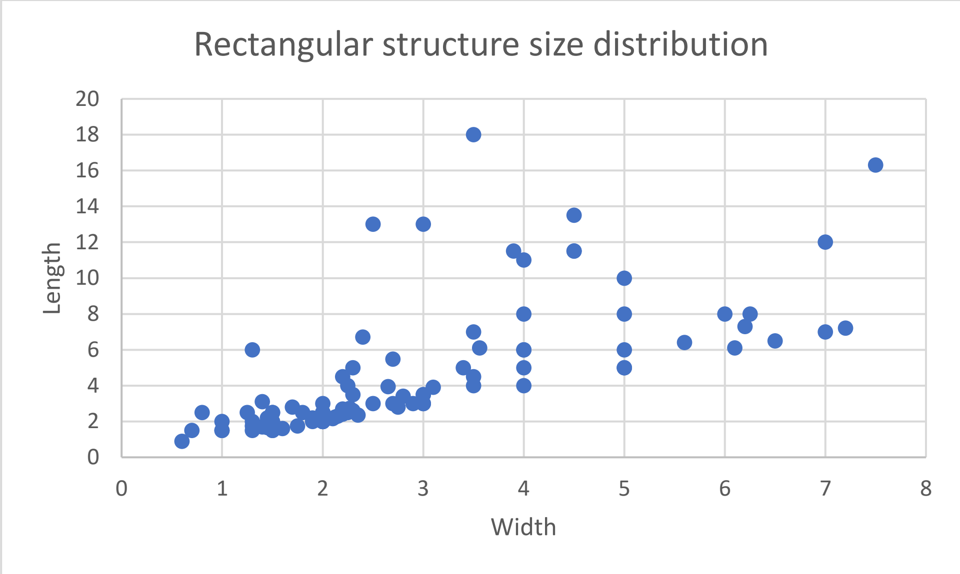

Figure 46 Scatter plot of rectangular structures width and length from the high-resolution dataset

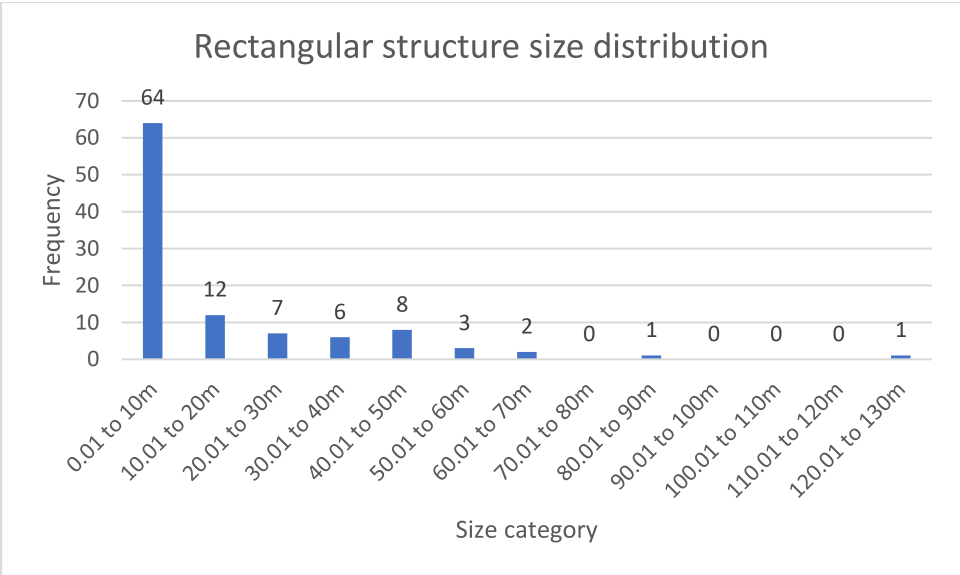

Figure 47 Histogram of rectangular structures width and length from the high-resolution dataset

50% of these structures were between 5.8m and 8.5m long and the majority of structures (90%) are between 4 and 24 square metres. There is a degree of variation in the size of quadrilateral structures. This is in part due to this category subsuming at least two forms of architecture. As such, further discussion of these statistics must be conducted by disambiguating these structures. Within reports the common means of doing so is to divide structures into those that were made of only four posts from those made of more. These are discussed below.

4.4.1.1 Four posters

4.4.1.1.1 Description

Most settlement sites are not made of a single rounded structure, and it is frequent that supplementary structures are also identified as storage houses. Colloquially these are termed four posters, although these structures might in fact be made from upwards of six post holes. These structures are thought to be covered, but too small to inhabit domestically, and are therefore seen as storage locations which were potentially raised off the ground (Gent 1983). They are identified by a series of post holes which are often wider in diameter than those for the structural supports of roundhouses.

Such structures have been suggested as being first identified by Pitt-Rivers in 1888 (*ibid*) and were initially interpreted as being the position of raised storage houses. For a time, this interpretation was developed further by the suggestion that some of the larger examples of these structures may have been used as houses (Stanford 1970 pp.110–112), although this has been refuted more recently, such that all modern interpretations typically follow the more traditional view (as seen in sources such as Garner, Allen, Wenban-Smith, *et al.* 2007; Powell, Smith & Laws 2010a; Best 2014).

4.4.1.1.2 Quantity

125 of these 191 structures were made up of only four identified post holes and were recognised as four post structures.

4.4.1.1.3 Size

55 of these structures had their dimensions recorded (Figure 48 and Figure 49). The shortest width recorded from one of these features range was only 0.6m whilst the largest recorded width was 5m. The average size of these structures is 5.02 square metres, whilst the majority lay between 2.6 and 5.5 square metres in size. 21 of these structures were truly square, the remaining 62% having dimensions that varied by more than 10cm. The average ratio of those that were rectangular was 1.3.

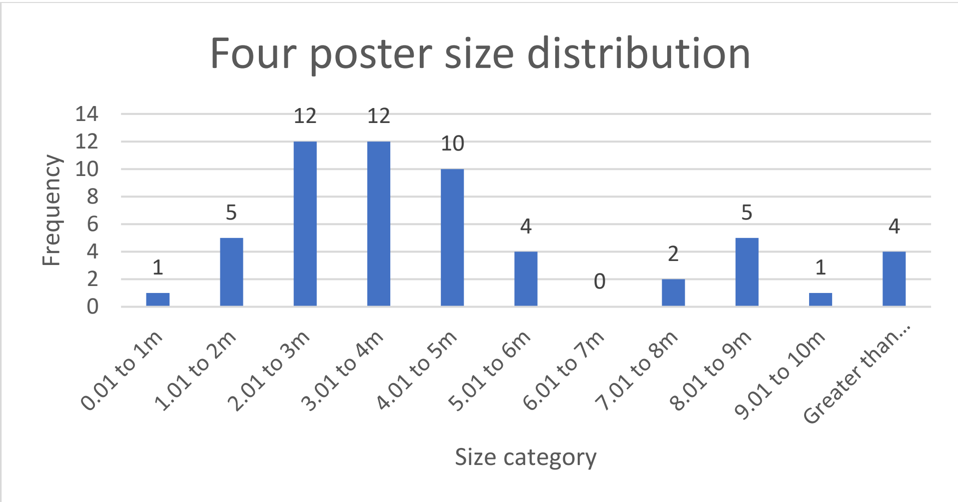

Figure 48 Histogram of four poster structures width and length from the high-resolution dataset

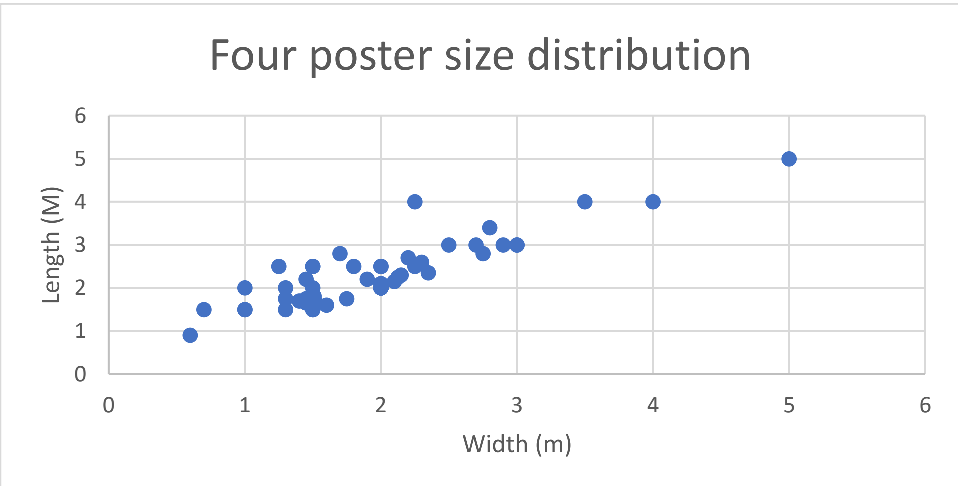

Figure 49 Scatter plot of four poster structures width and length from the high-resolution dataset

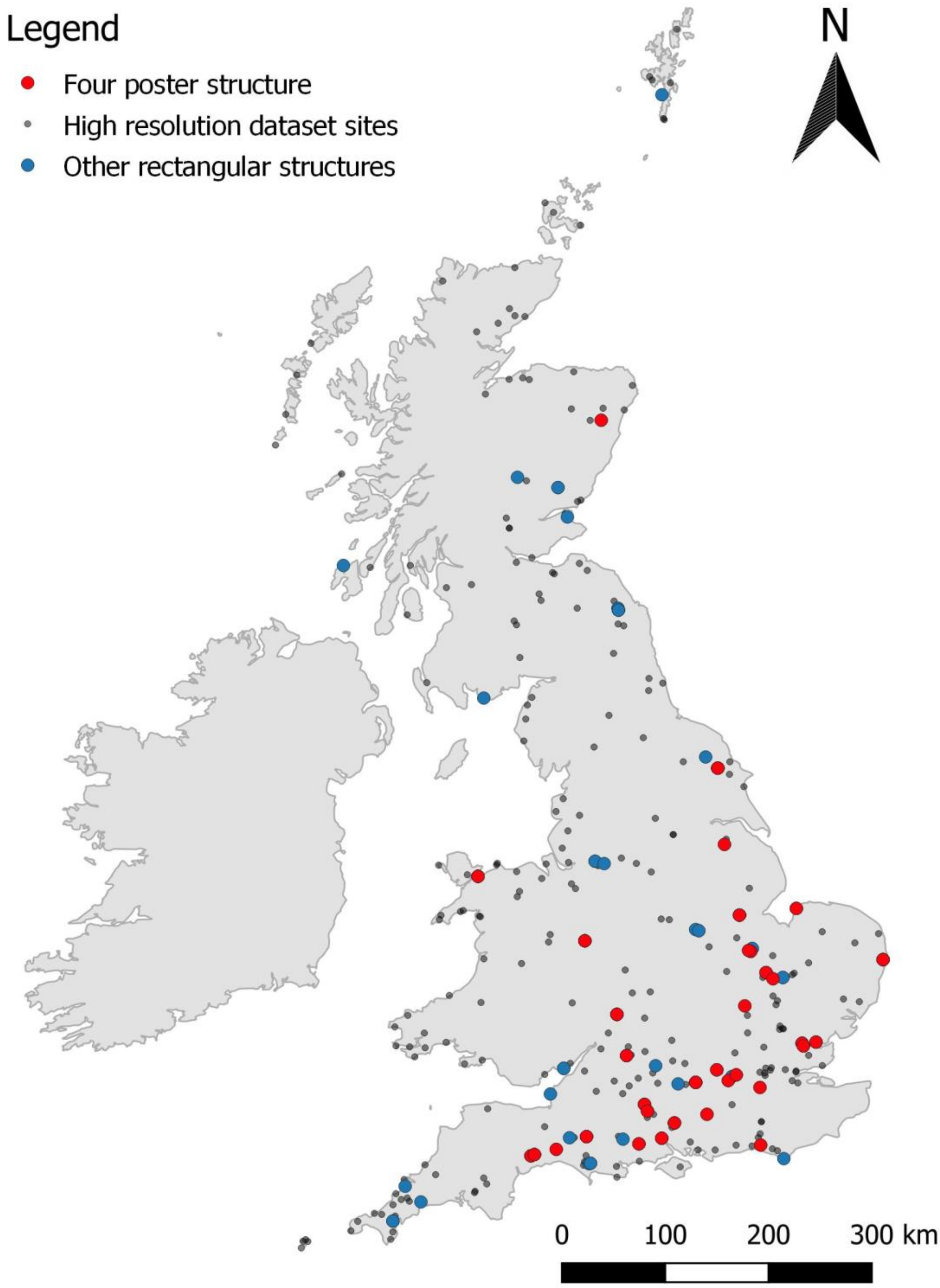

Figure 50 The distribution of those Bronze Age rectangular structures identified within the high-resolution database. Contains OS data © Crown copyright and database right 2019.

4.4.1.1.4 Chronology

Only 2 four post structures have been dated through the use of radiocarbon dates. However, 126 have been dated through other means. Those four posters that have been identified appear to be predominantly Late Bronze Age in date (Table 20).

Period	Frequency
BA	3
EBA	
EBA-MBA	
MBA	8
MBA-LBA	24
LBA	69
LBA-IA	22
BA-IA	
Undated	

Table 20 Chronological distribution of four poster structures from the high-resolution dataset

4.4.1.1.5 Distribution

They are found mostly in the south of Britain, with notably few in Wales, the south west of England, northern Britain and Scotland (Figure 50).

4.4.1.2 Rectangular structures

4.4.1.2.1 Quantity

61 structures have been described by the database as rectangular post-built structures made up of more than four posts, 58 of which were built of posts and 3 of which were built of stone.

4.4.1.2.2 Size

Dimensions were recorded for 44 of these structures. The shortest width recorded from one of these features range was only 0.8m whilst the largest recorded width was 18m. The average ratio of those that were rectangular was notably 1.97 times larger than those four post structures.

The average floor space covered by these structures is 26.9 square metres. 50% of these structures were between 10.3 and 44.2 square metres and the majority of structures (90%) have surface areas between 4m and 59.4m. 19 were larger than 25 square metres. The average ratio of those that were rectangular was 1.3.

4.4.2 Chronology

Unfortunately, only 10 rectangular structures have been dated through the use of radiocarbon dates. However, 126 have been dated through other means. Those four posters that have been dated appear to be predominantly Late Bronze Age in date, although Early and Middle Bronze Age examples were also identified whose surface areas were greater than 25 square metres (Table 21).

Period	Rectangular structures
BA	11
EBA	6
EBA-MBA	1
MBA	16
MBA-LBA	34
LBA	96
LBA-IA	29
BA-IA	
Undated	

Table 21 Chronological distribution of the rectangular structures identified from the high-resolution dataset

4.4.3 Distribution

They are found across England, Scotland and Wales, although it is notable the majority are placed near coastal regions along the Bristol Channel, along the south coast of England and the east coast of England and Scotland (Figure 50).

4.5 Table summaries

Category	Post Rings	Single rings	Double rings	Ring Groove	Stone architecture	Ring banks	Stonewalled roundhouses	Rectangular structures	Four posters
Count	585	497	50	34	160	46	114	193	126

Table 22 Quantities of different settlement structures found in Britain throughout the Bronze Age, from this study's high-resolution dataset

Period	Post Rings	Single rings	Double rings	Ring Groove	Stone architecture	Ring banks	Stonewalled roundhouses	Rectangular structures	Four posters
BA	23	21	2		17	8	9	11	3
EBA	32	30	1	3	14	3	11	6	
EBA-MBA	23	19	3	4	7	3	4	1	
MBA	119	107	11	9	29	20	9	16	8
MBA-LBA	109	93	13	7	74	8	66	34	24
LBA	191	174	17	7	8	2	6	96	69
LBA-IA	87	53	2	3	8	2	6	29	22
BA-IA	1		1		3		3		
Undated				1					

Table 23 Quantities of different settlement structures found in Britain throughout the Bronze Age, from this study's high-resolution dataset, by different periods

Category	Post Rings	Single rings	Double rings	Ring Groove	Stone architecture	Ring banks	Stonewalled roundhouses
Average	7.4	7.3	8.2	10.3	7.3	8.8	6.3
St,DevpS	2.3	2.4	1.9	2.7	3.4	3.1	3.3
Min	2.5	2.5	5.0	4.5	2.1	2.8	2.1
Max	20.0	20.0	12.5	19.0	16.0	16.0	14.5
0.25	5.8	5.5	6.9	8.9	4.2	7.0	4.0
0.75	8.5	8.5	9.4	11.3	9.1	10.0	7.8
0.05	4.0	4.0	5.5	6.8	2.8	3.9	2.5
0.95	11.5	11.5	11.3	14.3	14.0	14.6	14.0

Table 24 The diameter of those Bronze Age rounded structures identified within the high-resolution dataset

Category	Post Rings	Single rings	Double rings	Ring Groove	Stone architecture	Ring banks	Stonewalled roundhouses	Rectangular structures	Four posters
Count	47.2	383.0	38.0	28.0	72.0	29.0	43.0	104.0	57.0
Average	30.8	45.6	55.5	88.7	48.5	61.2	39.9	16.4	5.8
St,DevpS	4.9	31.8	26.1	50.5	40.8	32.8	43.7	20.6	7.4
Min	314.2	4.9	19.6	15.9	3.6	6.3	3.6	0.5	0.5
Max	26.4	314.2	122.7	283.5	165.1	153.9	165.1	122.3	51.8
0.25	56.8	23.8	37.7	62.7	13.6	38.5	12.3	4.0	2.6
0.75	12.6	56.7	68.9	99.5	64.9	78.5	47.2	24.0	5.6
0.05	96.6	12.6	23.8	37.2	6.0	11.7	5.0	2.0	1.5
0.95		95.0	99.9	161.2	153.9	109.4	153.9	51.8	14.4

Table 25 The floor area of all Bronze Age settlement structures, round or rectangular, of those identified within the high-resolution dataset

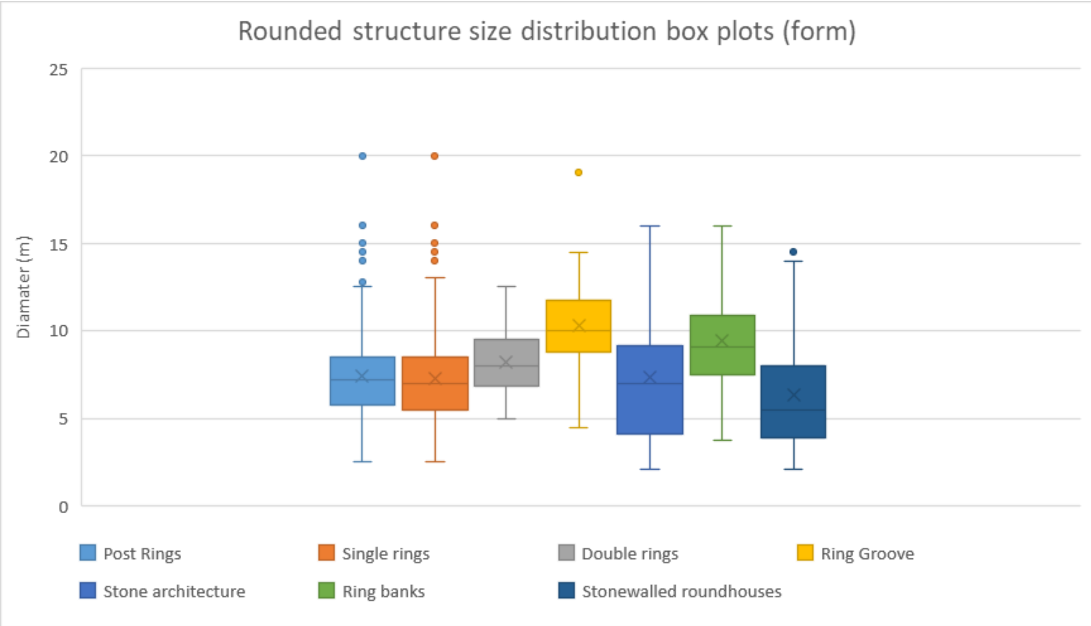

Figure 51 Boxplots displaying the size of those rounded structures within the high-resolution dataset divided by form

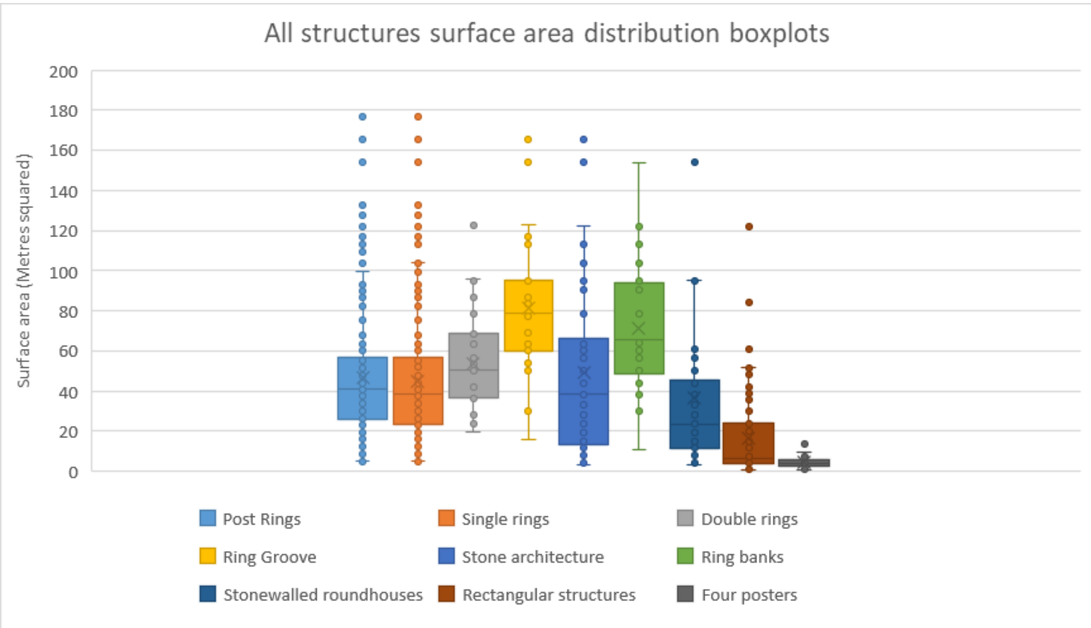

Figure 52 Boxplots displaying the surface area of all Bronze Age settlement structures, rounded or rectangular, identified within the high-resolution dataset

4.6 Discussion

The chapter has been able to identify the shape (RQ 1.1), size (RQ 1.2) and architectural features (RQ 1.3) of Bronze Age structures on settlement sites in England, Scotland and Wales. This discussion explores to what extent this data may be representative of the wider dataset identified. It then further discusses the shape of Bronze Age architecture (RQ 1.1), the changes seen in Bronze Age settlement structures over time (RQ 2.1) and concludes with a discussion on whether a formal spatial and temporal typology of Bronze Age settlement structures could be proposed (RQ 2).

4.6.1 How representative are the data of the wider samples identified?

This chapter has been able to establish the form of Bronze Age structures as identified by the project's high-resolution dataset (RQ 1). This dataset comprises those structures from Bronze Age settlement sites that have been excavated and are associated with at least one radiocarbon date. These 316 sites make up just over 1/5th of those sites identified in the coarse dataset as potentially containing a Bronze Age structure that have been excavated. In turn, this is less than 1/20th of those 6975 potential Bronze Age structures in the potential settlements dataset. As such, the nature of these results and their reliability must be discussed.

The analysis above encompassed a relatively low number of stone walled roundhouses when compared to the number of post-built structures. Such a pattern may be recognised within the numerous publications and reconstructions of Bronze Age settlement sites which typically depict post-built roundhouses with wattle and daub walls (Brown & Medlycott 2013; Garner, Allen, Wenban-Smith, *et al.* 2007; Burstow, Holleyman & Helbaek 1958 p.209; Collard, Darvill, Watts, *et al.* 2006 p.407; Hamilton 2002 pp.165–167; Jones 1998 p.44; Kelly, Conway, Williams, *et al.* 1988 p.133; Kendrick, Barclay, Cowie, *et al.* 1995 p.62; Toolis 2005 p.496). However, a large number of the 6975 sites in the potential settlement dataset, for example, the majority of those found in Dartmoor, were those made of stone walls and are found in numerous upland regions. These regions have had comparatively little archaeological excavation, and so little confirmation, that all such houses are Bronze Age. It is likely that the number of stone-walled roundhouses is therefore underrepresented in this study.

It is notable that regional architectural forms, such as the sunken floored roundhouse (see Figure 39), ring groove (see Figure 41) and ring bank (see Figure 34) architectural forms are also more spatially restricted than post-built roundhouses. It may well be that these architectural forms are underrepresented due to the lower intensity of excavation in these regions. Yet their low number and restricted distribution should still be contrasted with the high proportion of post-built roundhouses that are found throughout the vast majority of England, Scotland and Wales, excepting remote island locations such as Orkney.

4.6.2 How applicable are the results of this analysis if they may either under-represent or over-represent certain phenomena?

Only those sites with radiocarbon dates were targeted and used by the analysis above as a means to provide a level of temporal certainty, the lack of which has frequently required major revision to the Bronze Age settlement record (Chapter 2).

The benefit of this criteria has been that to limit the extent of developer-funded excavation bias towards the south of Britain (Chapter 6.2). By doing so, this chapter has been able to provide comparable research and syntheses of the entire national corpus of sites. Furthermore, such a scope has allowed a national analysis of Bronze Age structures, which has helped indicate the sheer variety in settlement structures not often represented in general summaries of the period, which often focus much attention on the Itford Hill form of post-built settlements (Chapter 2). It has identified those sunken floored roundhouses, ring grooves structures and chambered stone-walled roundhouses which may frequently be overlooked outside of regional reviews. As such, while the results above should not necessarily be taken as representing the proportions of Bronze Age settlement structures seen in the Bronze Age, they certainly reflect the variety of its forms (RQ 1), the presence or absence of these forms and their relative visibility within excavated and well published material.

4.6.3 When is a house a home? The shape and size of Bronze Age architecture

This chapter has divided Bronze Age settlement structures based on the general shape of their form between rectangular and rounded architecture. It has shown that the majority of structures are rounded, although there are a not insignificant number of quadrilateral structures occurring in addition to these (RQ 1.1). The general assumption for round structures is that they are domestic in nature, although their function may be limited to that of a secondary workspace for another structure (following Ellison 1978). Rectangular and square architecture are, by and large, interpreted as storage spaces as at Brigg's Farm, Cambridgeshire (Pickstone & Mortimer 2011 p.11), Lanton Quarry, Northumberland (Waddington 2009 p.24) and Hayne Lane, Dorset (Butterworth 1999 p.123) inspired by the work on four poster granary buildings (Gent 1983).

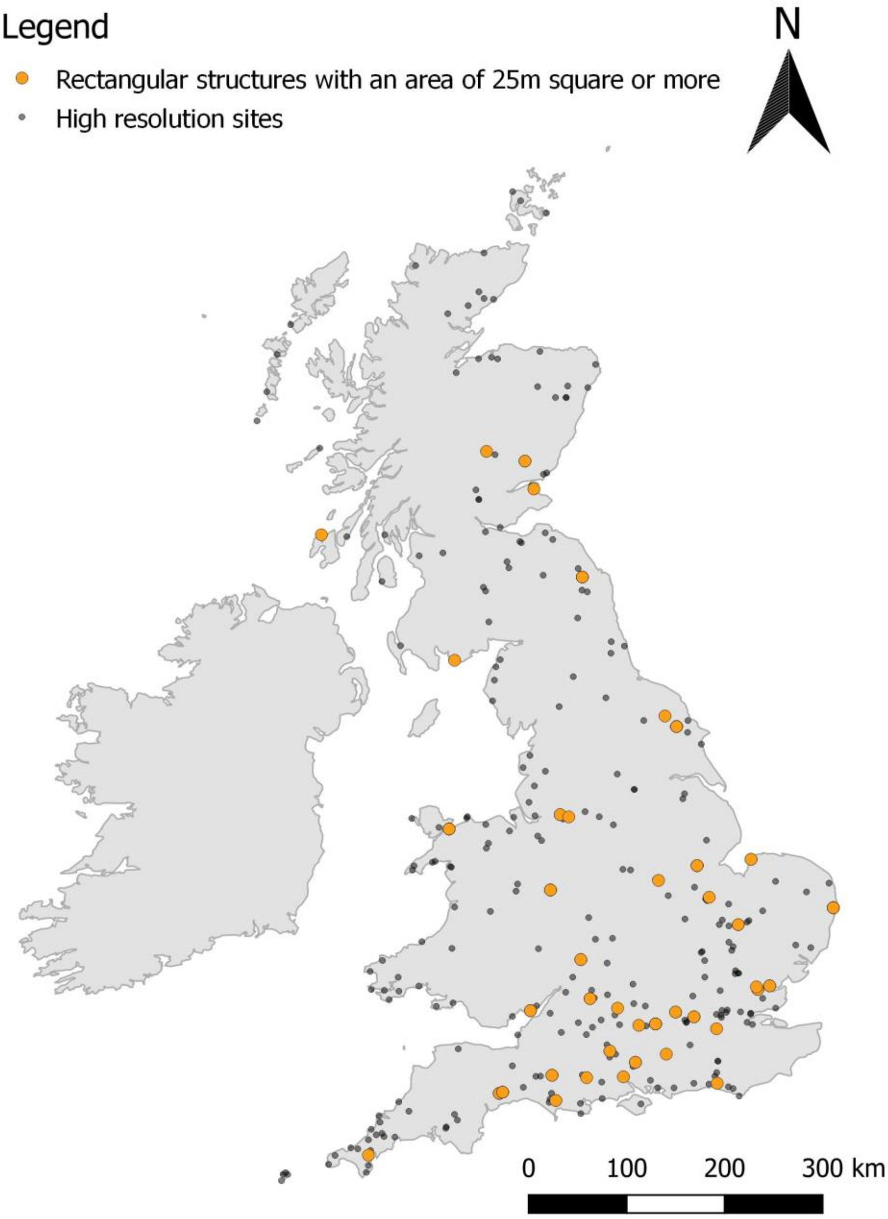

Figure 53 The distribution of those rectangular Bronze Age settlement structures with floor space of 25m² or larger. Contains OS data © Crown copyright and database right 2019.

However, the presence of rectangular buildings at Redwick, Severn Estuary, (Bell 2013) indicate that rectangular architecture can and did serve similar domestic functions. It is therefore appropriate to identify how many of these possible rectangular structures may in fact be primary habitation structures. When assessing the size of quadrilateral and rounded structures, it is clear there is a degree of crossover between the largest rectangular structures and the smallest roundhouses. Rectangular structures are on average are smaller, skewed no doubt by the presence of square rectangular granary structures, typically no more than 4 square metres in floor space. Only 16 rectangular structures have been identified from the dataset with a floor space greater than the average Bronze Age roundhouse, which is 46.9 square meters.

Yet, Late Neolithic settlement structures, as seen at the stone-built settlement of Skara Brae (Childe, Bryce & Watson 1931; Childe 1931), whose average floor space is c. 25 square metres, and the post-built structures at Durrington Walls (Craig, Shillito, Albarella, *et al.* 2015), have similarly limited floor space compared to Bronze Age roundhouses. This demonstrates that a lower surface area than those seen for Bronze Age roundhouses need not exclude a domestic function for a structure. As such, I would suggest that theoretically, any structure above 25 square metres may be treated as a *potential* house. If accepted, the number of potential domestic rectangular structures increases to 22 (Figure 53). This does not exclude the possibility that such structures were used for storage, as it will be hard to understand their function unless further internal features are identified. However, it does indicate that rectangular domestic architecture is present in Britain.

This understood, it is of value to understand the distribution of those 22 potential rectangular domestic structures whose surface area is equal to or greater than 25 square meters. Bradley (2016, 186, 2007, 194-5) has suggested rectangular domestic structures are placed predominantly near the channel and near the north coast. This chapter has identified rectangular houses of a size larger than the average roundhouse of all Bronze Age periods found across England, Scotland and Wales (Chapter 4.4.1.2.3), such that there does not appear to be a strong spatial component to their distribution. This said, this study has only focussed on those radiocarbon dated sites, such that further rectangular structures on sites without radiocarbon dates may have a more southerly distribution, but they may also further extend their use elsewhere.

4.6.4 How do Bronze Age settlements change over time?

This chapter has demonstrated that both rounded and rectangular formed settlement structures show a large degree of diversity in their size. However, there is little convincing data to suggest an upwards trend over time in the surface area of these structures (RQ 2.1). It has been discussed above (Chapter 2) that there have been long-standing assumptions that roundhouse size increased over time, becoming larger in the Iron Age, and that this requires investigation using the project dataset to determine if such patterns can be seen.

Period	Post Rings	Ghey et al IA
Count	457.00	84.00
Average	47.17	53.52
St. Dev	30.84	25.48
Min	4.91	18.10
Max	314.16	176.70
0.25	26.42	35.30
0.75	56.75	63.60
0.05	12.57	22.20
0.95	96.60	93.74

Table 26 A comparison of the floor space of Bronze Age settlement structures recorded within the project's high-resolution dataset to those roundhouse structures thought to date to the Iron Age in Wales

Ghey et al’s 2007 study suggest Iron Age houses have an average surface area of 53 square meters with 50% of sites ranging between 35.3 and 63.6 square metres . These statistics do suggest Iron Age houses are on average larger than those of the Bronze Age, however, this increase is only minor and it is clear that these size ranges show a large degree of crossover, such that roundhouse size should not be a means with which to date a prehistoric roundhouse (Table 26).

4.6.5 To what extent are the forms of structures seen regionally specific?

Barring the upland stonewalled roundhouses, it appears that the primary form of architecture identified is the single post ring, which is found throughout the majority of Britain. This does raise the question that if the predominant house type is a form seen so widely, can a region be said to have its own form of domestic architecture (RQ 2.2)?

Regionally, several attempts have been made to investigate Bronze Age settlement typology previous to this research. Pope, Jobey and Feacham’s (Chapter 2) work in the north of Britain has presented a consistent typology of settlements. In the south west of Britain, a particular architectural form (the sunken floored roundhouse) has been noted (Jones & Quinnell 2011), whilst a recent review by Davies has argued that these settlement structures should be categorised by the presence or absence of a porch (Type 1 and Type 2 roundhouses respectively) (2016, 39). It does appear that regional forms of settlement structure are identifiable, for example, in those structures seen in Orkney and Shetland (Whittle 1985; Mamwell 2018), those platform settlements seen frequently in the Scottish borders and northern-most parts of England , and in the sunken floored roundhouses of Cornwall. However, it is also correct to recognise that many of the architectural features discussed above can be identified in isolation in large numbers across the country. For example, the presence of ring banks, defined purely for northern England and Scotland, may be paralleled by retaining stone walls seen in Cornwall.

4.7 Summary

In the chapter above, the size, form and internal features of rounded Bronze Age architecture have been identified, in addition to the geographical and temporal spread of these found. It has also identified that many structures may be composites of these traits and are not represented by any single one of these. As such, those details above cannot be said to represent a typology of settlement. This raises the question of whether a typology can be formed, which can subsequently be investigated.

Such typologies have been suggested for limited regions (Pope 2015) and the resultd above would support that such regional architecture appears to be visible. Yet, despite taking a systematic approach to architecture by dividing structures into their constituent features, it is simply not possible to be confident in any national typology. A range of architectural features have been descibed, the periods in which they have been used identified and the regions in which they are found. While the primary design of Bronze Age architecture is circular, this hides a degree of variation in these houses' construction, such as the digging of sub-surface floors, the building of supporting walls out of stone or in the inclusion of features such as porches and hearths.

As such, there is a high degree of variability within and between sites. Houses may vary in:

- The material used for their walls
- The structural features that support their roofs and the combination of these
- Their size
- The preparation of their floors
- The presence/absence of features such as hearths, porches, storage pits, internal divisions

None of these traits show a straightforward chronological or spatial clustering at a national level. Instead, the data demonstrates that within the preference for a circular form of architecture, pragmatic choices were made within settlements, likely according to their specific preferences. As such, I would suggest that a national formal spatial and temporal typology for architectural features in the Bronze Age cannot be compiled for these data (RQ 2).

Chapter 5: *When did it all happen?* Establishing a diachronic framework for British Bronze Age settlements

"*Different types of chronological definition or different degrees of temporal knowledge will suggest different kinds of spatial pattern, ultimately obscuring and restricting our interpretation of the background process, especially in cases where we are seeking a diachronic perspective*"

(Crema, Bevan & Lake 2010 p.1)

5.1 Introduction

This chapter discusses time and Bronze Age settlement. In particular, it seeks to answer the following research questions:

RQ 3. How does the intensity of settlement structures in Britain vary across the Bronze Age? (Chapter 5)

> RQ 3.1 Can a model for the changing intensity of settlement occupation be identified with radiocarbon dates?
>
> RQ 3.2 Can any temporal differences be identified between when settlements were being constructed, occupied and abandoned?
>
> RQ 3.3 Can a model for the changing intensity of settlement occupation be identified through material culture?
>
> RQ 3.4 To what extent do models for the changing intensity of settlement made with radiocarbon dates and material culture align?

Intensity in this context is understood as the relative number of Bronze Age settlements, understanding that the dataset collected is a sample of known Bronze

Age settlements and so are not able to say the exact number of settlements known per time period.

The chapter answers these questions by meeting the following the objectives:

Objective 3.1 Assembling a representative database of radiocarbon dates that relate to Bronze Age settlement structures in Britain.

Objective 3.2 Assessing the quality of those radiocarbon dates that relate to Bronze Age settlement structures in Britain.

Objective 3.3 Modelling those high-quality radiocarbon dates to produce summed probability distributions for construction, occupation and abandonment phases of Bronze Age structures.

Objective 3.4 Assessing to what extent Britain's national gazetteers of radiocarbon dates indicate how the number of settlement structures vary across the Bronze Age.

The result of this chapter is the production of an evidence-based settlement chronology using relative and absolute dating techniques which highlights the biases inherent within each method. The meeting of the chapter's final objective allows an objective assessment of the radiocarbon model's validity and the likelihood that it will be revised in the near future. This is particularly important as two chronological narratives for settlement intensity are proposed. One using high quality radiocarbon dates which suggest a boom and then bust in the number of Bronze Age settlements. The other based on established relative chronological dating which suggests a continuing acceleration in the number of Bronze Age settlements being occupied. The former model also establishes a narrative for the tempo of settlement, construction, occupation and abandonment. Together they form the basis for the diachronic analysis of settlements throughout the rest of the thesis.

5.2 Means of establishing a chronology

Some of the most basic, yet vital, questions that can be asked of any archaeological phenomena are: when did that phenomenon first appear; when did it disappear; and was there any change in the phenomenon's intensity over time? The answers to these questions, and their subsequent interpretation, rely heavily on the method(s) used for creating such a chronology. While in some circumstances different methods might produce complementary narratives, in others the narratives may disagree (see Chapter 2's discussion of ceramic and metalwork typo-chronology for a contemporary case study in this). As such, a small discussion on the means available to produce chronological narratives is required that can identify where such disagreements might arise.

5.3 Absolute chronologies

One of the primary issues with use of the relative chronologies used within historic environment records (HERs) is that they rely on existing chronological schema, such as dividing the Bronze Age into three "bins", which do not reflect either the rate of appearance of Bronze Age settlement or the social reality of the time, being an archaeological ordering of time that the Bronze Age inhabitants would neither have distinguished nor experienced in their everyday lives (Mizoguchi 1993). Similarly, they may mask fluctuations in the settlement record that might have occurred during a single time period, such as the Middle Bronze Age, where the same forms of material culture are being used throughout. This is a particular problem in the Bronze Age, where the most abundant finds, ceramic and flint, often provide the poorest resolution schema. In particular, flints provide extremely limited chronological information due to their coarseness typically only being able to indicate the nature of activity of a site (McLaren 2008 pp.153–154; Ford 1987), whilst ceramics at best may indicate a possible date within a bracket of several hundred years (see Table 5). The material that may provide a higher resolution narrative, metal (Burgess 1980; Needham 1996; Needham, Ramsey, Coombs, *et al.* 1997; Roberts, Uckelmann & Brandherm 2013), is rarely found on settlement sites. Furthermore, those metal and metal-related artefacts that have been found are often either residual or represent curated artefacts (Knight 2019), such that they are often not representative of the primary occupation of the settlement. Radiocarbon dates provide an alternative means of producing a chronological narrative, not tied to these issues. Absolute chronologies theoretically avoid this problem studying phenomena at whatever resolution is necessary or permitted by the method employed on a consistent time scale. However, using radiocarbon dates also present their own biases and issues that must be discussed (Chapter 5.4.2 and below).

An often-cited issue is that plain observations of radiocarbon probabilities alone are often misleading or have been misinterpreted in archaeological reports due to the nature of the data depicted (Ramsey 2009 p.339). In particular, dates are sometimes understood as representing the actual use period of the activity dated when, in fact, they represent the probability of a single event occurring at one point in time which may not relate to the duration of use of a site. Similarly, it has been recognised that the statistical scatter and probability of the event occurring within the graph is often under discussed (Bayliss, Bronk Ramsey, van der Plicht, *et al.* 2007 p.9).

Some issues are beyond the control of those researchers outside of the laboratories that obtain radiocarbon dates, such as the biases and differences in chemical pre-treatment in the laboratory. Yet many are within the remit of this study to control for. Of primary significance for this research project is understanding *what* material is being dated, and the issues in the resultant date this will present, *how* this date relates to the feature from which the sample has been taken, before finally understanding this feature's *relationship* to the research questions in mind.

5.4 Creating an absolute chronology for Bronze Age settlements

5.4.1 The raw dataset

The primary data identification phase of this study identified 316 Bronze Age settlements sites that were likely to contain at least one radiocarbon date associated with a Bronze Age settlement structure (Chapter 3.6). However, radiocarbon dates from only 293 of the 316 settlement sites were identified and recorded. Literature from 23 (7.3%) of the 316 sites settlements sites was either unobtainable or did not record any radiocarbon dates for said sites. A total of 3116 radiocarbon dates were identified and recorded from those 293 settlements sites.

Although this list should not be regarded as total, it being possible that settlements that have been radiocarbon dated but whose HER record shows no indication of this may have been missed as well as those 23 sites that are also likely to have had radiocarbon dates not being included, it is believed this represents the vast majority of all published high-quality radiocarbon dates associated with a Bronze Age settlement in Britain up until 2014. In order to confirm this, the radiocarbon dates gathered were cross-checked against an archive of radiocarbon dates said to represent 75% of all those in Britain and Ireland (Bevan et al. 2017). As no additional dates were identified, this means this thesis' database, at a minimum, represents 75% of those dates from Bronze Age settlement sites. Furthermore, the quantity of dates is such that those that have been missed within the literature are unlikely to significantly change the results of the following discussion (see Chapter 5.7.2).

5.4.2 Data quality and refinement

3116 radiocarbon dates from the 293 Bronze Age settlement sites dates were identified. However, not all of these dates related to the Bronze Age settlement at these sites and many were taken from samples with material less than ideal for studying the occupation of such a site. As such, each radiocarbon date's relevance to the study had to be assessed in addition to the date's quality.

Ideally radiocarbon dating material quality should be based on the following criteria:

1. The dating technique employed.
2. The lifespan and coherence of the dated material.
3. The sample's relevance to the structural feature's construction, occupation or abandonment.

By including these criteria for each date, no radiocarbon date needed to go unrecorded, such that the radiocarbon database of this project includes the vast majority of prehistoric radiocarbon dates associated with excavations of each settlement site, even if not dating Bronze Age activity. It is hoped that, in providing this detail, it will be possible for future research to assess the continued use of settlement sites throughout time.

5.4.2.1.1 Dating method

AMS radiocarbon dating is more accurate at obtaining the date of the sample obtained (Hedges, Mook & Margaritz 1987) and it has also been suggested that all pre-1980s dates should be treated with caution (see Sheridan 2007). Unfortunately, the dating technique used for most reports was not identified nor specified, such that if only those dates whose dating method could be identified were used, the sample obtained would be too small to perform any analysis. As such, a decision was made not to rank radiocarbon dates based on their method.

5.4.2.1.2 The lifespan and coherence of the dated material

When obtaining a radiocarbon date from a structure the ideal material sampled would be well-preserved wood from a structural timber of the building itself. Failing this rare scenario, other material is sampled for the dating of Bronze Age settlements. In doing so, it is now widely understood that single, short-lived species provide the most suitable material for understanding the date of features (e.g. Ashmore 1999). In essence, samples taken from short life span specimens are more likely to reflect the date of the feature’s in-filling. Examples of such specimens include human or animal bone (ideally articulated), cereal grains or charcoal samples from hazel, alder, and willow. Similarly, these samples should ideally come from the same specimen or same part of the specimen instead of being grouped from amalgamated material. Unfortunately, it is not always possible to obtain such specimens, such that it is still not uncommon for mixed samples to be dated (224 of the 3116 are of mixed samples). As such, the material dated had to be assessed and rated for its suitability for study.

5.4.2.1.3 The feature's relevance to the structural feature's construction, occupation or abandonment

It has long been recognised that the association between the material dated and the context and feature that is being investigated is also vital when using radiocarbon data (Waterbolk 1971). If, for example, the material dated is intrusive or has been curated before deposition it may not represent the time of the feature's placement (for example see Pearson, Chamberlain, Craig, *et al.* 2005 pp.536–537 where earlier human remains are found within a later settlement context). Similarly, in recognising the importance of making clear the relationship of a radiocarbon date to the research questions intended, it is important to be clear on the associations listed with each radiocarbon date.

This study is primarily interested in the use of Bronze Age settlement spaces. In particular, it is targeting domestic architecture, therefore, the radiocarbon dates quality had to be assessed on the direct relationship to a structural feature of a Bronze Age settlement and then be categorised to make clear its relationship to either its construction, occupation (noting that some settlements may have more than one phase of occupation), or abandonment.

This study assumes that material obtained from sealed habitation surfaces, such as hearths or floor surfaces, or the fills of features in use during the occupation of the site, such as ring gullies or primary fills, are understood as representing the direct remains of habitation and so date the occupation of the structure. It do so based on the assumption that any domestic cereal in settlement related features (post holes, ditch fill, pits) relate to crops cultivated by inhabitants of, and during the use of, that settlement site. This may not be true in all instances if, for example, material such as grain has been redistributed, yet to identify this possibility is beyond the scope of this study and to rule out this material due to this uncertainty would require eliminating the vast majority of available radiocarbon dates.

Structural features whose fills were described within their publications as being deposited during the construction of the settlement were understood as representing the construction of the settlement. These features include post pipes, the primary fills of post holes, or timber from surviving structures.

It is recognised that some Bronze Age settlements show signs of “ritual abandonment” (Nowakowski 2001), such that the fill of post holes may reflect an event of the site’s abandonment or even occupation if the material placed is from that which has been cut during the site’s occupation. As such, the database has identified where ritual deposits were identified within post holes and labelled these as relating to either an occupation or abandonment phase, although the majority of post holes were assigned to construction phases on the above justification.

Contexts such as dispersed internal post holes or stake holes, or internal or external hearths are recorded within the thesis’ database. These may not directly relate to particular structures. As such, they were recorded as their own feature. As these features do represent occupation in the vicinity of Bronze Age settlement the analyses below assess the effect of their inclusion or exclusion.

5.4.3 The final data set

The data obtained for the 3116 radiocarbon dates was variable in quality and accessibility, such that not all the desired information could be retrieved in all instances. Statistics for the quantity of detail obtained are detailed in Table 27.

Category	Count	% of 3116
Number of dates collected	3116	100%
Lab ID codes identified	3085	99%
Lab Age identified	3088	99%
Error Margin identified	3084	99%
Material information identified	2979	96%
Species details identified	2481	80%
Those placing activity in the Bronze Age	1799	58%
Relevance to Bronze Age settlement known	1174	38%
Direct structure relationship	1136	36%
Delta 13c identified	686	22%

Table 27 Statistics for the quantity of information possible to place within the study database

Of the 3116 radiocarbon dates, 1799 produced calibrated dates within the Bronze Age (c. 2400 – 800 cal BC). Those dates which did not in part cross this Bronze Age time span were eliminated from the study (Table 28).

Category	Count
Total C14 dates	3116
Those placing activity in the Bronze Age	1799
Features dated	480
Bronze Age sites	293

Table 28 The number of Bronze Age sites and features with radiocarbon dates

Of these 1799 radiocarbon dates, 1140 samples were found to relate to Bronze Age settlement occupation either by directly dating a Bronze Age settlement structure or a feature contemporary to one (Table 29). The remaining 659 dates were therefore eliminated from the study.

Category	Count
Those placing activity in the Bronze Age	1799
Material classification	1414
Relevance to site identified	1372
Confirmed relevance to the study	1140
Bronze Age structures	430
Bronze Age sites	266

Table 29 Organisation and division of radiocarbon dates in the study, to use only those directly assigned to Bronze Age structures

Of the remaining 1140 radiocarbon dates, 904 samples had information recording the material selected for dating, allowing comments on their quality to be made. Whilst this grading of quality was subjective, being assessed by myself, ranking the quality was essential in determining the reliability of the radiocarbon dates. 785 of these 904 dates were of good quality or higher (mixed species with life <200 years or better). The remaining dates were eliminated from the study (Table 30).

Category	Count
Actually relevant to the project	1140
Material classification	904
Acceptable dating material	785
Bronze Age structures	370
Bronze Age sites	229

Table 30 Further division of useable radiocarbon dated structures by reliability

Of these 785 radiocarbon dates, 413 dates could be directly related to at least one phase of either construction, occupation or abandonment of a Bronze Age structure. These 413 dates came from 178 Bronze Age structures taken from 87 settlement sites (Table 31).

To summarise, of the original 3116 radiocarbon dates, only 413 have been able to be classified as high quality and suitable for answering this project's research questions (Figure 54). Those 413 dates were each recalibrated using IntCal 13 using the OxCal program v4.3.2 (Ramsey 1995, 1997, 1997, 2009) and the results are made available within the thesis' supporting materials (Appendix 1). The resulting sampling intensity is 25.6 dates for every 100 years and 0.002 dates per square kilometre, albeit with considerable local variation (with notable absences in Kent; the Highlands of Scotland, Oxfordshire, southern Wales and much of northern Britain). It is now possible to use these data to construct a chronology for the use of Bronze Age settlement in Britain.

Category	Count
Acceptable dating material	785
Phased relevance known	413
Bronze Age structures	175
Bronze Age sites	88
Separate construction, occupation or abandonment phases recorded	215

Table 31 Final organisation of radiocarbon dated Bronze Age sites, of those found to directly relate to one phase of Bronze Age construction, occupation or abandonment

At a basic level, the total number of British dates is proportionate to that gained from a similar study to this thesis in Ireland which identified 700 radiocarbon dates from 150 sites, 144 of which were high quality dates which came from 67 settlement sites (Ginn 2012 p.75). While the number of dates in Ireland is smaller, the scale seems appropriate bearing in mind the size of the area studied compared to this study, which is approximately one third of that of England, Scotland and Wales combined.

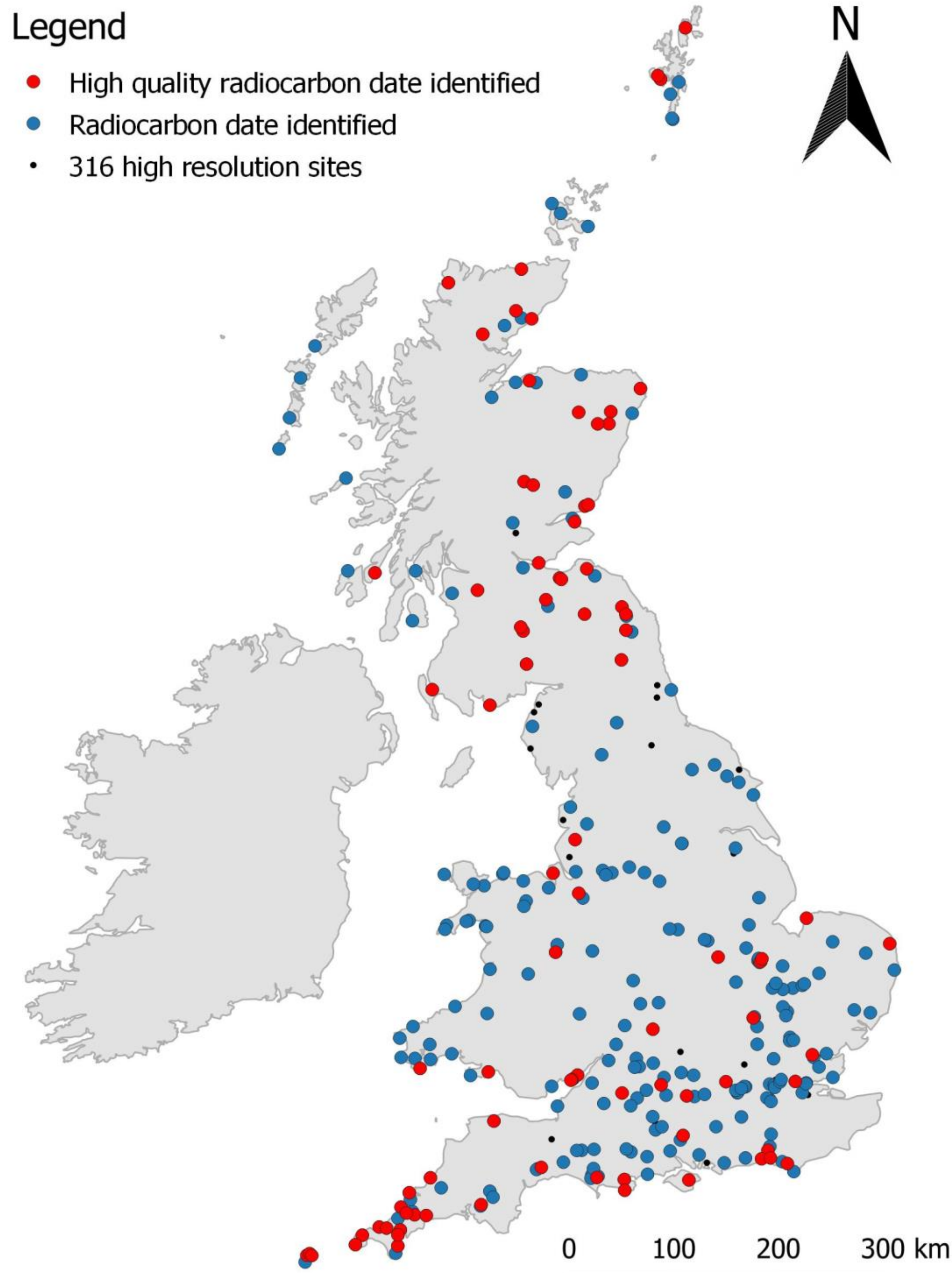

Figure 54 The distribution of sites with radiocarbon dates before and after the data had been filtered based on quality. Contains OS data © Crown copyright and database right 2019.

5.4.4 Specific biases recognised in the study

Bevan et al. (2017) have raised concerns that archaeological sites that have a large number of radiocarbon dates might skew any summed radiocarbon curves (Bevan, Colledge, Fuller, *et al.* 2017 Supporting information page 1). Similarly, it is possible that certain archaeological sites or site phases have garnered disproportionate and misleading numbers of dates (*ibid)*. Bevan et al's (2017) solution to this has been to pool adjacent dates from the same site and re-scaling these sub-site clusters before summing distributions between different sites. In this study's case, a choice has been made to combine multiple dates from the same structure (see below) and to identify the number of structures per site recorded to make clear any such bias.

Additional biases arise from regionally varying investment in modern housing construction, especially in commuter-belt areas (Figure 54). Furthermore, despite the unusually good mix of dates from both developer-led archaeology and traditional academic research projects, certain well-resourced archaeological sites have garnered unusual concentrations of dates (for example, the Neolithic flint-mining site at Grimes Graves with 307 dates). As such, the analyses below make clear the extent to which they are overly reliant on specific settlement sites or structures.

5.4.5 Bayesian analysis

5.4.5.1 Do the radiocarbon data show when Bronze Age settlement architecture began/ended?

Independently, the radiocarbon dates gathered could provide an estimate for a settlement's period of construction, occupation or abandonment. However, it is not uncommon to combine these dates for several purposes. Frequently, dates are used together to create models for the use of settlement sites (see Table 32). These rely on the use of Bayesian statistics, which allows more refined chronologies of events to be produced. These have been particularly useful in the last decade for certain site reports to produce high resolution chronologies of sites such as Bestwall Quarry (Bayliss, Bronk Ramsey, Cook, *et al.* 2009), Hartshill Copse (Collard, Darvill, Watts, *et al.* 2006) and Runnymede Bridge (Needham & Longley 1980). Such high-resolution narratives have been produced at 12 sites (see Table 32).

Macro Name	Region
Gwithian	Cornwall and Scilly
Downsview: MBA settlement	East Sussex
Hartshill - Settlement	West Berkshire
Higher Boden	Cornwall and Scilly
Late Bronze Age site, Runnymede Bridge	Surrey
Neolithic and Bronze Age occupation at Cheviot Quarry North (Area 1)	Northumberland
Multi-Period Settlement at Bradford's Brook	Oxfordshire
Sipson Lane [Imperial College Sports Ground] Hillingdon, UB3 {Bronze Age Occupation}	Greater London
Springfield Lyons	Essex
Stansted Airport 1 AIP MTCP Site	Essex
Newton (Llanstadwell, Waterston)	Pembrokeshire
Huntsman's Quarry, Kemerton	Worcestershire
Bestwall Quarry	Dorset

Table 32 Existing published high-resolution narratives of Bronze Age settlement sites in Britain (up to 2015)

The method relies on combining collected data about a question with additional knowledge (prior beliefs) to generate new understanding based upon both standardised likelihoods and prior beliefs (see Bayliss, Bronk Ramsey, van der Plicht, *et al.* 2007 for a detailed discussion of the Bayesian method). In the majority of these cases, these prior beliefs rely on stratigraphic relations. While on a site by site basis these assumptions allow a tighter chronological narrative to be produced which may identify further unseen phases of activity or reduce the possible lifespan of each settlement (Needham & Longley 1980; Collard, Darvill, Watts, *et al.* 2006; Ladle & Woodward 2009), these same assumptions and models can be used to understand the appearance, use and disappearance of discrete archaeological phenomena, such as particular forms of ceramics (Law 2009; Wilkin 2013; Sheridan 2007, 2003; Woodward 2009; Nowakowski 2012), the exploitation of certain resources (Stevens & Fuller 2012; Bishop 2015) or the move to particular forms of architecture (Ginn 2012, 2016). This same method can be applied to the dataset to identify potential start and end boundaries for specific Bronze Age domestic structures in Britain.

In this instance, such modelling is not necessary to identify a start or end date as it is clear when looking at the calibrated radiocarbon dates that phases of settlement date from the earliest years of the Bronze Age, as at Standrop Rigg, Northumberland (Jobey 1983), Trelystan, Cornwall (Britnell, Darvill, Dresser, *et al.* 1982)and Redgate, Norfolk (P.Chowne, F.Healy, R.Bradley, *et al.* 1993). Similarly, settlement structures have also been dated to the latest years of the Bronze Age as at Aveley Road, London (Greenwood 1986), Taplow, Buckinghamshire (Allen, Hayden, Lamdin-Whymark, *et al.* 2009) and Ross Bay, Kirkcudbright (Ronan & Higgins 2005). These sites and the number of structures dated between the Early and Late Bronze Age (Chapter 5.4.5.2.1) makes it clear that there are domestic structures that date to all parts of the Bronze Age from 2400 cal BC to 800 cal BC. This shows that settlement architecture was used across the entire Bronze Age, a finding that should be unsurprising as there are ample structures known, albeit a few that date to the Neolithic and plenty that date to the Iron Age. Of more value to this study is understanding the tempo of settlement, namely how often settlements were built and then occupied or then abandoned in Britain over the Bronze Age.

5.4.5.2 What is the tempo of Bronze Age settlement construction, occupation and abandonment?

5.4.5.2.1 Summed probability distribution analysis: a quick background

Over the past 20 years, a key means of studying settlement intensity has been the summing of radiocarbon dates to produce cumulative frequency graphs. Typically, in these studies (Ginn 2012, 2016; Stevens & Fuller 2012; Bevan, Colledge, Fuller, *et al.* 2017; Crema, Habu, Kobayashi, *et al.* 2016; Torfing 2015; McLaughlin, Whitehouse, Schulting, *et al.* 2016; Williams 2012) , radiocarbon dates are gathered for either a particular class of material or for a particular region and then their calibrated ranges are summed together. These produce a cumulative distribution which has often been interpreted as representing the frequency of human activity over time, despite it being noted that the dated events need not reflect the actual activity occurring at the time (Bayliss et al. 2007, 1- 13). Similarly, when conducting studies involving summed probability graphs, it is important to be aware of considerations such as plateaus and steeper parts of the radiocarbon calibration curves, which result in discrepancies in refinement and issues in the final visual result produced (see for instance Needham 2007).

Summed probability distribution analysis is not without critique, their results often being suggested to be too general (a good example of such a critique being Bishop 2015) but they have also been supported by numerous large impact studies (see above) and occasional instances where the method has proved to accurately reflect supporting records, such as the summed radiocarbon dates for Irish prehistoric trackway sites (Plunkett, McDermott, Swindles, *et al.* 2013). Other archaeologists have used them as they also provide a graphic display of the spread of dates which is easily comparable to other monuments or datasets for which similarly derived distributions are available, as such summed probability distributions remains a useful tool (Schulting, Murphy, Jones, *et al.* 2012). It is necessary then to conduct a similar analysis of the dates collated in its database using this method. Using only the high-quality radiocarbon dates from this study, a basic Bayesian model was produced, which assumed that all the dates belonged to a single broad phase of activity (representing the Bronze Age), the chronological sequence of which is unknown.

5.4.5.2.2 Summed probability distribution analysis: methods

All 413 radiocarbon dates from 87 sites were chosen for modelling. It should be noted that it has been suggested that for such studies any plots with less than c. 200 radiocarbon dates should be treated as provisional (Williams 2012) as they are likely to change with future dates. Ideally, such studies should have at least 500-780 radiocarbon dates (Williams 2012). This study has been able to obtain this number of radiocarbon dates, to the extent that a single summed radiocarbon probability distribution of Bronze Age settlements may be applicable. However, the dates obtained relate to at least one phase of either the construction, occupation or abandonment for 175 individual Bronze Age structures. By design, these do not record the same phenomena, such that a summed distribution of each of these materials should not be relied upon without interrogation. Instead, three plots have been produced each representing the different phases. In practice only a minority of dates (n=26) could be used to indicate the abandonment of Bronze Age settlements, however, sufficient numbers indicating the occupation (n=224) and construction (n=179) of settlement were obtained for a fair comparison.

It is recognised that an issue with such analyses is that some sites may be more thoroughly dated than others. This can lead to a skewing of results which in fact overly reflects these particular sites rather than the dataset as a whole. In this study's case, this can apply when one settlement structure's phase of use is dated far more extensively, or if an entire settlement was disproportionally investigated. As such, when possible and appropriate, dates from the same phase of the same structure were combined (OxCal function: R_Combine), and the combined date used within the model. The limitation of this method is that if a site with many structures or many structural phases were investigated, such as Bestwall Quarry (Ladle & Woodward 2009), any resultant curve may disproportionally weigh towards this site's unique characteristics. To investigate this possibility, the sites with far more radiocarbon dates were first included and then excluded. The resultant models show little to no difference, such that this was not a concern.

It should be noted that when combining these dates as stated above or dividing them into distributions representing construction, occupation or abandonment, that the total number of samples considered is in effect reduced. As such, the record is still not ideal for this form of analysis. This said, a shorter time scale has been chosen for the study than is typically used for summed probability distributions, while the number of dates is far in excess of studies of a similar scope (Ginn 2012, 2016; Law 2009; Needham, Ramsey, Coombs, *et al.* 1997; Wilkin 2013).

5.4.5.2.3 Summed probability distribution analysis: results

5.4.5.2.3.1 Summed probability of all dates (all merged)

An initial distribution was first created using all high-quality dates that could confidently be related to a domestic Bronze Age structure. This analysis uses the 413 dates associated from 175 structures across 88 sites. These sites are mostly well distributed across the majority of England, Scotland and Wales, although there are notable absences of sites in the north east of England and Kent. The highest number of dates (19) came from the platform at Caldicot Castle Lake (Nayling & Caseldine 1997), whilst the largest number of structures were from Bestwall Quarry (12) (Ladle & Woodward 2009). Neither of these are greater than 7% of the study population, such that it is unlikely that the distribution overly represents either a single well excavated structure or a single extensively dated settlement. These dates were then modelled following the methods outline above. The two cumulative frequency distributions graphs (one prepared without modelling and one with) are mostly complementary.

The results of the analysis (Figure 55 to Figure 57) show that the quantity of domestic structure in the Early Bronze Age was low. Then, following 1700 cal BC, there is a sharp increase in the number of settlements constructed. This upwards trend lasted until approximately 1400 cal BC. A little after this time, the frequency of dates, and so potentially domestic structures, decreases, albeit not to a point as low as in the Early Bronze Age, before rebounding again to a slightly higher rate in the Late Bronze Age, at around 1000 cal BC.

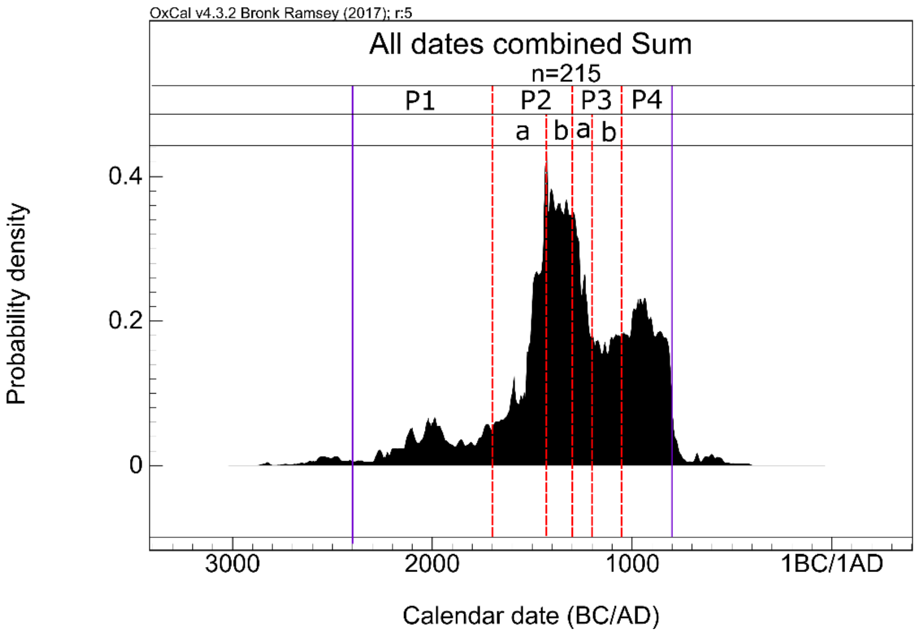

Figure 55 A summed probability distribution graph of modelled high-quality Bronze Age radiocarbon dates directly associated with a Bronze Age structure in Britain. These dates have been modelled to prevent over representation of structures with more than one date. This is overlaid by a proposed chronological model, the detail of which are explained below

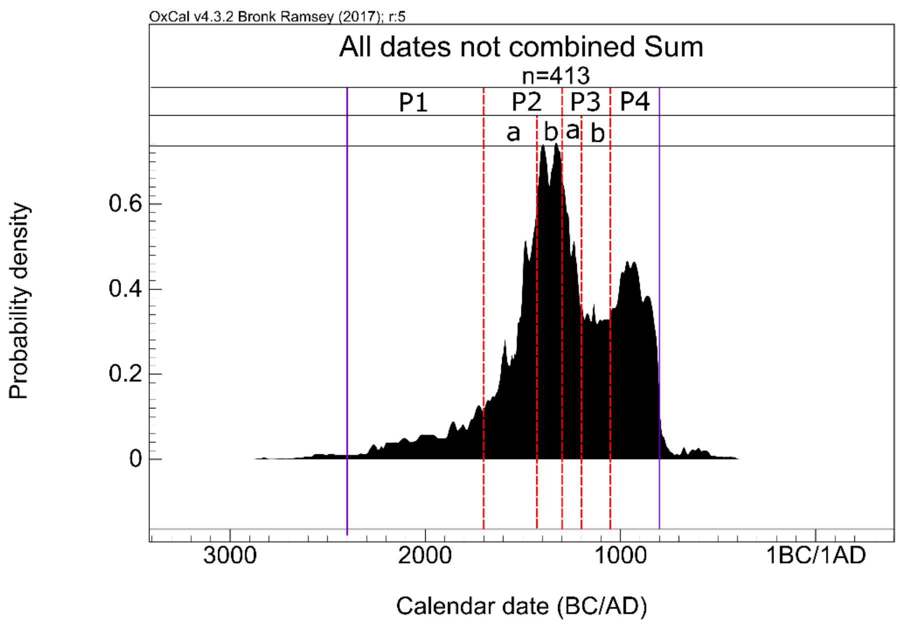

Figure 56 A summed probability distribution graph of all high-quality Bronze Age radiocarbon dates directly associated with a Bronze Age structure in Britain. These dates have not modelled such there is a possibility of over representation of structures with more than one date. This is overlaid by a proposed chronological model, the detail of which are explained below

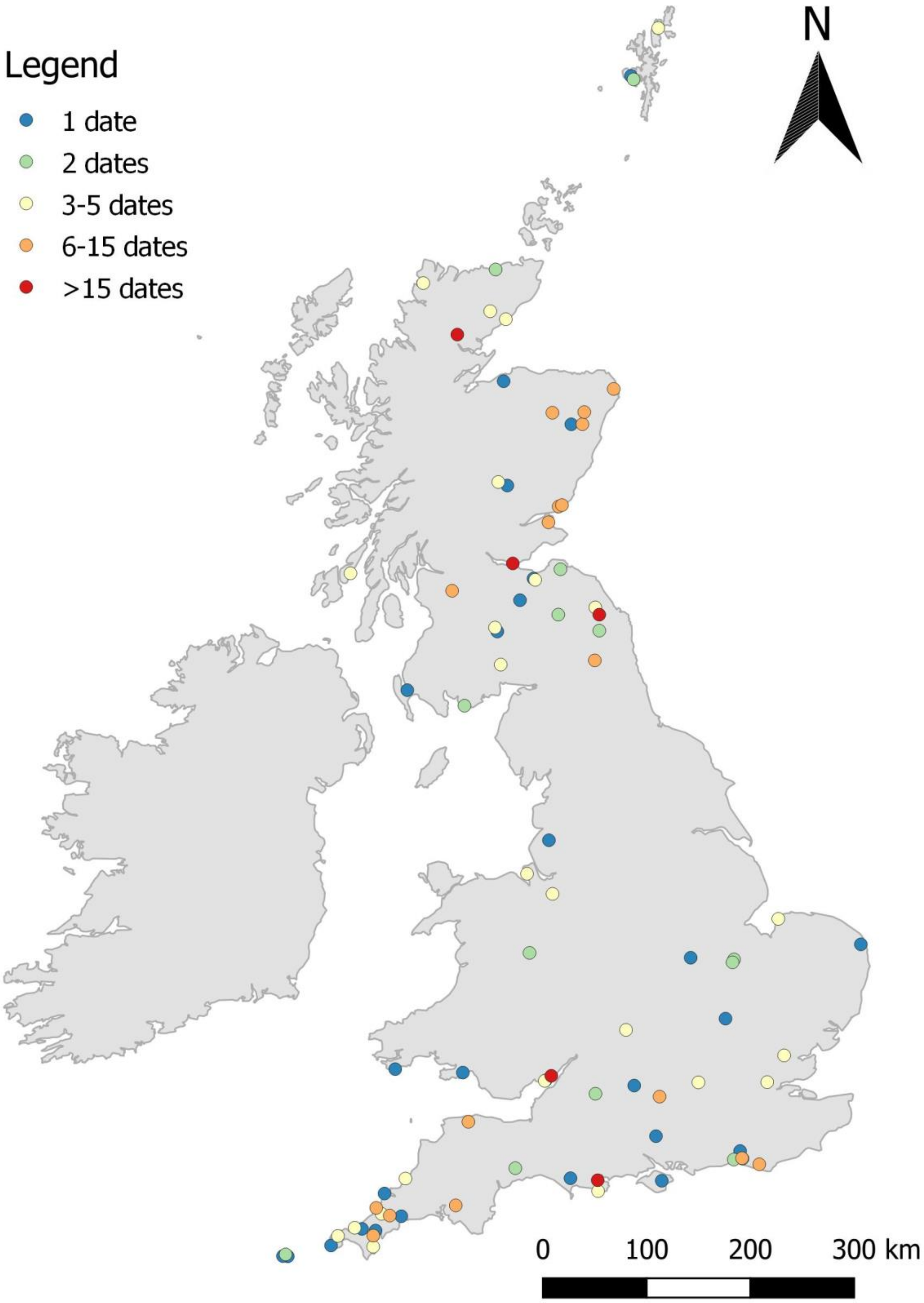

Figure 57 The distribution of all high-quality radiocarbon dates used within this chapter for the diachronic model. The number of dates per structure are identified by the colour of each dot. Contains OS data © Crown copyright and database right 2019.

While both cumulative frequency graphs agree with this overall narrative, some differences do exist. Notably, the uptake in settlement at 1700 cal BC is far starker when using those unmodelled radiocarbon data, whilst the decline and then increase in settlements following this point is more exaggerated within the modelled data. The former issue can be explained by the large number of late Early Bronze Age dates from certain sites that in effect needed modelling to better reflect the appearance of structure. The potential reasons for the latter difference will be made clear in the sections below.

The results above provide a narrative which represents Bronze Age settlement construction, occupation and abandonment. However, these events should be chronologically distinct, and assuming settlements were used for a consistent amount of time, offset from one another. As this possibly could skew the results of the analysis above, each subset of this data will now be discussed.

5.4.5.2.3.2 Settlement construction

179 radiocarbon dates pertain to the construction of a Bronze Age structural feature (46) or were taken from postholes (133) assigned to the construction phases of that structure. Together these data represent 77 structures across 48 sites.

The highest number of dates (19) came from the platform at Caldicot Castle Lake (Nayling & Caseldine 1997), whilst the largest number of structures were from the Upper Forth crossing (6) (Ladle & Woodward 2009). The proportion of dates from Caldicot forms slightly more than 10% over the study population while the Upper Forth crossing makes up less than 8% of the study population. It is unlikely that the

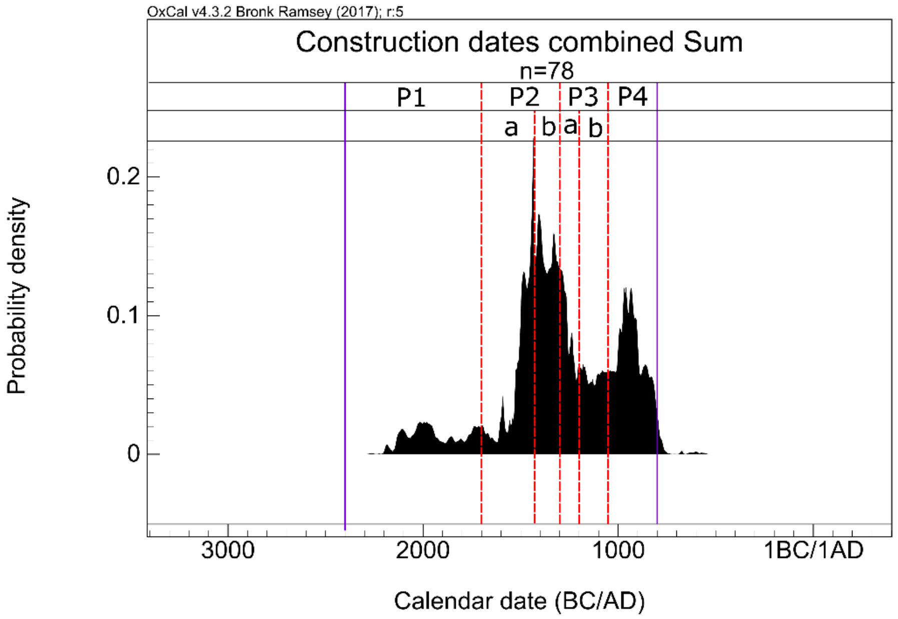

Figure 58 A summed probability distribution graph of modelled high-quality Bronze Age radiocarbon dates directly associated with the construction phase of a Bronze Age structure in Britain. These dates have been modelled to prevent over representation of structures with more than one date. This is overlaid by a proposed chronological model, the detail of which are explained below

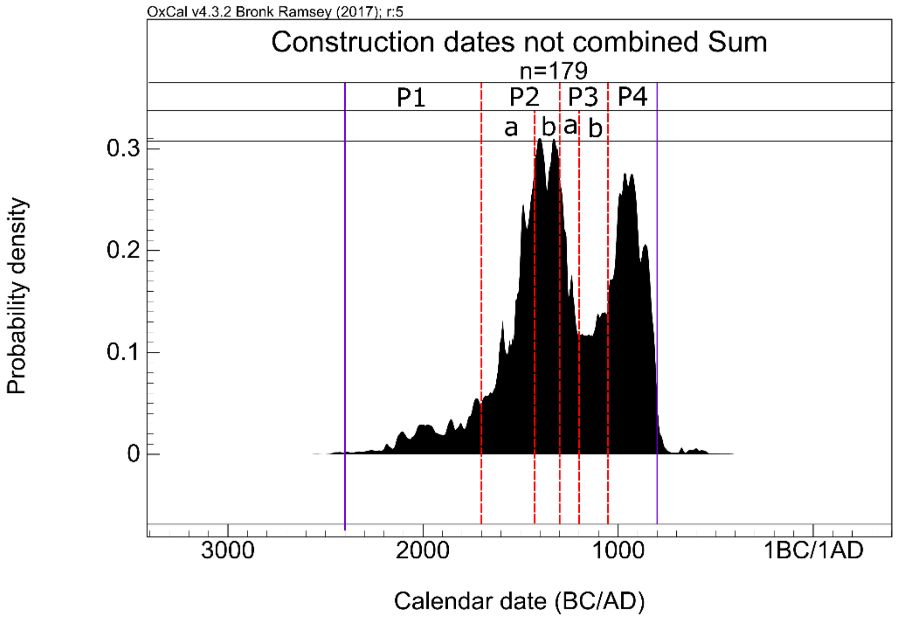

Figure 59 A summed probability distribution graph of all high-quality Bronze Age radiocarbon dates directly associated with the construction phase of a Bronze Age structure in Britain These dates have not modelled such there is a possibility of over representation of structures with more than one date. This is overlaid by a proposed chronological model, the detail of which are explained below

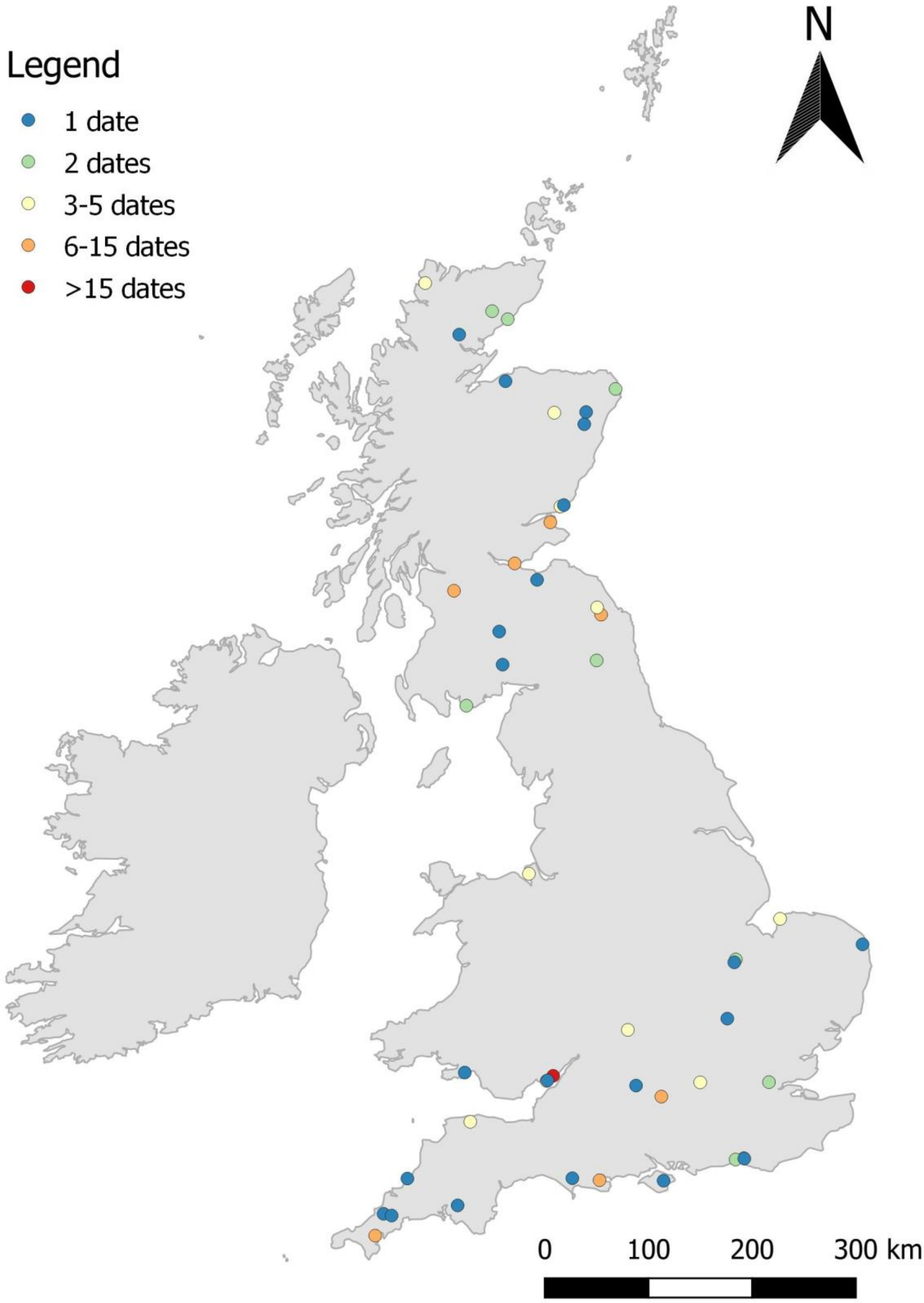

Figure 60 The distribution of all high-quality radiocarbon dates associated with the construction phase of a Bronze Age structure. The number of dates per structure are identified by the colour of each dot. Contains OS data © Crown copyright and database right 2019.

distribution overly represents a single extensively dated settlement, although it may be slightly biased to those results from Caldicot Castle Lake. As with the primary dataset, these sites are well distributed across the majority of England (Figure 60), Scotland and Wales although their density is, as would be expected, lower.

It is already understood that the Bronze Age structural remains have been found from the Earliest Bronze Age. Any drop offs outside the bounds in the Iron Age (from 800 cal BC) should be ignored as they are result of the date selection process. This said, it is notable that no dates relating to the construction of a settlement are found earlier than 2200 cal BC within the primary data. This might simply be due to the fewer Early Bronze Age structures identified, combined with the fact that only a few dates are typically obtained for the construction of the site.

The summed probability is intriguing as it suggests that the peak of the construction of Bronze Age settlements occurred in the Middle Bronze Age at around 1450 cal BC (Figure 58 and Figure 59). Before this time, the intensity of settlement construction, as represented by the probability distribution, is lower than at any other time, albeit relatively stable. At 1700 cal BC, there is a massive upswing in construction. At 1300 cal BC this scale of construction quickly receded until approximately 1200 cal BC. There may be a similar sized increase in settlement construction at 1000 cal BC, although this is smaller than the initial Middle Bronze Age boom.

5.4.5.2.3.3 Settlement occupation

225 radiocarbon dates were determined to date an occupation event associated with a Bronze Age structural feature. These dates came from 121 structures across 65 sites.

The highest number of dates (7) came from the House 4 at Lairg (McCullagh & Tipping 1998), whilst the largest number of structures were from Bestwall Quarry (10) (Ladle & Woodward 2009). Neither of these are greater than 9% of the study population, such that it is unlikely that the distribution overly represents either a single well excavated structure or a single extensively dated settlement. As with the primary dataset, these sites are well distributed across the majority of England, Scotland and Wales, although there are notable absences along the south coast of Wales and in the regions of Norfolk and Suffolk.

The results of this analysis are strikingly similar to that of the first two models (Figure 61 to Figure 63). Once again, a boom in activity can be seen beginning at 1700 cal BC which peaks between 1400 and 1300 cal BC before collapsing. It is notable that the modelled and modelled data models potentially disagree on the intensity of activity following 1300 cal BC, with the modelled data suggesting a recovery at around 1100 cal BC while the modelled data suggests the intensity of structures did not change after this point.

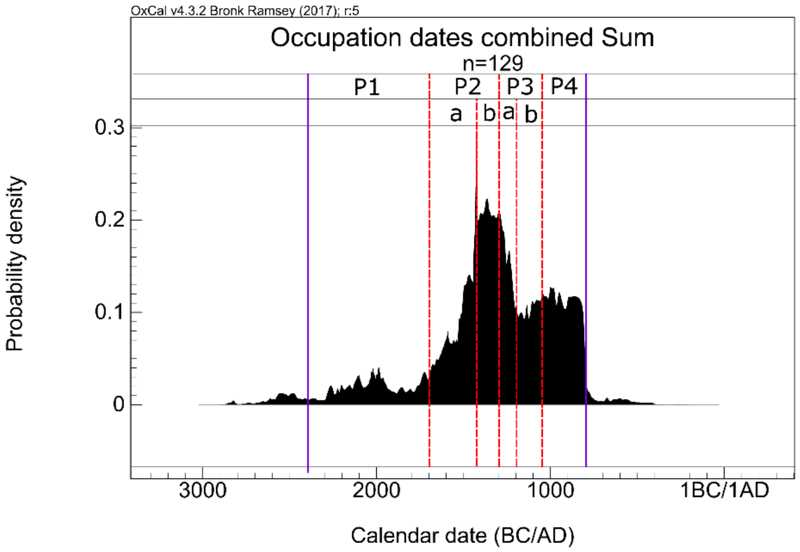

Figure 61 A summed probability distribution graph of all high-quality Bronze Age radiocarbon dates directly associated with the occupation of a Bronze Age structure in Britain. These dates have been modelled to prevent over representation of structures with more than one date. This is overlaid by a proposed chronological model, the detail of which are explained below

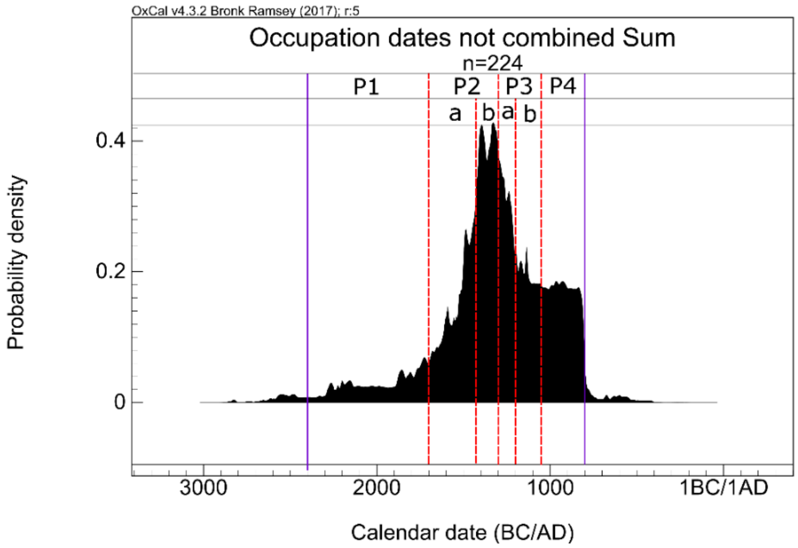

Figure 62 A summed probability distribution graph of all high-quality Bronze Age radiocarbon dates directly associated with the occupation of a Bronze Age structure in Britain. These dates have not modelled such there is a possibility of over representation of structures with more than one date. This is overlaid by a proposed chronological model, the detail of which are explained below

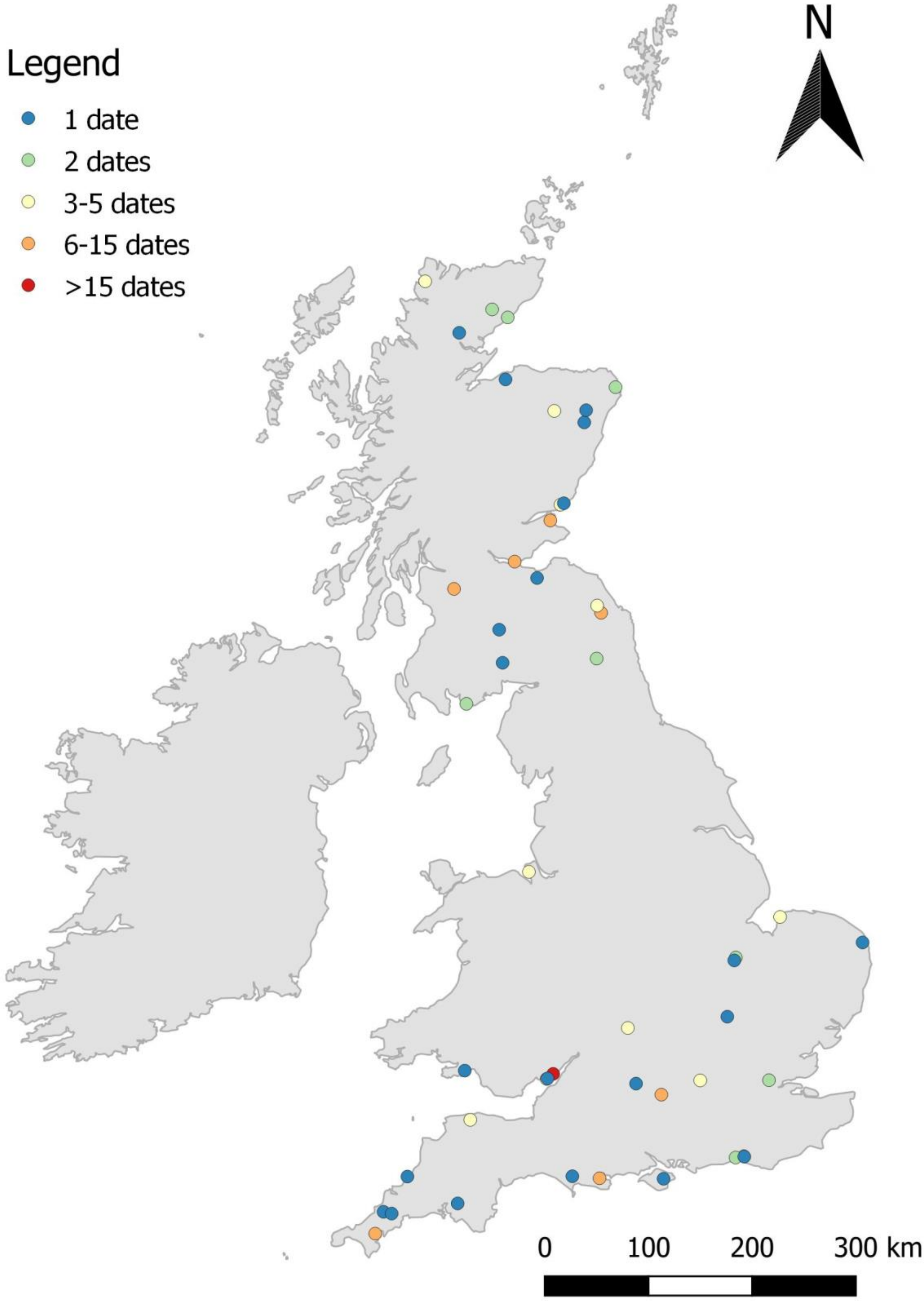

Figure 63 The distribution of all high-quality radiocarbon dates directly associated with the occupation of a Bronze Age structure in Britain. The number of dates per structure are identified by the colour of each dot. Contains OS data © Crown copyright and database right 2019.

5.4.5.2.3.4 Settlement abandonment

Only 10 high quality radiocarbon dates were determined to be associated with the abandonment of a Bronze Age structural feature. These dates came from eight structural features across eight sites.

This number is too few to conduct an analysis as above with any certainty. The low number of dates identified is the result of the complications in rigorously dating settlement abandonment when compared to dating features that can be classed as related to settlement construction and occupation. This is partly down to the nature of what can be used to date this material, typically charcoal related to a phase of burning in a settlement, or samples related to the ceremonial closing of a feature. Often samples are by necessity taken from later activity that produces a *terminus ante quem,* by which time that activity must have ceased. However, it is often impossible to identify the time period between this phase and the abandonment of the Bronze Age settlement. As a consequence, these dates have been excluded.

As the number of dates available is so limited, it has been decided to review the evidence for both the high-quality dates and those previously excluded due to their material being of a less certain age. This brings the number of radiocarbon dates up from 10 to 27. In either case, the relative distribution should not be relied upon with only the presence of abandonment phases being of any use.

The sites are not as well distributed across the majority of England, Scotland and Wales (Figure 66). There are notable absences in the south east of England and large portions of Scotland. While the site of Callestick (Jones 1998) has four radiocarbon dates dating the abandonment of the site (14.8%), the remaining sites are evenly represented such that any analysis is not over represented by one particular site or structure.

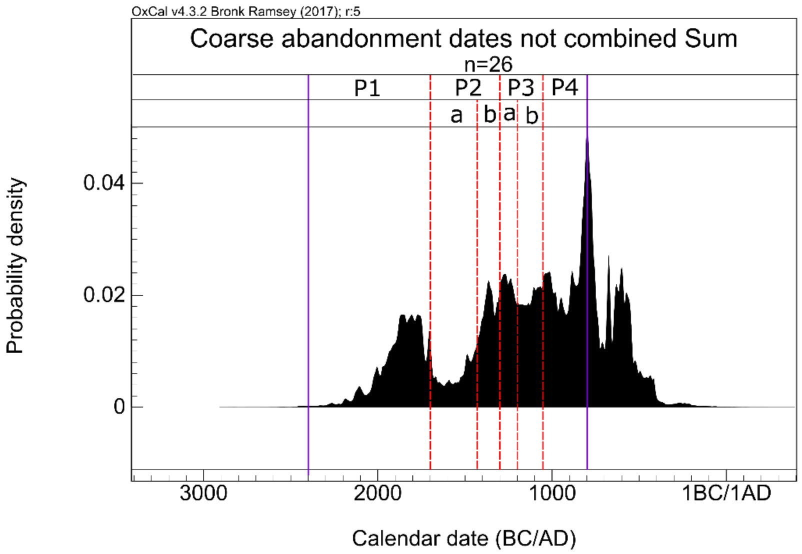

Figure 64 A summed probability distribution graph of all Bronze Age radiocarbon dates (not filtered by quality) directly associated with the abandonment phase of a Bronze Age structure in Britain. These dates have been modelled to prevent over representation of structures with more than one date. This is overlaid by a proposed chronological model, the detail of which are explained below

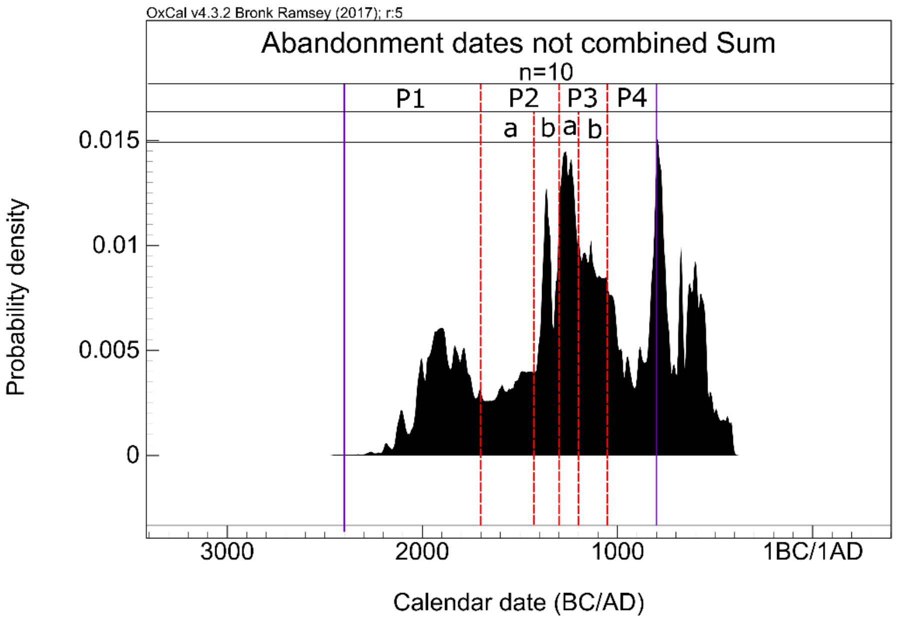

Figure 65 A summed probability distribution graph of only those high-quality Bronze Age radiocarbon dates directly associated with the abandonment phase of a Bronze Age structure in Britain. These dates have not modelled. As such there is a possibility of over representation of structures with more than one date. This is overlaid by a proposed chronological model, the detail of which are explained below

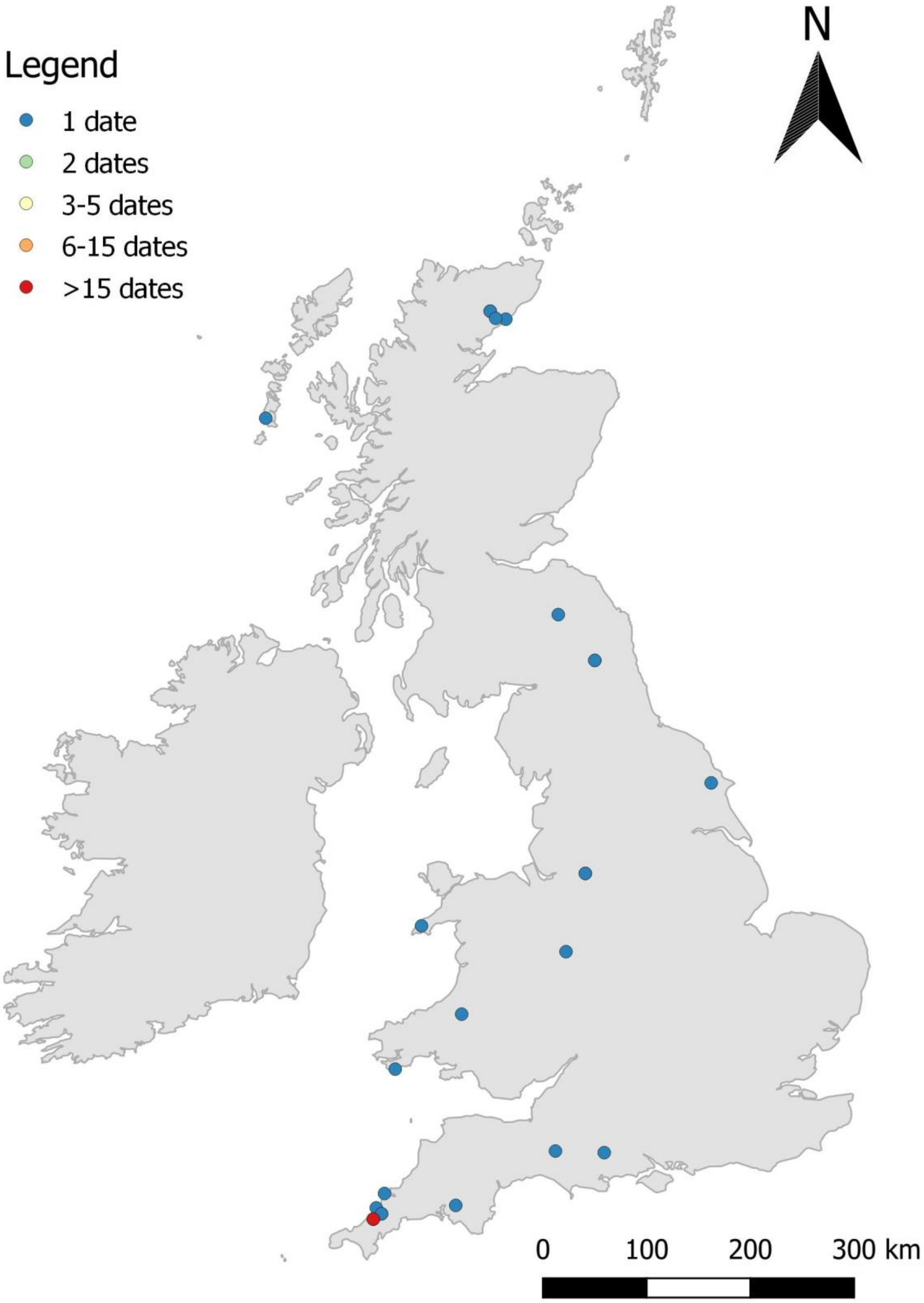

Figure 66 The distribution of all radiocarbon dates (regardless of quality) associated with the abandonment phase of a Bronze Age structure. The number of dates per structure are identified by the colour of each dot. Contains OS data © Crown copyright and database right 2019.

In each of these instances the overall distributions produced are similar (Figure 64 and Figure 65). Abandonment phases can be identified throughout the Bronze Age. It may be that there is a slight dominance of abandonment phases being made visible in the latter half of the Bronze Age, although this cannot be confirmed due to the small sample size. These results then are useful only in confirming that abandonment occurred throughout the Bronze Age and that the data is not sufficient to support a single, large phase of collapse in Bronze Age settlements similar to the boom in their construction and occupation previously identified.

5.4.5.3 A narrative for settlement tempo in Bronze Age Britain based on radiocarbon dates

The narratives of both construction and occupation are remarkably similar. When characterising the narrative produced of the construction, occupation and abandonment of Bronze Age domestic structures, a coherent pattern emerges. Bronze Age domestic structures can be temporally divided into four primary phases. As such, the following scheme is suggested for the tempo of domestic Bronze Age settlement in Britain (Table 33).

Phase Name	Time period	Description
Phase 1	2400 - 1700 cal BC	There are few domestic structures in Britain, although they are found throughout England, Scotland and Wales (see below for a more detailed discussion of geographical analysis)
Phase 2a	1700 -1400 cal BC	There is rapid expansion in the number of domestic structures in Britain.
Phase 2b	1400 -1300 cal BC	The number of structures in use stabilises at a peak which lasts c.100 years.
Phase 3a	1300 -1200/1100 cal BC	Following this peak, there is a collapse of settlement albeit not to a level as low as in Phase 1.
Phase 3b	1200/1100 cal BC	Settlement levels again stabilise at a level which is above that seen in Phase 1 but is considerably lower than that seen during Phase 2.
Phase 4	1100 - 800 cal BC	Eventually settlement numbers begin to increase again to a level at which they may stabilise before the Iron Age begins.

Table 33 Diachronic model for settlement use over the Bronze Age

5.5 Relative chronologies

Before absolute dating methods existed, any discussion of the chronology of archaeological phenomena would rely solely on seriation-based narratives using existing material culture. For the Bronze Age in Britain, this material culture was primarily ceramics (Table 5) and metals (Burgess 1980; Gerloff & O'Connor 2019; Montelius 1908; Needham, Ramsey, Coombs, *et al.* 1997), flint apparently regressing in complexity in this time (McLaren 2008 pp.153–154; Ford 1987) and lacking enough distinction for all but the most general typological schema. With the material grouped or "binned" in this manner, they could be arranged in a chronological order, the dates of which were presumed through known archaeological events.

Seriation-based typologies all share the same strengths and weaknesses. Their strength lies in their ability to date the features with which they are found regularly within the archaeological record, such that they have been able to provide a chronological framework that can apply to the majority of sites found, as long as this material is found with them. Their primary weakness lies in the validity in the seriation schemes established and the duration of each phase identified. These issues are particularly exacerbated in prehistoric periods where known temporal events within which to place seriation schemes are fewer and farther between. However, the critical issue of such a method is that the chronological "bins" produced may have no relationship to the cultural reality of the time or be of suitable resolution to capture the meaningful changes occurring in the past.

Since 1940 it has been possible to evaluate and enhance relative schema with the use of radiocarbon dating. In the case of Bronze Age metalwork this has mostly served to reinforce the validity of existing schema (Needham 1996; Needham, Ramsey, Coombs, *et al.* 1997). In the case of ceramics, however, it has found that well established chronologies (Abercromby 1912; Montelius 1908; Hawkes 1960 discussed in Gerloff & O'Connor 2019), while mostly accurate in their sequence, required backdating several centuries earlier than had been supposed (Chapter 2.3.3). Furthermore, it has also shown that stylistic differences within pottery forms **do not** provide a reliable chronological indicator (Law 2009; Nowakowski 2012) such that ceramics are often only able to provide a date estimate that covers a period of several hundred years (Sheridan 2003, 2007; Woodward 2009; Nowakowski 2012; Wilkin 2013; Law 2009; Brudenell 2012). Despite these scientific and scholarly revisions, ceramics and metalwork have long provided a chronological framework for dividing the Bronze Age into three distinct periods which has yet to be widely supplanted, despite numerous suggested alternative schema attempting to do so (Burgess 1980; Needham 1996; Needham, Ramsey, Coombs, *et al.* 1997).

5.6 Creating a relative chronology for Bronze Age settlements

Within heritage records, sites are frequently given an approximate time period for their use. In British grey literature reports and Historic Environment Records, the chronological schema most often used for these summaries are: the Three Age division of the Bronze Age with an Early, Middle and Late Bronze Age; a two stage division into Earlier and Later Bronze Age; or an even broader attribution to the

Later Prehistoric period – which while typically defined between 2400 cal BC to 43 AD - is often taken to mean 1600 cal BC to 43 AD in most records (see for instance Harding 2009 which uses the term in a book dedicated solely to the Iron Age). In the Three Age division, the Early Bronze Age is typically defined as the period between 2400-1600 cal BC, the Middle Bronze Age as the period between 1600-1150 cal BC, and the Late Bronze Age as 1150-800 cal BC (Roberts, Uckelmann & Brandherm 2013). Yet, in practice within grey literature reports, these attributions are given only if certain pottery forms are found. For example, Food Vessels, Beakers and Collared Urns are used to justify an Early Bronze Age date; Deverel-Rimbury or equivalent pottery, such as Trevisker ware, are used to justify a Middle Bronze Age date, despite these ceramics having a slightly different temporal currency (see for instance monument record 5919 within Devon's historic environment record which states *"The date of the second phase is constrained by the recovery of sherds of Trevisker ware, indicating a mid-late Bronze Age date"*). Sites with plain wares, such as post-Deverel-Rimbury ware are then assigned to the Late Bronze Age. This is despite these pottery forms not entirely accurately mapping the Three Age division entirely over time (Sheridan 2007, 2003; Woodward 2009; Wilkin 2013; Law 2009; Brudenell 2012; Nowakowski 2012; Also see Roberts, Uckelmann & Brandherm 2013); being found only in restricted geographic locations (for instance Deverel-Rimbury pottery is limited to the south of England and Trevisker ware to the south west of England); and overlapping in their periods of use (Table 5). Furthermore, it is not uncommon for sites to be determined as Later Prehistoric or often Late Bronze Age/Early Iron Age simply on settlement form alone (the database for instance has identified potentially 1609 sites whose dating was based solely on form according to the text within their summary data).

Such typo-chronological schema for Bronze Age settlement date attribution are clearly imprecise and used very irregularly, such that sole reliance on any such schema should be cautioned against. However, the data collection phases of this study has identified a total of 1303 Bronze Age settlement sites that are dated using relative chronological methods that can be used as an additional, supporting dataset to the radiocarbon dataset. It would be impossible to source the comprehensive literature for this relatively dated dataset needed to provide an accurate data assessment for all of these sites in the time available to the study. Yet the rough date, attributed using the means clarified above, is often made available within the summary data available from heritage bodies. As such, it was decided that a quick study estimating the date of settlements solely on the summary text available for each site would be useful in establishing a crude provisional narrative for Bronze Age settlement. For each of the 1303 sites identified as likely containing Bronze Age domestic structural remains, all summary text provided by the heritage bodies was surveyed in full. Any mentions of a date were then recorded and if deemed applicable to the settlement discussed, recorded. No dates were added to sites if they were not *explicitly* recorded at this phase of analysis.

Using this method, 1076 of 1303 (83%) sites had a typological period assigned to them, the rest remaining undated. The results of this early study display a very clear picture of the numbers of settlement increasing through the Bronze Age with the majority being found in the Late Bronze Age (Table 34). The large number of Late

Bronze Age sites may be over exaggerated by the number of sites that are described as Late Bronze Age/Early Iron Age. However, even when removing these sites, it is clear that there appears to be an acceleration in the construction of settlements throughout the Bronze Age.

Activity Present	Count	% of 1488
Early Bronze Age (c. 2400-1600 cal BC)	147	10%
Middle Bronze Age (c.1600-1150 cal BC)	219	15%
Late Bronze Age (c. 1150-800 cal BC)	403	27%
Late Bronze/Early Iron Age (c. 1150/900-600 cal BC)	96	6%
Bronze Age (c. 2400-800 cal BC)	229	15%
No details listed	526	35%

Table 34 Activity present on sites from the data study arranged by typological period

While these results indicate the number of settlement sites attributed a relative date, they do not indicate the number of domestic structures in use during each period. As such, each Bronze Age structure listed by these records was also recorded and assigned a provisional date (based solely on the HER summary available). While equally as coarse, and so as unreliable as the first analysis, the results presented are of note. They present similar proportions of Early Bronze Age to Middle Bronze Age and Middle Bronze Age to Late Bronze Age settlement structures but also a higher proportion of those structures identified as being from the Bronze Age (Table 35 and Figure 67). This may imply that the proportions of settlement produced when using a relative schema have been used consistently down to individual structures.

Structure Provisional Date	Count	% of 2273
Early Bronze Age (c. 2400-1600 cal BC)	117	5%
Middle Bronze Age (c.1600-1150 cal BC)	488	21%
Late Bronze Age (c. 1150-800 cal BC)	840	37%
Late Bronze/Early Iron Age (c. 1150/900-600 cal BC)	136	6%
Bronze Age (c. 2400-800 cal BC)	320	14%
No details listed	348	15%

Table 35 Provisional dates on sites from the data study arranged by typological period

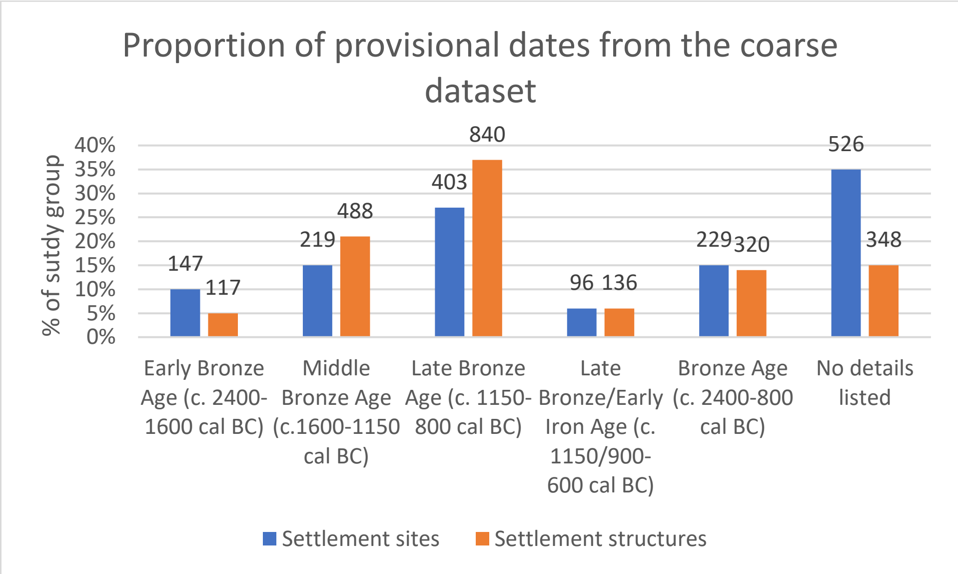

Figure 67 Comparison of provisional dates for settlements and structures from the data study arranged by typological period. NB. Numbers above each bar represent the frequency

5.7 Discussion

5.7.1 Comparing the relative and absolute chronologies for Britain

Two narratives have been proposed for the intensity of settlement structures across the Bronze Age (RQ 3.1, RQ 3.3). The first, which uses radiocarbon dates to present a model, suggests a boom of settlement expansion be identified between 1700 cal BC and 1300 cal BC followed by a “bust” between 1300 cal BC and 1100 cal

BC followed by a final recovery between 1100 cal BC and 800 cal BC (RQ 3.1). The second approach indicates an increase in the number of settlements throughout the Bronze Age (RQ 3.3). While the first model does allow for an increase in the number of settlements in the Late Bronze Age, the intensity of this is still far below that seen in at 1400 cal BC in the Middle Bronze Age.

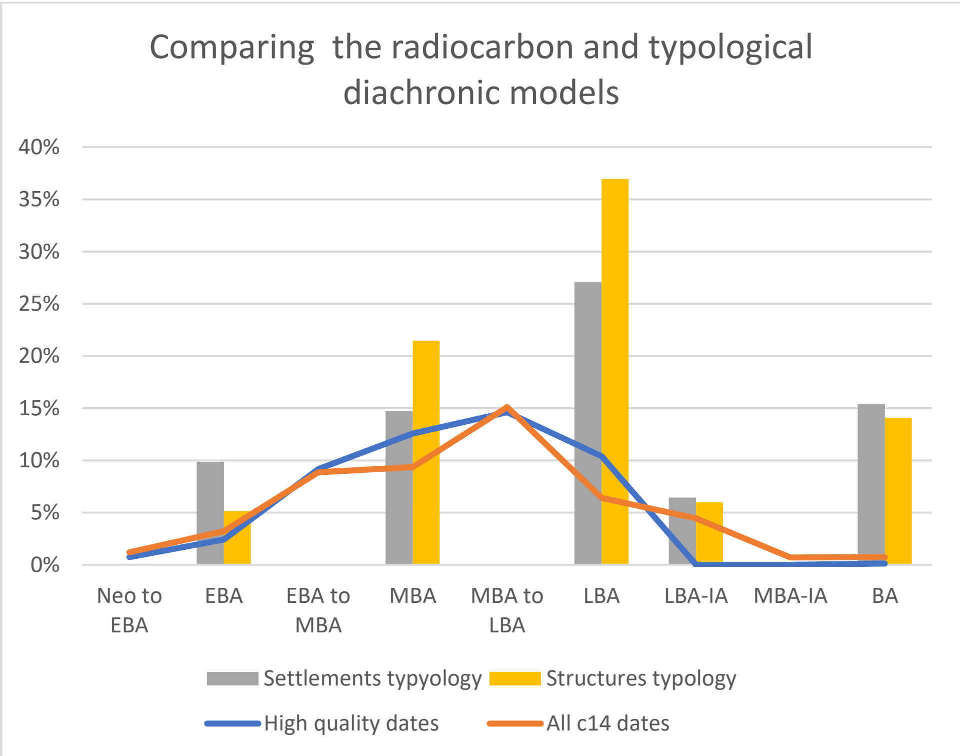

Figure 68 A normalised comparison of the radiocarbon and relative diachronic models. Bins for radiocarbon dates were formed to allow comparison by classifying each date within a period based on its start and end date

The two models' narratives are incompatible (RQ 3.4). This can be crudely demonstrated by binning those radiocarbon dates for each settlement based on their calibrated ages (Figure 68) which demonstrates that even if dividing the dataset into a three age system a different model of settlement growth is produced (although see Crema, Habu, Kobayashi, *et al.* 2016 for a more thorough method of how these data might be binned for comparison). How then might these models be compared to one another? The model using radiocarbon dates relies on that data most closely scrutinised, and so may be expected to represent the true record. It may also be that Middle Bronze Age sites are disproportionally radiocarbon dated compared to Late Bronze Age sites. Such a bias might arise if this period is more easily identified through existing ceramic chronologies, yet such ceramic chronologies are as able to identify Middle Bronze Age sites through the appearance of Deverel-Rimbury Pottery. However, the second model is also not without potential bias. It has already been highlighted how sites are often termed Late or Later Bronze Age based on insufficient criteria. The only means with which to assess this would require wholescale analysis of the material culture of those coarse data sites, a task beyond the scope of this thesis. As such, neither model is without potential bias, the extent of which is difficult to determine. However, it is possible to determine how likely the radiocarbon model is to change (Objective 3.4).

5.7.2 How vulnerable are the modelled narratives to change?

Summed probability distributions do not by necessity reflect the true tempo of human activity such that any narrative using this form of analyses requires careful discussion and consideration. It is appropriate to assess how likely the model is to change. It is possible to comment on this by utilising those low-quality radiocarbon dates previously omitted and through comparing the number of dates used within this chapter compared to all those recorded for the Bronze Age in Britain.

5.7.2.1 Comparing good and high-quality data

The number of high-quality dates (n=414 of 3116) from structures (n=141 of 1085) and sites (n=87 of 293) is far smaller than the total study sample and far smaller than the number of raw radiocarbon dates. While these have been cut down for appropriate reasons, the less refined dataset does allow some comparison to be made that supports the validity of the model produced by the high-quality dataset.

As in the chapter's main section of analysis, it is possible to create summed probability distribution using those data eliminated due to their poor quality. To do so, only those dates that were known to be relevant to Bronze Age structures were chosen. This analysis uses a total of 1141 radiocarbon dates taken associated with a total of 464 Bronze Age settlements features from 227 sites. Normally such an analysis should be treated with caution, as it contains data that had been excluded for reasons made clear above.

Using this data, it has been possible to produce models of the construction, occupation and abandonment of Bronze Age structures, though these are the same as those produced above using the high-quality dates (Figure 69 to Figure 72). This indicates that those poor-quality dates only serve to reinforce the model as presented. Similarly, it is notable that the overall proportions do not change significantly. This is despite the number of dates used in the model doubling. As such, it appears unlikely that the addition of the number of dates from those sites whose literature was not accessed would change the model substantially. This basic analysis indicates that even where new dates were added to the analysis from those excluded dates, that the same narrative proposed above remains consistent. This is despite twice the numbers of sites being added to the database.

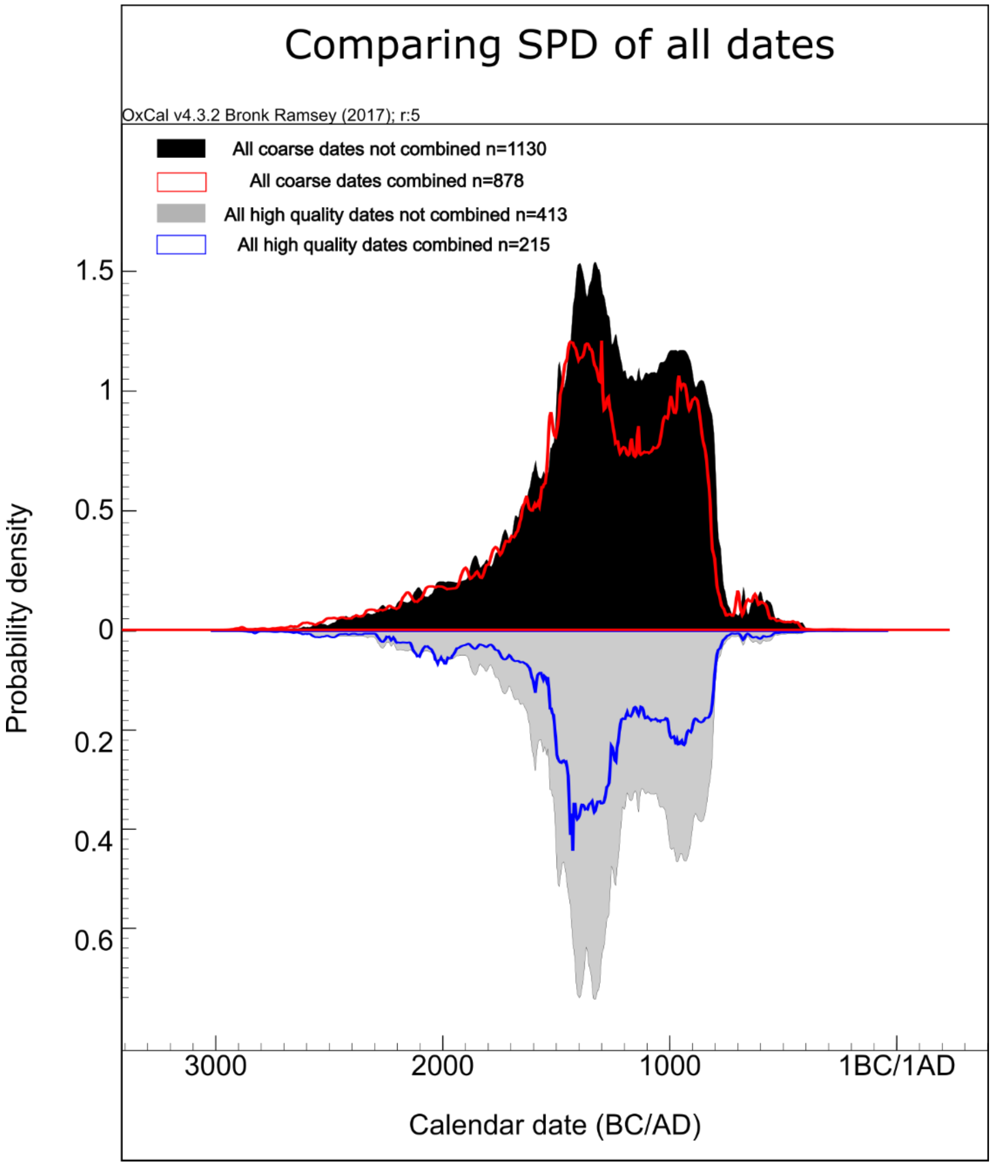

Figure 69 A comparison of all summed probability distributions divided by quality and modelling when using all the radiocarbon dates available

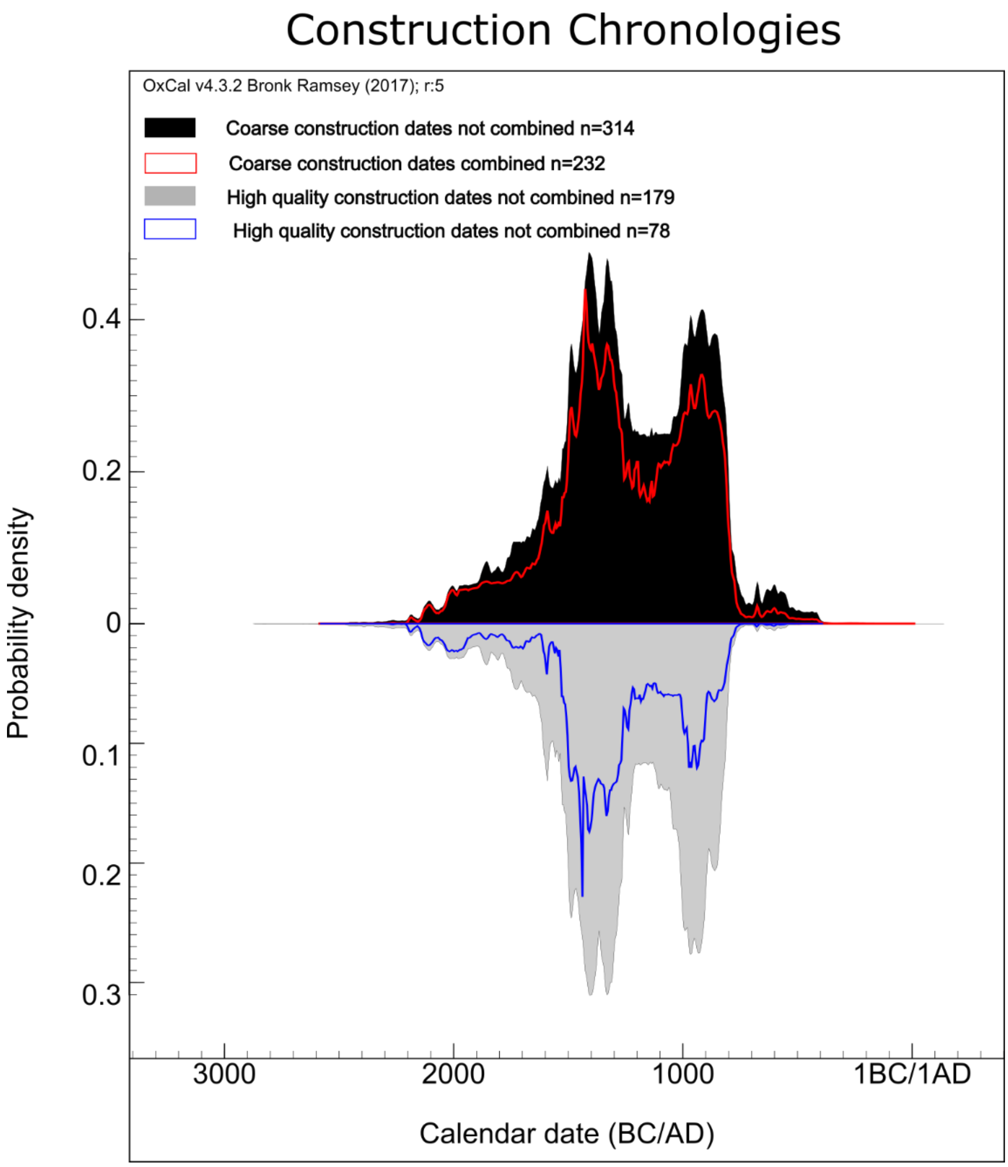

Figure 70 A comparison of all summed probability distributions generated for construction phases divided by quality and modelling when using all the radiocarbon dates available

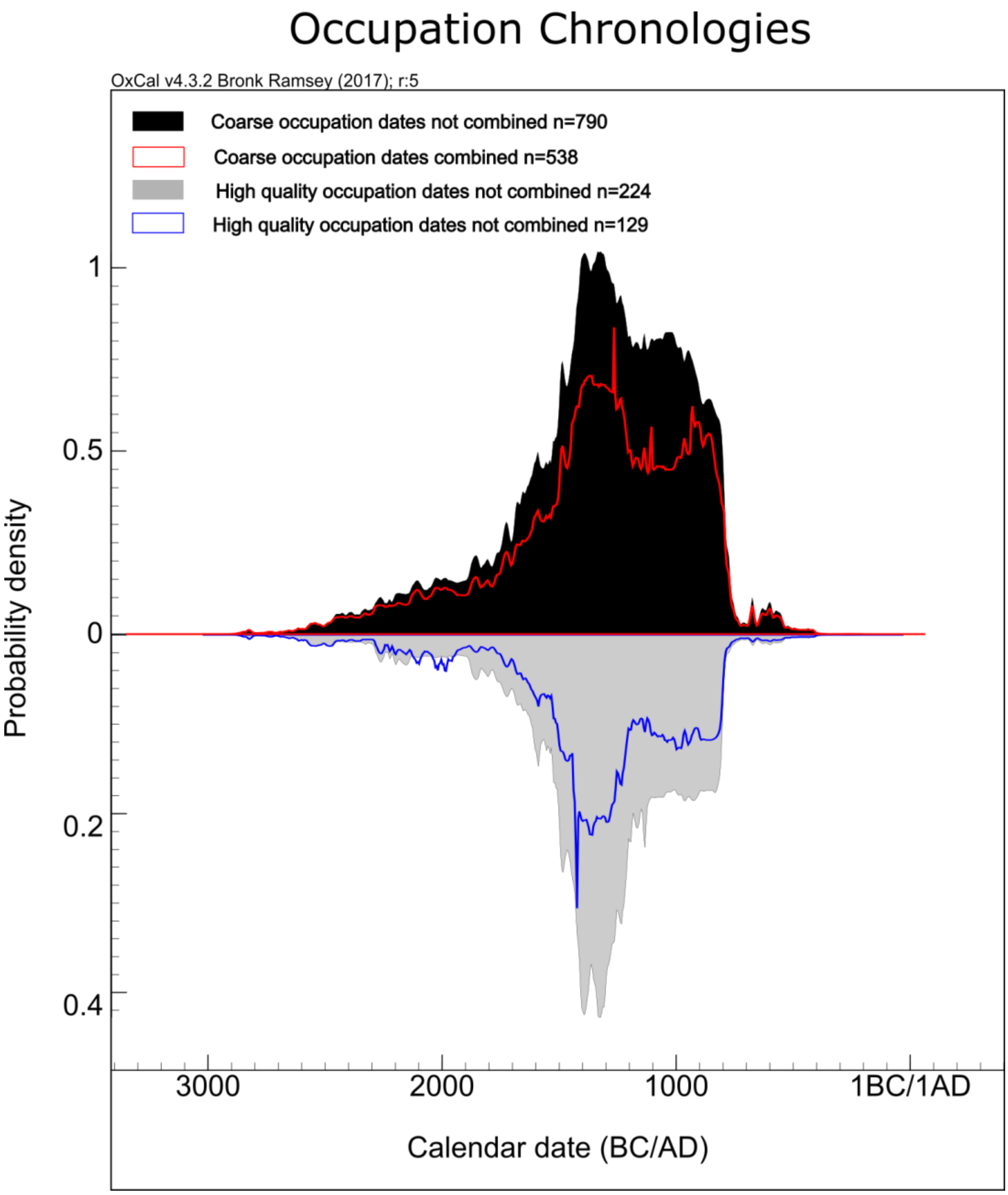

Figure 71 A comparison of all summed probability distributions generated for occupation phases divided by quality and modelling when using all the radiocarbon dates available

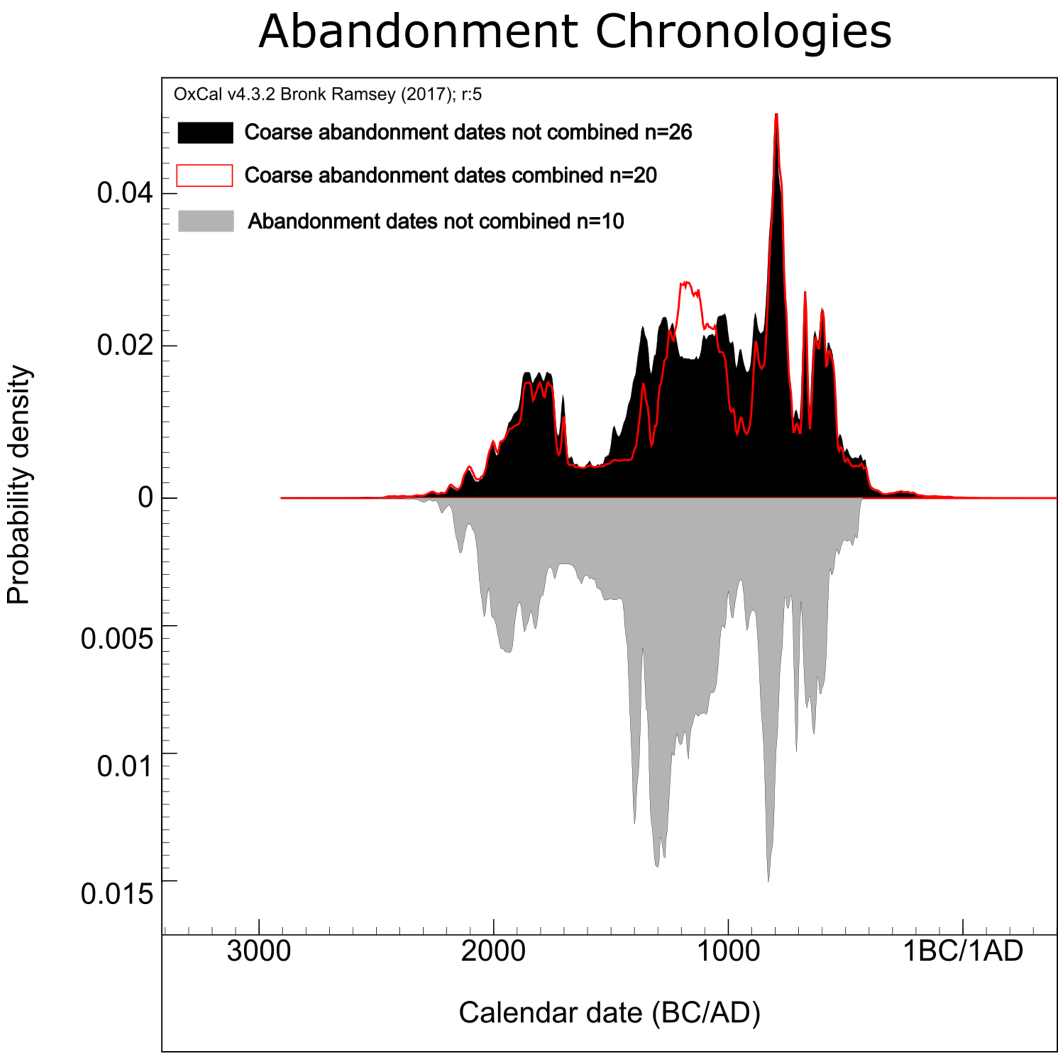

Figure 72 A comparison of all summed probability distributions generated for abandonment phases divided by quality and modelling when using all the radiocarbon dates available

5.7.2.2 The number of dates used

Current guidelines for use of summed probability graphs of radiocarbon dates suggest that a model requires c.200 dates, although numbers above 500 are preferable (Williams 2012). It is at this point that is understood that the number of dates used is likely to offset any bias or errors within the dataset. As such, the models using all phases of settlement, construction, occupation and abandonment, together meet the first criteria. Although those models for construction, occupation and abandonment in isolation are more likely to be suspect due to their having less than the minimum number of dates.

The combined dataset only narrowly misses the second criteria of using over 500 radiocarbon dates. This suggestion was for a study considering a much wider timescale than this study, such that the analysis may still be valid, although its results should be seen as provisional and subject to change if further high-quality dates become available. A similar study in Ireland (Ginn 2012) conducted comparable analyses to that of this chapter with a smaller dataset. Yet its results are similar (Chapter 7.5.5), as such it may be that a sufficient quantity of dates has been obtained in this thesis.

It is notable that of the 3013 dates identified, only 414 were of sufficient quality for modelling within this study. This number would have been further reduced (to 340 dates) if only selecting samples whose material was not of multiple species or whose lifespan was less than 100 years. As such, unless higher standards are maintained when collecting material for the purpose of radiocarbon dates, it is likely that many more thousands of dates will be required to substantially change the models presented.

5.7.2.3 Conclusion

As such, the model presented is unlikely to be seriously affected in the near future by those sites not studied (Chapter 5.7.2.1) or if the pace of radiocarbon dating settlement sites continues at a similar rate (Chapter 5.7.2.2). The only caveat to this conclusion is that the model could be altered if a major scheme of radiocarbon dating Bronze Age settlements in Britain is initiated. The scale of such a project can be estimated when comparing the number of dates sampled for the project to c.75% of all Bronze Age radiocarbon dates on British material. Those 1822 dates studied make up nearly one quarter of c.75% of all Bronze Age radiocarbon on British material, in essence 19% of those radiocarbon dates of all material recorded since the inception of the method. As such, a radiocarbon dating program of suitable size to change the results of this analysis would likely need to match the number of dates recorded over a period of c.70 years (c.9572 dates from this period have been recorded in Appendix 1). It can therefore be suggested that the model produced here is unlikely to change (Objective 3.4).

5.8 Conclusion

This chapter set out to establish a diachronic model for Bronze Age domestic structure in Britain in order to meet its core research objective 2.

Objective 2. To produce a diachronic model of the appearance, use and disappearance of Bronze Age settlement structures using radiocarbon dates and material culture.

In order to do so, a representative database of 3116 radiocarbon dates from 299 Bronze Age settlement sites (Objective 3.1) was assembled. The quality of these dates was extremely variable, such that a full analyses of these sites' dating material and relevance to the thesis' study subject were identified. This process identified only 413 high quality radiocarbon dates (Objective 3.2).

By doing so, new summed probability distributions were able to be formed indicating the varying intensity of Bronze Age settlement construction, occupation and, to a lesser extent, abandonment (Objective 3.3). This model suggested 4 phases of activity;

1. A period of low numbers of Bronze Age settlement structures as well as settlement construction, occupation and abandonment between 2400 – 1700 cal BC

2. A boom in Bronze Age settlement structures as well as settlement construction, occupation and abandonment between 1700 – 1300/1200 cal BC

3. A collapse in Bronze Age settlement structures as well as settlement construction, occupation and abandonment between 1300/1200 – 1200/1100 cal BC

4. A recovery in Bronze Age settlement structures as well as settlement construction, occupation and abandonment between 1100 – 800 cal BC

The results of this analysis suggest little difference can be seen in the intensity of when settlements were being built, occupied and abandoned. This is significant for understanding Bronze Age settlements as these results would suggest that, while there is certainly a boom in the intensity of settlement construction and occupation, these occurred broadly contemporaneously. As such, what does not appear to occur is a wave of abandonment due to a single event. Instead, it appears that settlements are abandoned throughout the Bronze Age, which may suggest they had relatively consistent use lives.

A second model for settlement use yhas also been identified through using seriation schema used by existing heritage archives (RQ 3.3). This produced a narrative that suggests Bronze Age settlements can be identified for all periods of the Bronze Age. They are at their scarcest in the Early Bronze Age and increase in number throughout the period, reaching their peak in the Late Bronze Age (Objective 3.4). This is notably different to the model produced through radiocarbon dates (RQ 3.4). Establishing firmly which of these is the more reliable would be beyond the scope of this study. However, it is argued that that model relying on radiocarbon dates is less prone to observation bias and less likely to change in any significant way barring with the collection of entirely new and different radiocarbon dates on an unprecedented scale.

Chapter 6: *Where were settlements found?*

Investigating settlement site distributions across Britain

6.1 Introduction

With a dataset complied and a diachronic model established for the thesis' dataset, it is now possible to begin to assess the spatial component of Bronze Age settlement sites. By doing so this chapter will meet its fourth objective:

Objective 4. To characterise the distribution patterns of Bronze Age settlements across Britain.

It does so by answering the following research questions:

RQ 4.1 How does settlement density vary over the British Isles?

> RQ 4.1.1 How does settlement density over the British Isles vary over time?
>
> RQ 4.2.2 Do certain regions show a disproportionate change in numbers of structures over time?
>
> RQ 4.2. 3 Can an origin point be found for Bronze Age settlement structures?

RQ 4.2 Is there a preferred set of environmental attributes for the placement of Bronze Age settlement structures?

RQ 4.3 Can an upland/lowland divide be identified in the location of Bronze Age settlements?

RQ 4.4 How does the distribution of Bronze Age settlement sites vary in relation to bodies of water?

RQ 4.4.1 What is the typical distance from a Bronze Age settlement to a river?

RQ 4.4.2 What is the typical distance from a Bronze Age settlement to the sea?

RQ 4.4 To what extent are Bronze Age settlements placed for potentially favourable agricultural conditions?

This chapter will first discuss the location and density of Bronze Age domestic sites in Britain over time, before comparing this distribution to the density of Bronze Age activity in Britain represented by radiocarbon dates.

It uses the thesis' high resolution dataset (316 sites), which represent all those Bronze Age settlement sites with radiocarbon dates, the coarse resolution dataset (1488 sites), which represents those sites that have been identified as having a Bronze Age settlement (see definition in chapter 2) and the potential settlement dataset (6975 sites) which represent all possible Bronze Age settlements identified in the study's data collection phase many of which will not have been excavated (Figure 6).

6.2 What is the general distribution of Bronze Age settlement sites?

This analysis will demonstrate that there is not an even distribution of Bronze Age settlement sites throughout England, Scotland and Wales. However, when biases in the dataset are accounted for, it becomes clear that Bronze Age settlements are present and numerous across almost the entire study area.

6.2.1 Coarse dataset

The coarse resolution dataset records 1488 potential Bronze Age settlement sites. These are found throughout England, Scotland and Wales (Figure 73). There is a far higher density of settlements in southern Britain, defined as the area beneath a line drawn between the Severn and the Wash, than seen in northern Britain, defined as the area above this same line (Figure 74). Furthermore, there are some areas which show an almost total lack of settlement sites. These include regions of northern Scotland, north Somerset and Devon, Northamptonshire, several upland regions of Wales, an area south of Manchester and the Weald in Sussex.

The dearth in Scotland can be explained by the study's methodology, which was unable to survey all sites listed within Scottish Scheduled Monument Records (SMRs) in the same manner as those from Welsh and English offices. Similarly, Northamptonshire and north Somerset were not able to send heritage data to the project.

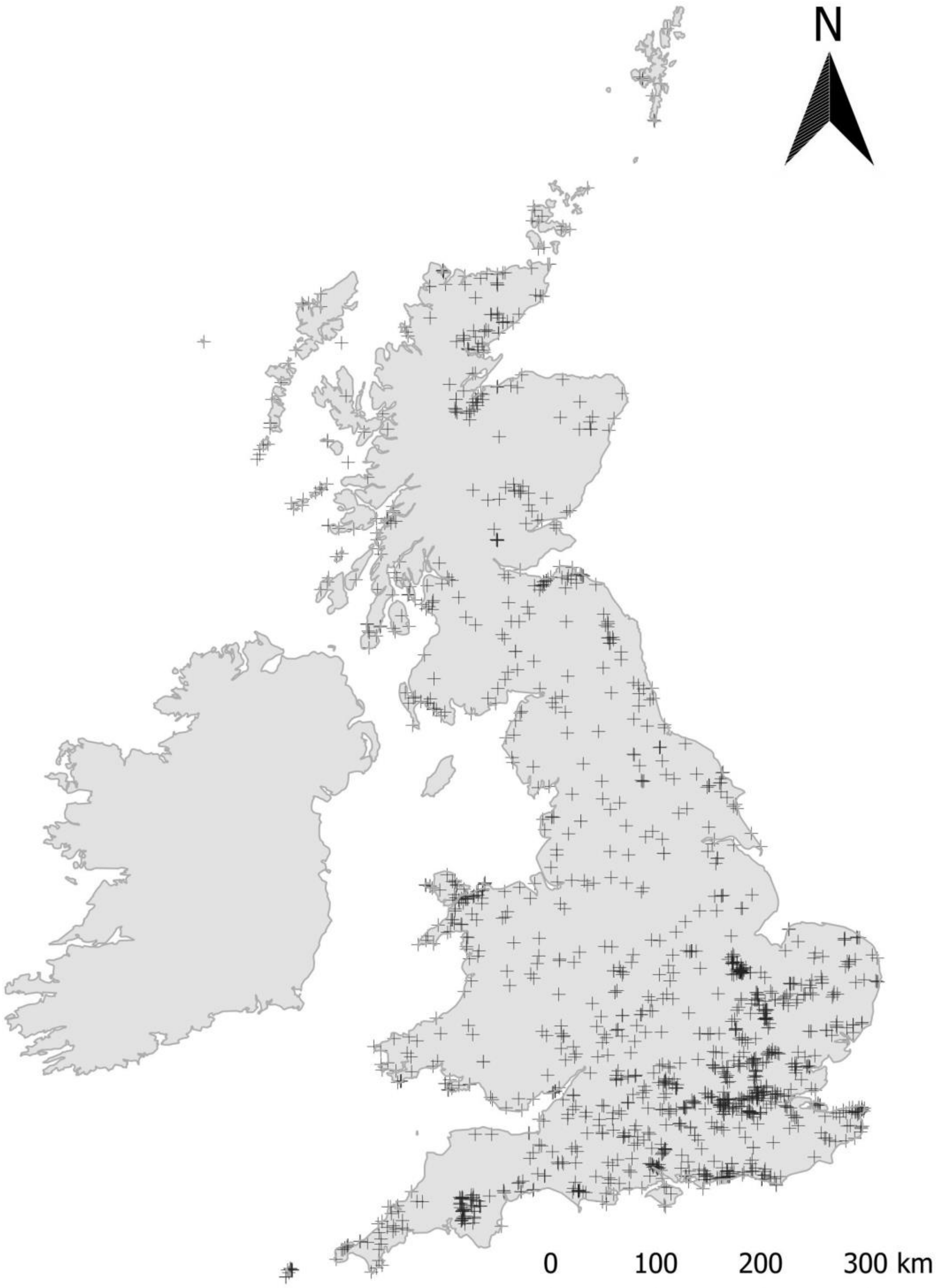

Figure 73 The 1488 Bronze Age settlement sites that have been excavated. Contains OS data © Crown copyright and database right (2019).

Figure 74: The 1488 Bronze Age settlement sites that have been excavated divided between the south and North of England using the "Severn Wash line". Each circle is 10km in diameter. Contains OS data © Crown copyright and database right (2019)

The remaining areas, the uplands of Wales, south of Manchester, the Weald in Sussex and the northern parts of England, however, were studied in full such that they certainly represent genuine areas of poor settlement recovery.

These dearths can be explained in one of two ways; either there has been poor identification of Bronze Age domestic structures in these areas (which may be related to either biases in archaeological investigation, regional variation in the choices of settlements forms chosen, or the depth at which such sites are recovered), despite them being there, or these areas are genuinely reflective of Bronze Age settlements as understood by the thesis, although this dearth may be compensated for by settlements taking less visible forms (sensu Brück 1999b) .

The absence of settlements in the area of the Weald is less clear. This region has been noted for lacking Bronze Age cremation burials (Caswell & Roberts 2018), and so may reflect a genuine archaeological reality or very specific recovery bias local to this region. It would be valuable to investigate this finding and to determine whether the speculative reasons for the dearth of settlement are true, however, in the time available for this study this was not possible, and it is recommended to examine in future.

6.2.1.1 Can non-geo-political absences be identified in the record?

Modern geopolitical boundaries are unlikely to be reflective of the division of land and communities in the Bronze Age, although the site at Cotswold Community highlights how modern boundaries can re-use those whose origins date to the prehistoric period (Powell, Smith & Laws 2010a). As such, it was decided to also inspect the division of sites by “landscape character” (Natural England 2019; Natural Resources Wales 2019; Scottish Natural Heritage 2019). In England, Scotland and Wales, regional character assessments have been conducted which have divided the land into regions based on a combination of landscape,

Wales (16/48) 33.3%	England (38/159) 23.9%
South Wales Valleys	North Northumberland Coastal Plain
Wye Valley and Wentwood	Orton Fells
Vale of Clwyd	South Cumbria Low Fells
Conway Valley	Pennine Dales Fringe
Deeside and Wrexham	Howardian Hills
Gwendraeth Vales	Morecambe Coast and Lune Estuary
Llangollen and the Vale of Dee	Bowland Fells
Tywi Valley	Lancashire Valleys
Epynt Plateau and Valleys	Humberhead Levels
Wye and Usk Vales	Lincolnshire Coast and Marshes
Ceredigion	Sherwood
The Spas and Wells of Central Wales	Derbyshire Peak Fringe and Lower Derwent
Rhos Hills	White Peak
Upper Wye Valley	South West Peak
Montgomeryshire Hills and Vales	Manchester Pennine Fringe
Maelor	Manchester Conurbation
	Lancashire Coal Measures
	Sefton Coast
	Potteries and Churnet Valley
	Melbourne Parklands
	Leicestershire and South Derbyshire Coalfield
	Mease/Sence Lowlands
	North Norfolk Coast
	Bedfordshire Greensand Ridge
	Yardley-Whittlewood Ridge
	Rockingham Forest
	Clun and North West Herefordshire Hills
	Herefordshire Plateau
	Teme Valley
	Malvern Hills
	Isle of Porland
	Weymouth Lowlands
	Marshwood and Powerstock Vales
	Mendip Hills
	Mid Somerset Hills
	Quantock Hills
	The Culm
	Lundy

Table 36 Those regions lacking a single excavated Bronze Age settlement identified within the study

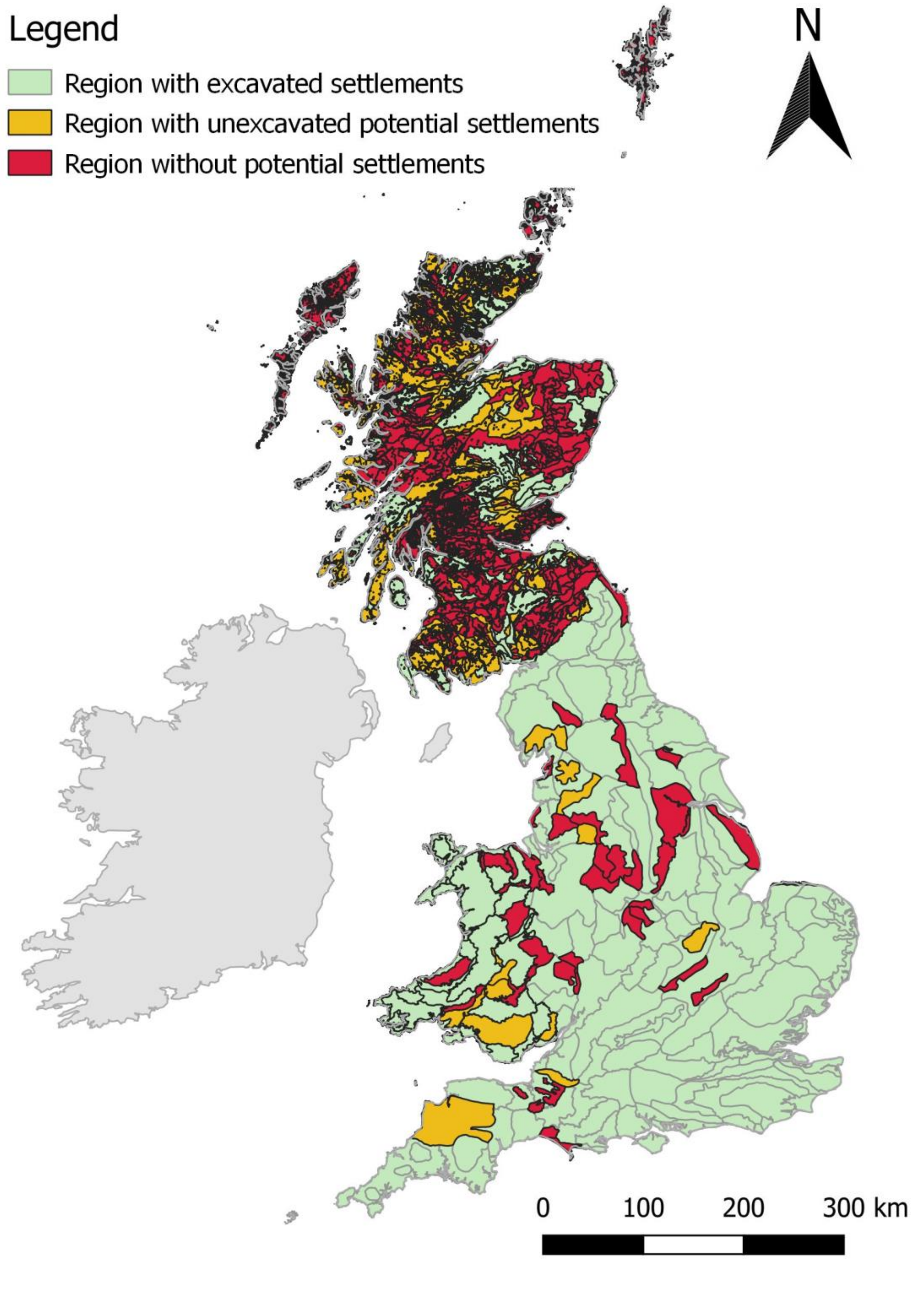

Figure 75 The study area divided by National Character Area. Those regions lacking any potential Bronze Age settlements are coloured in red, those which had a potential settlement which has not been excavated are coloured in orange. All remaining regions contained at least one excavated Bronze Age settlement from the coarse dataset. Contains OS data and Natural England data © Crown copyright and database right 2019

biodiversity, geodiversity and economic activity (*ibid*). While these do to an extent reflect modern geopolitical boundaries, they also heavily rely on natural geography that will have been consistent in the Bronze Age. These geographic regions are accessible as openly available data that may be assessed within a Geographic Information System (GIS), allowing quick assessment on the presence or absence of phenomena. As such, the number of Bronze Age settlement sites which have likely been excavated were calculated for each region (Table 36).

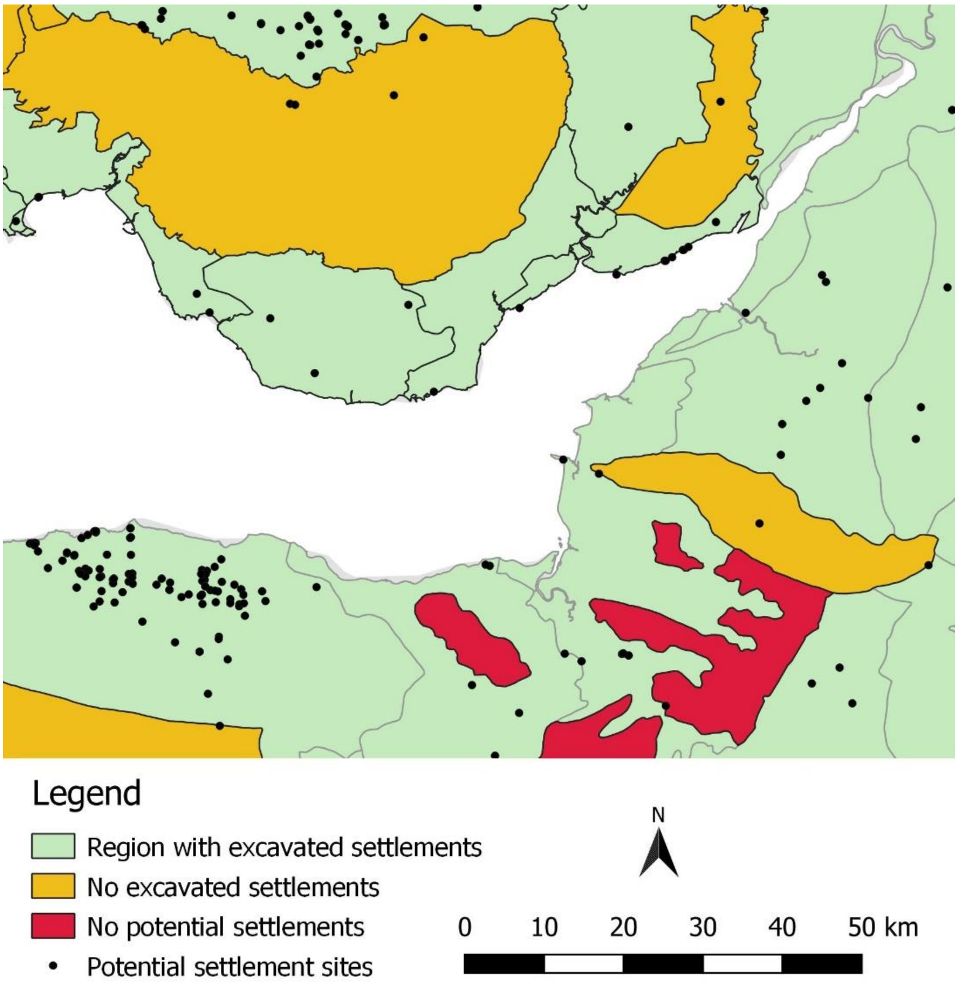

Figure 76 A closer view of the Severn Estuary region divided by National Character Areas, displaying the distribution of potential Bronze Age settlement sites. Those regions lacking any potential Bronze Age settlements are coloured in red, those which had a potential settlement which has not been excavated are coloured in orange. All remaining regions contained at least one excavated Bronze Age settlement from the coarse dataset. Each circle is 1km in diameter Contains OS data and Natural England data © Crown copyright and database right 2019

Two analyses were conducted with this data; an assessment of the coarse dataset (1488 sites) and the potential settlement dataset (6975 sites). In England and Wales those regions defined are of an equivalent size, however, those in Scotland are far narrower in their definition, such that far more regions of much smaller size were identified. The results of this analysis (Figure 75) indicate that in Wales and England, the majority (>66.6%) of regions have at least one Bronze Age settlement site with a structure that has been excavated.

11 further regions in England and Wales (from a total of 207) were found to have Bronze Age settlements within them, when considering the 6987 Bronze Age settlements. However, these sites were placed close to the borders of these 11 regions rather than within their central areas (Figure 76). It may therefore be that those regions without settlement sites from either dataset were purposefully avoided.

6.2.1.2 Diachronic study

The above summary treats Bronze Age settlement sites as occurring during one single band of time. As part of the project's data analysis stage, a provisional date for 962 of 1488 sites has been applied (Chapter 4), such that it is possible to assess whether this total distribution changes over time.

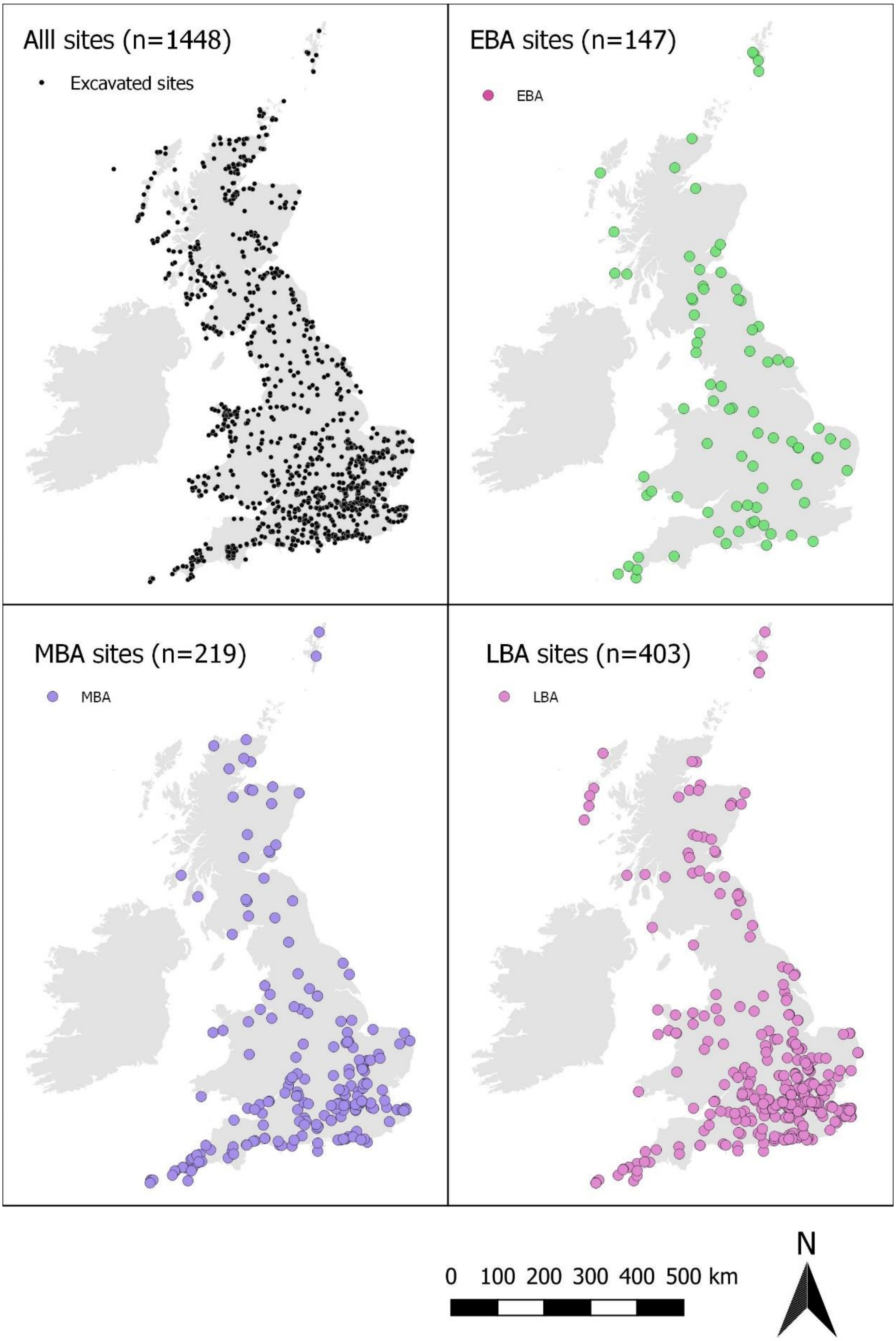

Figure 77 The distribution of the 1488 excavated Bronze Age settlement sites. Top left all sites. Top right sites whose dates cross are placed in or cross the Early Bronze Age. Bottom left sites whose dates cross are placed in or cross the, Middle Bronze Age. Bottom Right sites whose dates cross are placed in or cross the Late Bronze Age. Contains OS data © Crown copyright and database right 2019

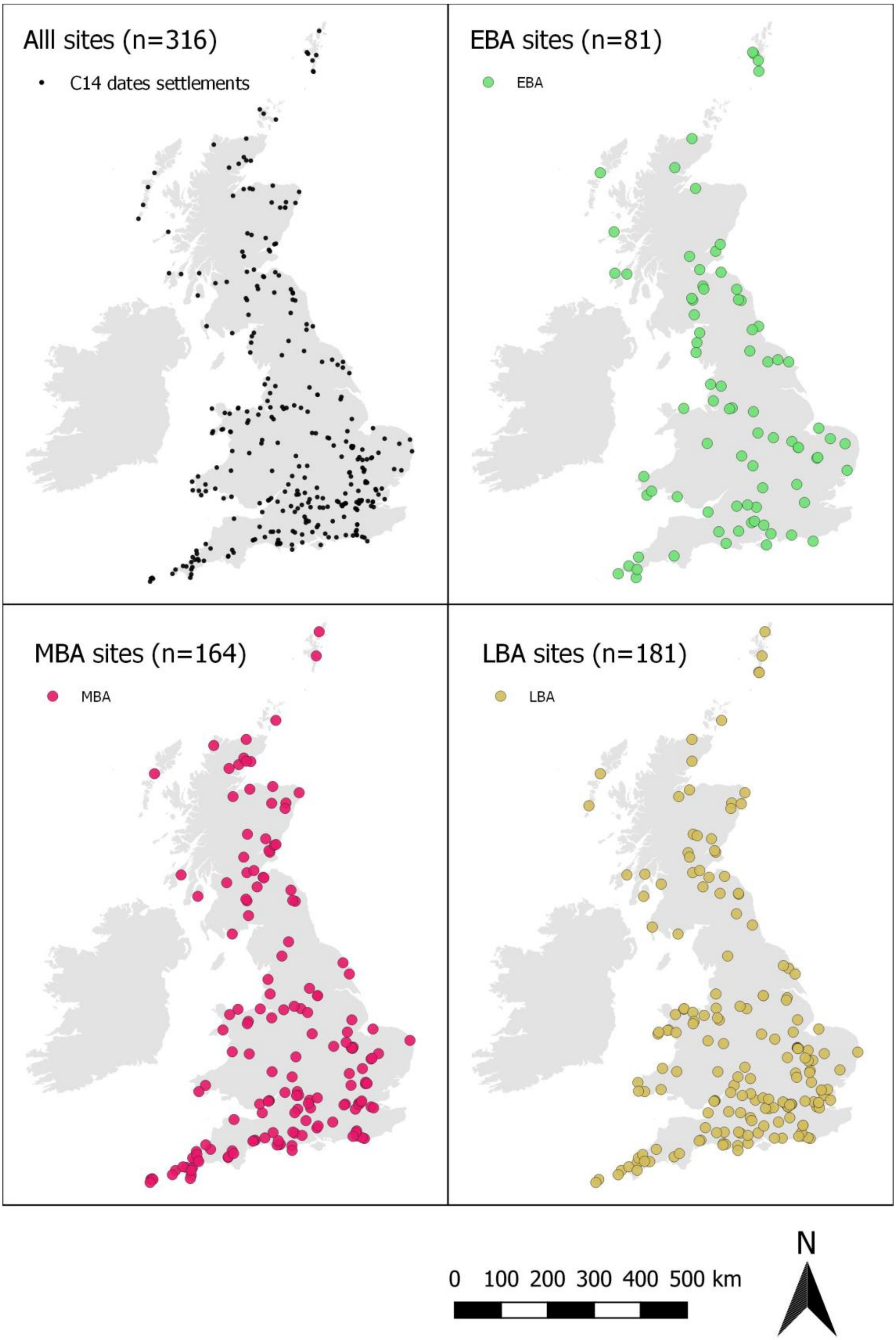

Figure 78 The distribution of the 316 radiocarbon dated Bronze Age settlement sites. Top left all sites. Top right sites whose dates cross are placed in or cross the Early Bronze Age. Bottom left sites whose dates cross are placed in or cross the Middle Bronze Age. Bottom Right sites whose dates cross are placed in or cross the Late Bronze Age. Contains OS data © Crown copyright and database right 2019

What is notable about this analysis (Figure 78) is that in all three periods; Early, Middle and Late Bronze Age, similar distribution patterns are presented for the appearance of Bronze Age settlement sites. As with the total distribution, it can be seen that Bronze Age settlements are found across the majority of Britain (see Figure 73). This indicates that, as a phenomenon, the appearance of settlements with structures occurred at least as early as the Early Bronze Age, and that this time period is not of sufficient resolution to identify a regional origin point for Bronze Age domestic structures. Instead, these data would suggest that such structures appeared contemporaneously and independently across multiple regions of Britain. While settlements are visible across all regions of Britain, they do show a greater density in the south of Britain, and in particular the south east of England (see Figure 77 below).

6.2.2 Radiocarbon dataset

The radiocarbon dated Bronze Age settlement sites that form the primary dataset used for the thesis (the high-resolution dataset) has identified a total of 316 sites with Bronze Age settlement sites with settlement structures.

As with the coarse dataset, these are found throughout England, Scotland and Wales (Figure 77). Notably, their distribution is less southern focussed than those seen in the coarse dataset, with a more even representation of Bronze Age domestic sites in Scotland compared to Britain and Wales due to the selection criteria not being biased against Scotland, as in the coarse dataset (Chapter 3).

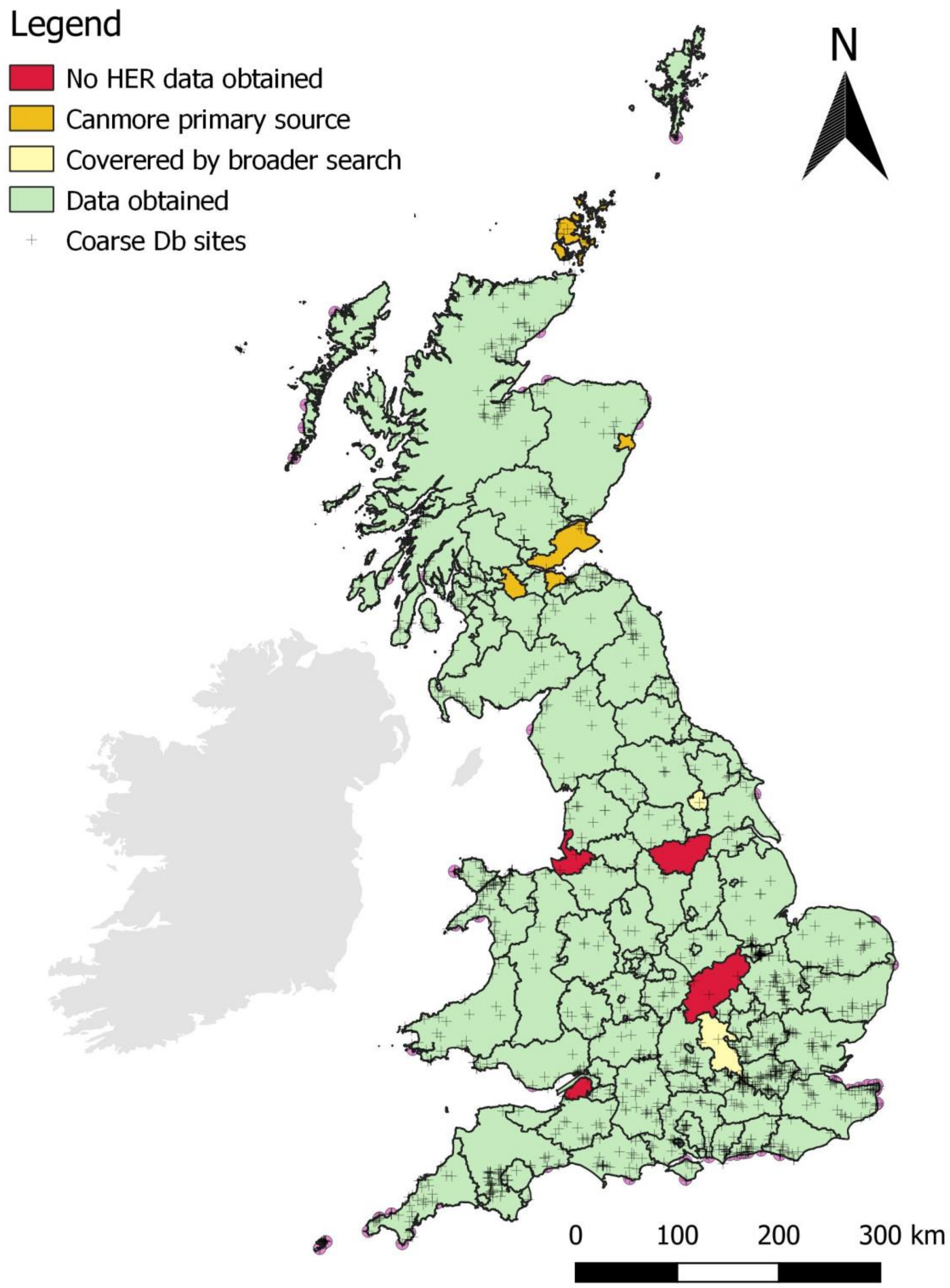

Figure 79 Those regions divided by the data collection method's effectiveness. Contains OS data © Crown copyright and database right 2019.

However, there are several areas which show a far lower number of settlement sites. These include Exmoor, Kent, the upland regions of Wales, Northamptonshire, regions of the Highlands of Scotland and much of northern England. In general, there also appears to be a slightly higher density of radiocarbon dates in southern Britain, defined as the land beneath a line drawn between the Severn and the Wash, than in northern Britain (Figure 78).

The dearth in north Somerset and Northamptonshire can be explained by the region not being able to send heritage data to the project (Figure 79). The remaining areas, however, were studied in full, such that they certainly represent genuine areas of poor settlement recovery with radiocarbon data.

The bias in settlement identification has already been discussed. As such, any deviations from this are likely to be the result of bias within archaeological research projects. In particular, northern Britain and Kent showing few radiocarbon dates is surprising, particularly as in the former, ceramic chronologies for the Later Bronze Age (c 1600-800 cal BC) are far less developed than in the south (Hodgson & Brennand 2007 p.49) such that radiocarbon dating would be of high value.

6.2.2.1 Diachronic study

As with the coarse dataset, it is possible to divide these sites into three periods; Early, Middle and Late Bronze Age, and study the change in distribution over time (Figure 78).

While it has been noted that there is a change in settlement presence over time (Chapter 5), it does not appear that the distribution in settlement changes in a similar manner. Sites dating to the Early, Middle and Late Bronze Age have been found in all areas of Britain.

The coarse data survey identified that if the use of domestic structure had a regional origin, the three-age division of the Bronze Age is not sensitive enough to identify a location where the earliest settlements in the Bronze Age are most densely clustered which could represent this point. As such, a similar attempt was made using solely the radiocarbon date sites. To do so, the earliest occupation associated with domestic structures for each site with radiocarbon dates were mapped. The resultant map (see Figure 80) is consistent with the coarse dataset study. Bronze Age domestic structures from the very earliest period of the Bronze Age can be found across Britain, albeit rarely. Sites include:

1. Beaker structure 108, Porthcurno-Sennen, Cornwall (Jones, Taylor & Sturgess 2012)
2. Ring ditch 1, Showell Nurseries, Wiltshire (Young & Hancocks 2006)
3. Redberth-Sageston A477 bypass, Pembrokeshire (Page 2001)
4. Roundhouse 5, Bradley Fen Bronze Age settlement, Cambridgeshire (Cambridge Archaeological Unit 2006)
5. Structure A, Trelystan Round Barrows, Powys (Gibson 1996)
6. House 4, Standrop Rigg, Northumberland (Jobey 1983)
7. Platform 8 phase 1, Lintshie Gutter, South Lanarkshire (Terry 1995)
8. Structure 5, Upper Forth Crossing (Jones, Sheridan & Franklin 2018)

Figure 80 Those earliest radiocarbon dated Bronze Age settlement sites. 1.Beaker structure 108, Porthcurno-Sennen, Cornwall (Jones, Taylor & Sturgess 2012) 2.Ring ditch 1, Showell Nurseries, Wiltshire (Young & Hancocks 2006), 3. Redberth-Sageston A477 bypass, Pembrokeshire (Page 2001), 4. Roundhouse 5, Bradley Fen Bronze Age settlement, Cambridgeshire (Cambridge Archaeological Unit 2006), 5. Structure A, Trelystan Round Barrows, Powys (Gibson 1996), 6. House 4, Standrop Rigg, Northumberland (Jobey 1983), 7. Platform 8 phase 1, Lintshie Gutter, South Lanarkshire (Terry 1995), 8. Structure 5, Upper Forth Crossing (Jones, Sheridan & Franklin 2018). Contains OS data © Crown copyright and database right 2019

These sites represent the earliest occurrence of Bronze Age domestic structures in Britain and may have been occupied even before 2400 cal BC. This result considers all forms of domestic Bronze Age structure. The distribution of these settlements can be seen to place those earliest Bronze Age settlement structures across Britain in England, Scotland and Wales in regions entirely disconnected from one another. As such, it can only be concluded that the practice of living within a permanent domestic structure, circular or not, either occurred independently and contemporaneously across multiple regions of Britain phrasing origins, which might have a regional centre, lie before the Bronze Age.

6.3 Where does settlement density increase?

With the larger number of settlements apparently recovered in southern Britain, it is appropriate to ask whether the boom in settlement at 1700 cal BC (Chapter 5.4.5.3) is regionally specific. It may be, for example, that the expansion of settlement construction postulated at 1700 cal BC was one primarily seen in the south of Britain (sensu Bradley 2007, 224) , whilst in the north, the rate of settlement construction remained more consistent.

In order to identify whether this was the case, kernel density maps were produced of the Bronze Age domestic sites by period (Figure 81 and Figure 82). These maps indicate the density of settlements across the entire study region. These can be compared by eye, which indicates that between the Early and Middle Bronze Age, the density of domestic settlement sites increases across almost the entirety of the country barring: parts of the east of Wales; the west Midlands; East Anglia; Cumbria; the north east of Scotland; and the north west of Scotland. When studying only those sites with radiocarbon dates, the only decrease is seen in the north of England.

Between the Middle and Late Bronze Age, the density of domestic settlement sites increases across the entirety of the country barring; much of the south west of England, the areas around Lancashire and Yorkshire, Dumfries and Galloway and the Highlands of Scotland. When studying only those sites with radiocarbon dates the model is the same barring a slightly larger decrease in the number of sites in Scotland. As such, this comparative analysis would indicate that the number of Bronze Age settlements increases in almost all regions, such that the boom in Bronze Age settlement does not have a particular regional location.

It is of note that Early Bronze Age domestic sites are found most commonly in relative terms, in the Fens around Norfolk and Suffolk. However, this centre of settlement density appears to shift towards London in the Middle Bronze Age, a trend which only increases in the Late Bronze Age, to the extent that a basic heatmap of Bronze Age settlement sites give the impression of a contraction of settlement from Britain towards London. This contraction towards London is mostly likely to represent developer bias, however it also indicates a downturn in settlement in the wetlands of East Anglia which may have been in response to the increased flooding of these regions (see Pryor 2001a for a good exploration of the flooding of this region during the Bronze Age).

It is also possible to establish the relative increase in each of these regions. To do so, the study area was divided into 11 geographic units, for ease of use based on current European designations of the British Isles. The number of sites within each region were then counted by period for the coarse and high-resolution datasets (Table 37). Using this, it became possible to compare the relative increase/decrease in the number of settlement per period (Figure 83 and Figure 84). This analysis indicated that on average every region barring the north west of England shows an increase in the number of settlements over time, although each region has a particular character. Once again, south west England shows a decrease in the number of settlements between the Middle and Late Bronze Age. The north east of England meanwhile may in fact have an overall decrease in settlements, its average ratio of increase only being positive due to a particularly large increase in the number of coarse Bronze Age settlements in the Late Bronze Age. It does also appear that more regions north of a line drawn between Liverpool and the Humber have a lower increase in the quantity of settlements.

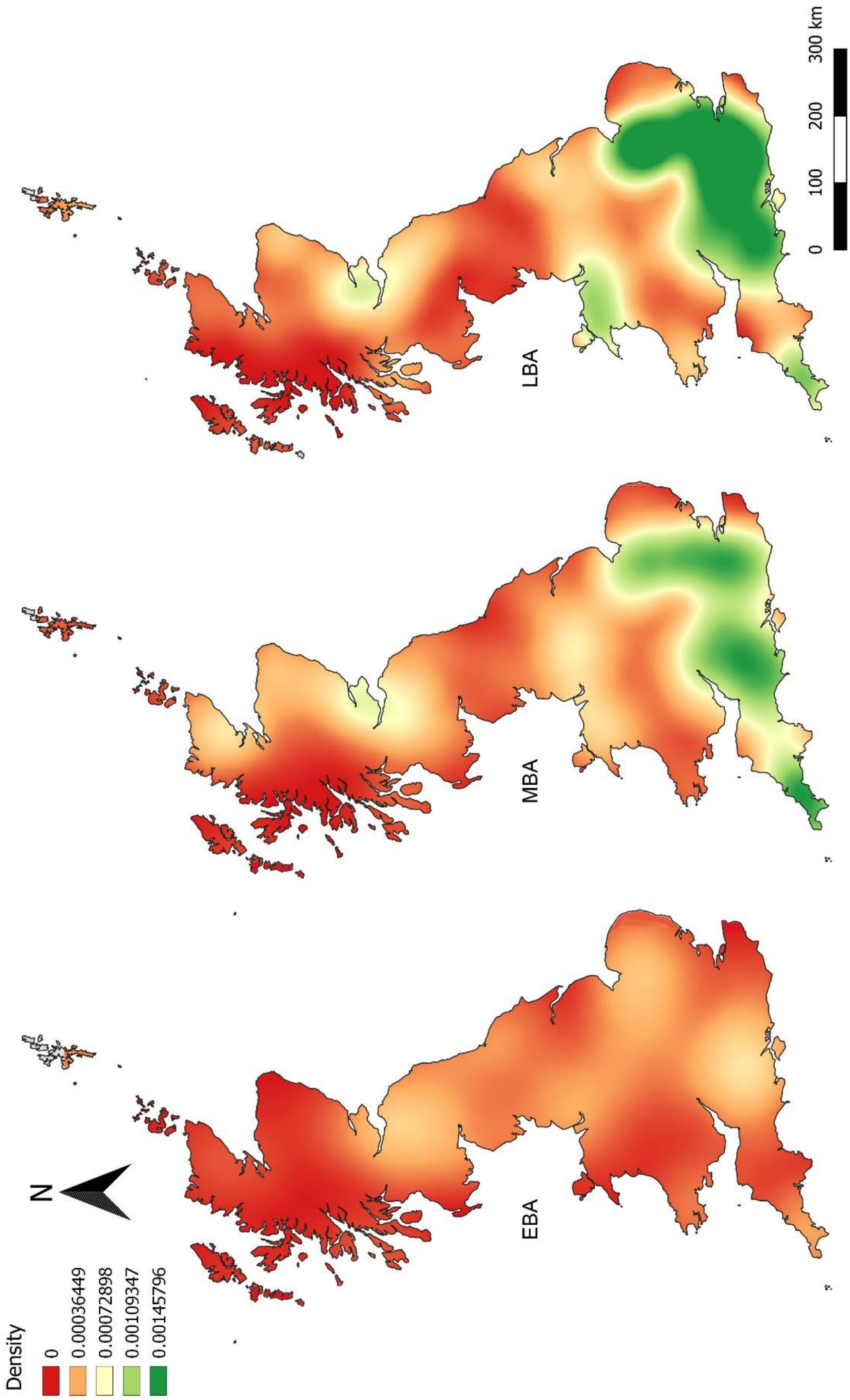

Figure 81 Kernel density distribution maps that depict the relative intensity of settlements by period, Early Bronze Age (left), Middle Bronze Age (centre) and Late Bronze Age (right). It has been created using the 316 Bronze Age settlements sites that form the high-resolution dataset. Contains OS data © Crown copyright and database right 2019

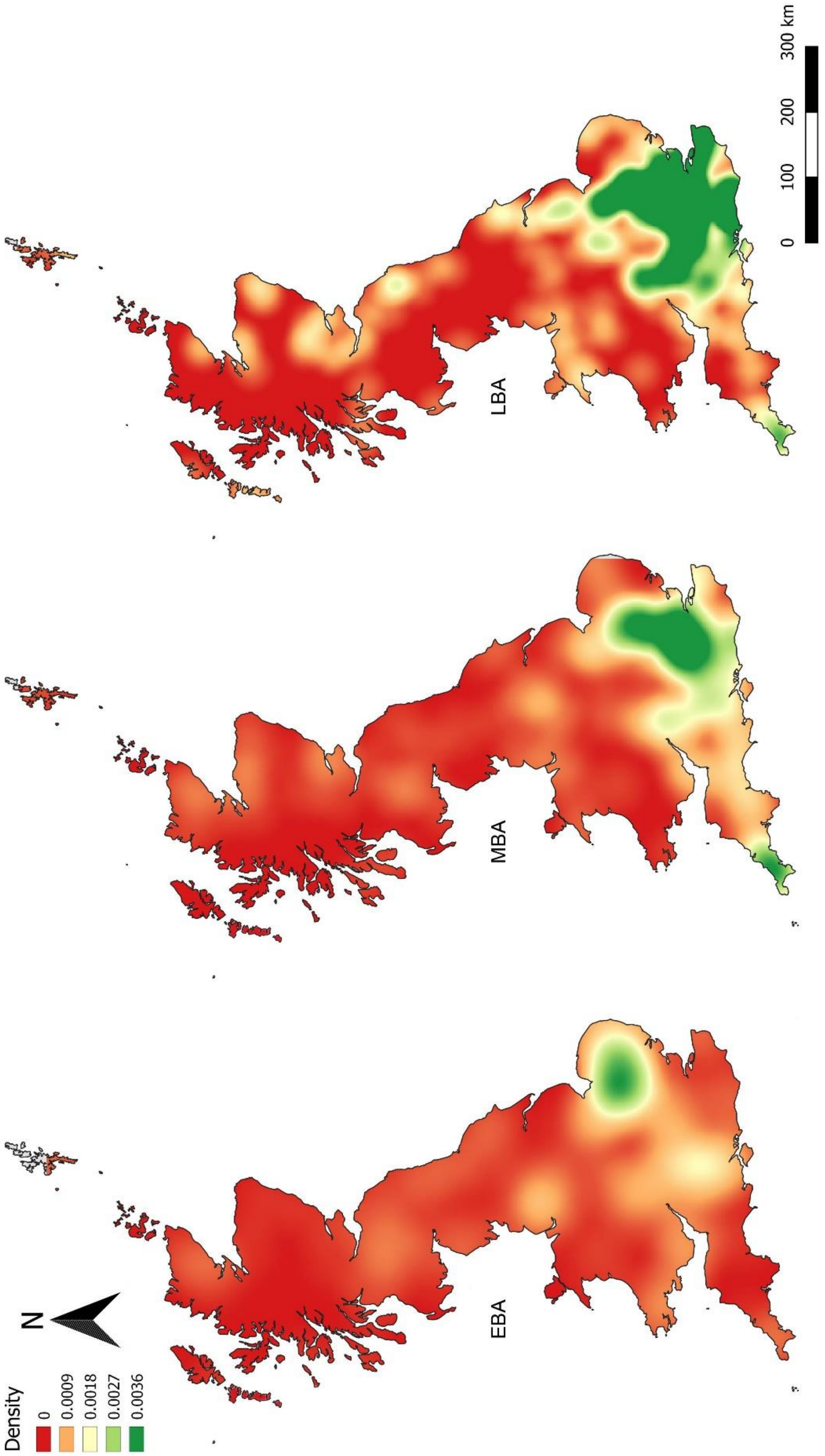

Figure 82 Kernel density distribution maps that depict the relative intensity of settlements by period, Early Bronze Age (left), Middle Bronze Age (centre) and Late Bronze Age (right). It has been created using the 1488 Bronze Age settlements sites that form the coarse resolution dataset. Contains OS data © Crown copyright and database right 2019

	Coarse data (n=1488)			High resolution data (n=316)		
Region	**EBA**	**MBA**	**LBA**	**EBA**	**MBA**	**LBA**
South West	14	58	49	13	46	37
South East	18	45	123	8	17	29
London	2	17	40	1	7	5
Eastern	43	37	87	9	17	27
Wales	13	10	16	6	13	22
West Midlands	8	4	10	2	3	4
East Midlands	6	9	20	4	7	6
North East	4	2	7	5	4	4
Yorkshire and the Humber	5	6	9	4	5	7
North West	12	6	5	8	7	6
Scotland	22	25	36	21	37	34

Table 37 Count of sites within each region divided by date

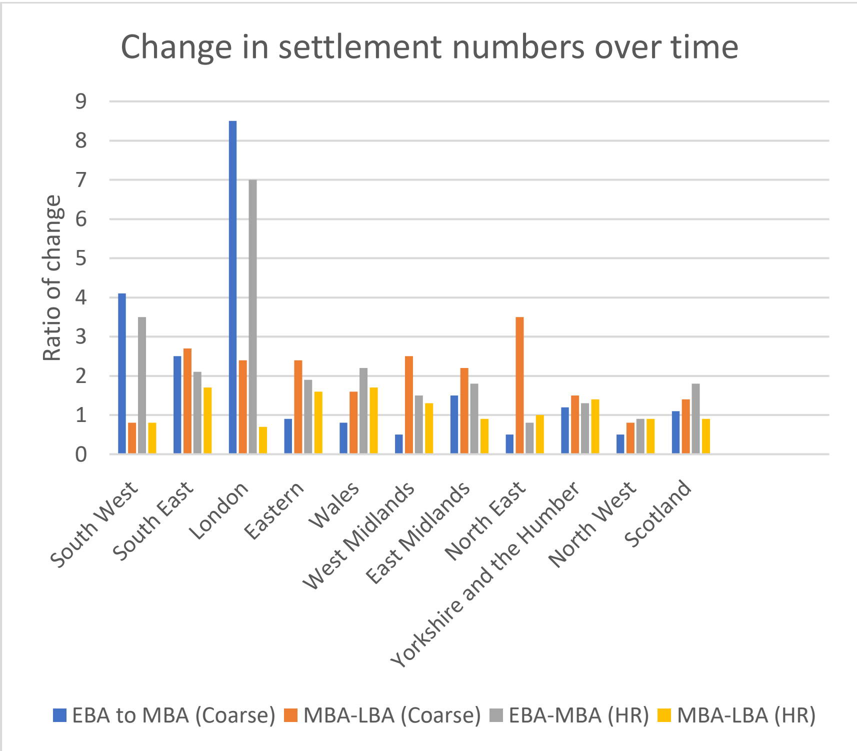

Figure 83 The relative increase in the number of settlements over time. Note that any number less than one represents a contraction in the number of settlements

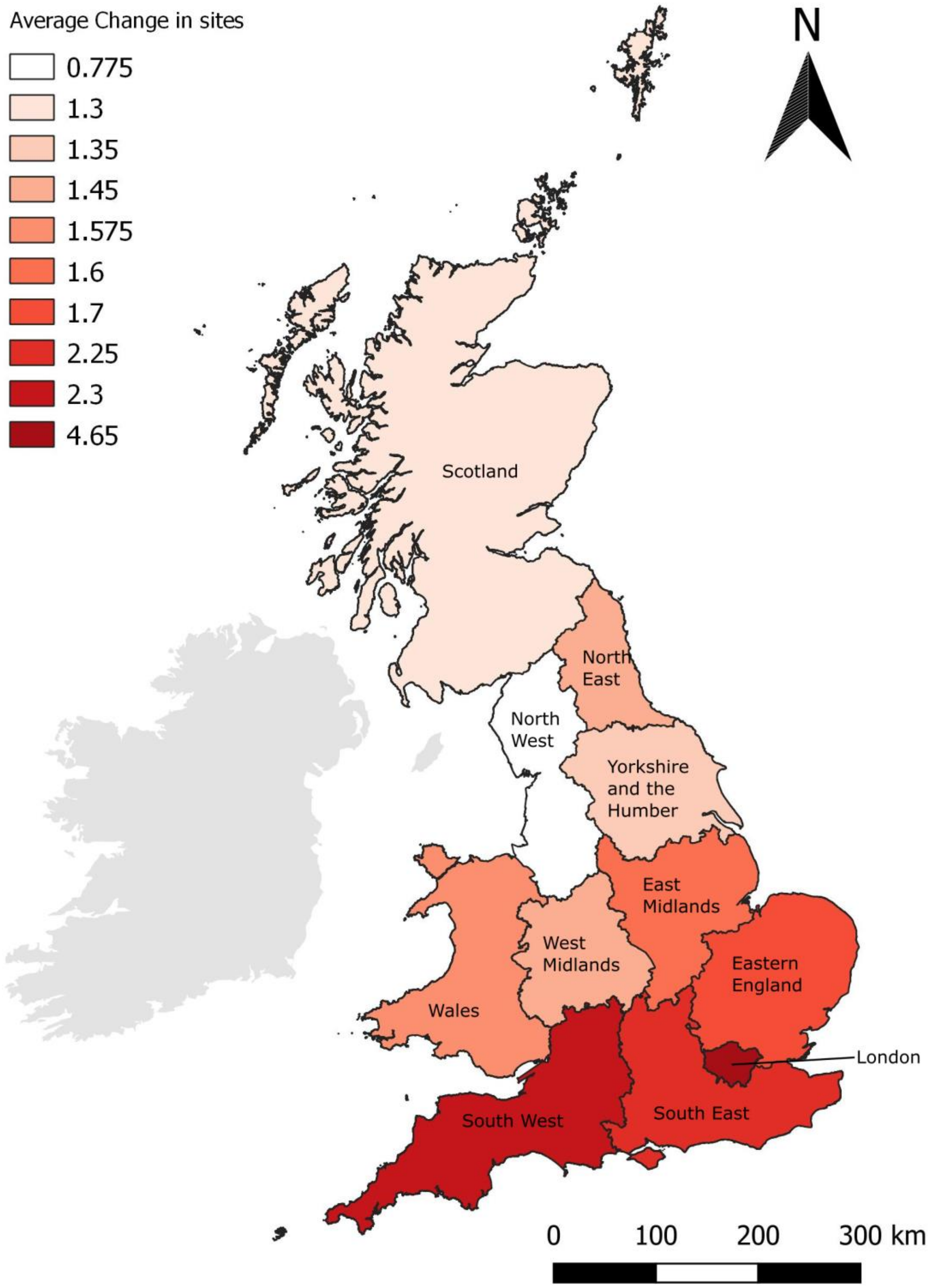

Figure 84 The average increase in the number of settlements over time. Graphs showing each region's particular profile are displayed in Figure 83. Contains OS data © Crown copyright and database right 2019.

6.3.1 Comparing the density of domestic structures in Britain over time

The above analysis has shown that the majority of Britain had at least some domestic structures throughout the Bronze Age and that the number of these sites increased over time. It has also shown that there is variation in the increase in the number of settlements regionally, with a particular increase in the south east of England. It is uncertain to what extent this merely reflects bias in archaeological investigation and radiocarbon dating. As such, it is important to contrast this change in settlement density to other readily available datasets. Unfortunately, no archive exists that evenly tracks the appearance of the majority of features whose density might be informative for Bronze Age settlements such as: henges; temporary occupation sites; burials; rock art; burnt mounds; barrows; field systems; or artefact scatters such as pottery. What studies do exist of this material are instead regionally focussed. However, one dataset was available to examine, one of which studies the entirety of England and Wales and the other which covered the entirety of Britain. This is the study's own index of radiocarbon dates for Britain.

6.3.1.1 Radiocarbon dates

A database of 9181 radiocarbon dates from 2880 sites were collected as part of the study. This was created using the author's own radiocarbon archive combined with information from Bevan et al. which is said to represent 75% of the radiocarbon dates in Britain up until 2015 (Bevan, Colledge, Fuller, *et al.* 2017). These have been taken on multiple phenomena including burials, settlements, burnt mounds, monuments and occupation layers.

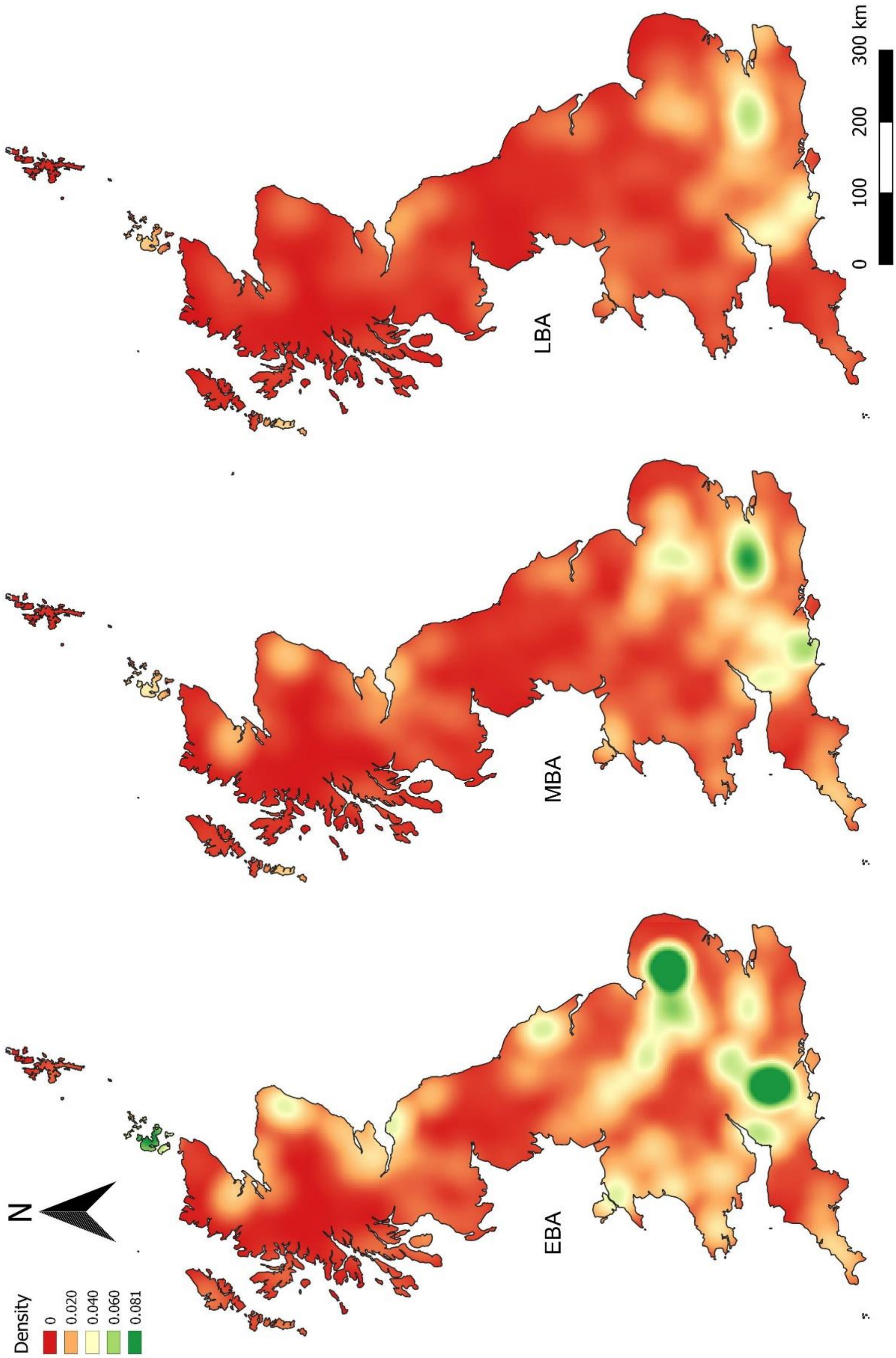

Figure 85 Kernel density distribution maps that depict the relative intensity of radiocarbon dates by period. These represent the density of radiocarbon dates whose calibrated range at least in part enters or is within the Early (left), Middle (centre) and Late (right) Bronze Age. Contains OS data © Crown copyright and database right 2019.

These have certainly shown an uneven bias in their recovery, with far more sites being identified in the south of Britain (Figure 85), yet this bias is consistent, such that the change in the quantity of these dates may reflect the variation in occupation over the Bronze Age. For example, the north of Britain may have been understudied, however, this period will have been understudied to the same extent for all Bronze Age phenomena.

In order to identify the regions where density of this material increased/decreased, each radiocarbon date was assigned a period bin based on its calibrated date distribution. These were then counted within each of the regional zones previously identified (see 6.3.1).

	Counts			Date quantity ratio	
Name	**EBA count**	**MBA Count**	**LBA Count**	**EBA to MBA**	**MBA to LBA**
South West	946	741	485	0.78	0.65
South East	429	406	466	0.95	1.15
London	100	210	121	2.10	0.58
Eastern	683	434	265	0.64	0.61
Wales	684	387	299	0.57	0.77
East Midlands	384	218	90	0.57	0.41
West Midlands	112	97	95	0.87	0.98
North East	110	56	58	0.51	1.04
Yorkshire and the Humber	301	126	111	0.42	0.88
North West	184	84	80	0.46	0.95
Scotland	1482	926	711	0.62	0.77
Total	5415	3685	2781	0.68	0.75

Table 38 The quantity of radiocarbon dates per region per period and the ratio of their difference between periods

The results of this analysis (Table 38) first show that the number of radiocarbon dates per period decline over time. This pattern is not accurate for the regions of London which has a far larger number of Middle Bronze Age radiocarbon dates and the south east of England which has slightly more Late Bronze Age radiocarbon dates. Those regions with a declining number of radiocarbon dates per period can be explained in one of three ways. Either:

There are less radiocarbon dates in each region due to the length of each period. Specifically, the Middle Bronze Age is 350 years shorter than the Early Bronze Age and the Late Bronze Age is 100 years shorter than the Middle Bronze Age.

Or

There are less radiocarbon dates in each region as there is genuinely less activity occurring in these areas as time progresses.

Or

There are less radiocarbon dates due to bias in obtaining radiocarbon dates either because they are not needed or because the region is understudied in this regard.

The first of these scenarios seems to be the most likely as the number of radiocarbon dates is broadly proportional to the duration of each period (see Table 39). Yet in each of these cases the declining number of dates barring and the scale of this decline only serves to emphasise that the near complete uniform increase in settlements seen across Britain is larger than should be expected. Furthermore, the sole region which sees a decline in settlement numbers also see a similarly scaled decline in radiocarbon dates, this may suggest the decline is due, not to an actual decline in settlement numbers during the Bronze Age, but to bias in the archaeological record as with the radiocarbon dates.

	EBA to MBA			MBA-LBA		
Region	**Coarse dataset**	**High resolution**	**C14**	**Coarse dataset**	**High resolution**	**C14**
South West	4.1	3.5	0.78	0.8	0.8	0.65
South East	2.5	2.1	0.95	1.7	2.7	1.15
London	8.5	7	2.1	0.7	2.4	0.58
Eastern	0.9	1.9	0.64	1.6	2.4	0.61
Wales	0.8	2.2	0.57	1.7	1.6	0.77
West Midlands	0.5	1.5	0.57	1.3	2.5	0.41
East Midlands	1.5	1.8	0.87	0.9	2.2	0.98
North East	0.5	0.8	0.51	1	3.5	1.04
Yorkshire and the Humber	1.2	1.3	0.42	1.4	1.5	0.88
North West	0.5	0.9	0.46	0.9	0.8	0.95
Scotland	1.1	1.8	0.62	0.9	1.4	0.77
	Ratio of EBA to MBA = 0.5625			Ratio of EBA to MBA = 0.7778		

Table 39 Comparison chart of the ratio of sites and dates per period per region

6.3.2 Summary and discussion

The coarse data study and radiocarbon dates present a consistent narrative for the distribution of Bronze Age settlement when treated as a single contemporary phenomenon or when divided by their temporal location. The earliest Bronze Age use of permanent domestic structures appears to occur across the majority of Britain, such that no location can be argued as the core progenitor of a Bronze Age settled lifestyle. If such a region exists, the earliest occurrence of this lifestyle lie outside the Bronze Age.

Early, Middle and Late Bronze Age sites can be found in almost all regions of Britain, such that few areas in Britain can confidently be suggested as being so incompatible with permanent domestic structures to the extent that no sites of this kind could be found there. Those regions that do exist have been indicated through the use of landscape character areas. It is notable that these include upland and lowland regions, areas primarily used for arable farming, areas primarily used for grazing coastal regions and those inland. As such, there does not appear to be a geographically defined set of traits that link these regions. It may be that the dearth of settlements in those well occupied lowland areas represent an issue in recovery, yet those upland regions, which have been the subject of aerial survey, do appear to present a genuine bias, unless only architecture which would not appear in these surveys was used.

These biases understood, it is possible then that those regions without settlement may be accounted by some cultural factor of the Bronze Age. The answer to this could be that these regions were occupied by those people not using domestic structures, or that these regions were shunned by everyone for another now-unknown reason.

The number of sites in southern Britain are more numerate than those in the north of Britain. However, it appears that the “boom” in settlement building around 1700 cal BC was felt across the entire country, such that it serves only to magnify an already existing bias in the archaeological record. The extent to which these patterns may represent a genuine difference in settlement distributions is unknown. However, when compared to the presence of radiocarbon date depositions it does appear that the decline in settlement numbers in the north west of England and the slower expansion in settlement numbers elsewhere in the country may be due to taphanomic issues rather than reflecting the reality of the period.

6.4 Is there a set of environmental attributes preferred for the placement of Bronze Age settlement structures?

This section will discuss the locations selected for the placement of Bronze Age domestic structures in Britain, focussing on broad characteristics of the landscape, namely; the region's topography, the relationship to the coast and river channels, the region's geology and then finally the environmental conditions of the locations themselves.

6.4.1 Elevation upland vs lowland

Previous discussions of Bronze Age settlements, monuments and activities that have tried to identify spatial clustering or to divide the country into regions where certain activities were limited and contrasted with one another usually compare the uplands of Britain to the lowlands (Burgess 1980; Fox 1932; Poyer 2015; Simmons & Proudfoot 1970). This section assesses the validity of this division and the comments that can be made on Bronze Age society when seeing the location of Bronze Age settlements.

There are three datasets that are able to comment on the applicability of an upland-lowland division of sites. Those 316 Bronze Age settlement sites that have associated radiocarbon dates, those 1488 potential Bronze Age settlement sites which have been excavated and those 6866 sites that potentially have a Bronze Age settlement structure (Table 40).

Height Value	High Res 316	%	Coarse 1448	%	Potential 6866	%	Terrain Cells	Terrain cells %
up to 10	66	21%	243	17%	414	6%	3765	7%
10 to 50	86	27%	498	34%	1063	15%	9045	18%
50 to 100	78	25%	334	23%	1113	16%	10986	21%
100 to 150	38	12%	150	10%	1042	15%	7970	16%
150 to 200	15	5%	75	5%	805	12%	4905	10%
200 to 250	5	2%	33	2%	491	7%	3515	7%
250 to 300	7	2%	29	2%	445	6%	2684	5%
300 to 1000	21	7%	86	6%	1493	22%	8508	17%

Table 40 The number of Bronze Age settlement sites from the high resolution (radiocarbon dated) and coarse (non-radiocarbon dated) datasets found at different heights compared to the proportion of Britain that is made up of these height classes, in metres. Most sites had lowland locations, under 200m above sea level

	High Res 316		Coarse 1448		Potential 6866	
Height value	Expected	Observed	Expected	Observed	Expected	Observed
up to 10m	23	66	106	243	503	414
10 to 50m	56	86	255	498	1209	1063
50 to 100m	68	78	310	334	1468	1113
100 to 150m	49	38	225	150	1065	1042
150 to 200m	30	15	138	75	655	805
200 to 250m	22	5	99	33	470	491
250 to 300m	17	7	76	29	359	445
300 to 1000m	52	21	240	86	1137	1493
	P Value	**>0.99**	P Value	**>0.99**	P Value	**>0.99**

Table 41 Chi-squared test proving that each of the distributions are significantly different to the expected profile if distributed across the country at greater than 99%

Each of these sites has been confidently placed geographically within Britain. The heights of these sites above sea level have been extracted from a DEM constructed using the Ordnance Survey's OS Terrain 50 layer using ArcGIS' extract values to points function. This has identified the height above sea level of all 1488 settlements. It should be noted that this assumes a settlement occupies only a single infinitesimally small single location, when the reality is that it covers a number of square metres, the height of which varies. However, when settlements were typically made of only a few houses, such that they rarely cover more than the cell size used in the digital elevation model (DEM), this value gives a pragmatic and suitable representation of that site's possible height above sea level.

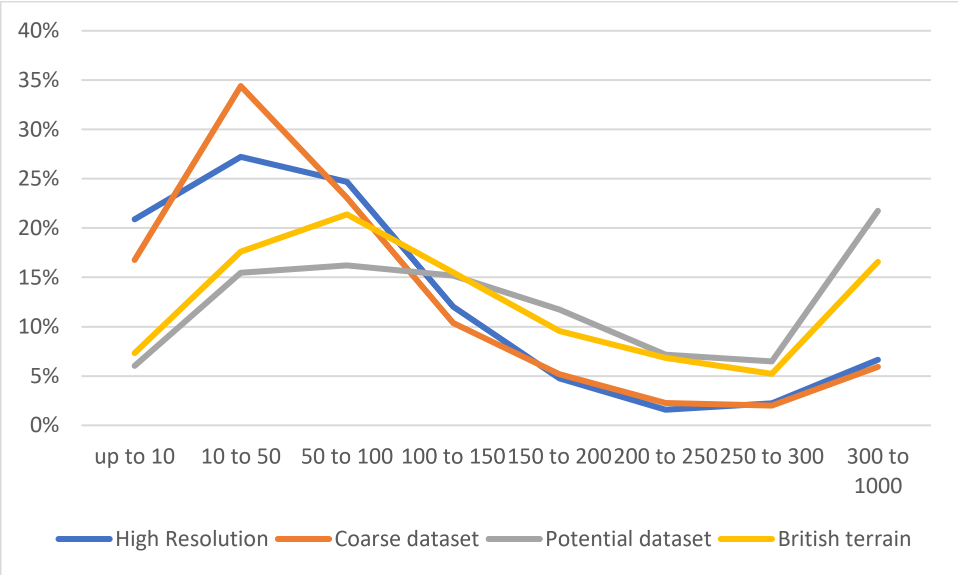

Figure 86 The relative proportion of settlements divided between different height bands of Bronze Age settlement sites from the high resolution (radiocarbon dated), coarse (non-radiocarbon dated) and potential (all possible Bronze Age settlements) datasets found at different heights compared to the proportion of Britain that is made up of these height classes, in metres

For the purposes of this thesis, the uplands of Britain are understood as anywhere placed 200m above sea level (Bradley 2019 p.13; Following Fox 1932). The datasets present contrasting views of the location of Bronze Age settlements. Both the high resolution and coarse data suggest that less than 8% of the sites identified are placed above this height. Similarly, the vast majority of sites are placed below 200m (90%), and so within these debates can be confidently stated as lowland locations (see Table 40). Yet when studying those potential Bronze Age settlement sites, a different division of sites emerges. While 65% of sites are still placed below 200m, over 17% are placed between 300 and 1000m.

These values can be compared against the expected number of settlements by elevation, if assuming that settlements were evenly distributed across all heights. By doing so, it is possible to see if any trends in the data are simply the result of Britain's geography, for example, if the majority of sites were found at 100m but the 90% of the country was at this height, then it would be unlikely to be archaeologically significant. For each of the three datasets the distribution of sites is statistically significantly (Table 41) different than the number of sites that would be expected if evenly distributed across all terrains.

These results indicate that it is the potential Bronze Age settlement dataset that most closely follows the expected number of settlements, if normally distributed with slightly more appearing in upland locations and slightly less between 10m and 150m (Figure 86). Conversely, the coarse dataset and high-resolution dataset show a disproportionate number of sites below 150m, while those sites in the uplands are underrepresented.

The results of this analysis are likely to be skewed by the fact that the majority of excavations now occur in areas of modern development which tend to be in lowlands. Similarly, the higher number of potential settlement sites in upland regions may be skewed by the number of upland stone-built sites visible with aerial photographs. This thesis is not able to identify the extents of these biases fully, and no other analysis has to date. Instead, it is more effective in this case to simply identify which landscape zones have been selected or rejected for settlement. When plotted, it is clear that there are no landscape zones as defined by height above sea level zones bereft of settlements (Figure 86, Table 40). All highland zones (baring that of the Scottish Highlands) contain at least one Bronze Age settlement, as do all lowland zones.

As such, the data can only lead to the conclusion that the entirety of Britain, when studying height above sea level, was viable and then selected for habitation during the Bronze Age. Any apparent low-density areas (which still do contain settlements) are likely to produce further Bronze Age settlements if investigated through targeted excavation or by random sample through development led investigation.

6.4.1.1 Diachronic perspective

In Ireland there has been the suggestion that the uplands were increasingly occupied in the Middle Bronze Age, whilst in the existing narratives of Bronze Age Britain there is a suggested abandonment of the uplands in the Late Bronze Age (see review of the debate in Tipping 2016). As such, it is relevant to comment on the extent to which this thesis' data support or refutes the abandonment of the uplands in the Late Bronze Age.

Two datasets are available to do so - those 316 Bronze Age settlement sites that have associated radiocarbon dates, and those 1488 potential Bronze Age settlement sites which are likely to have been excavated (976 of which have a provisional date attached to them). Both these datasets present supporting models that are similar to one another, both suggesting that less than 8% of the sites identified are placed above this 300m and that the vast majority of sites are placed below 200m (80%). Furthermore, the same division of space seen in the cumulative dataset occurs with no variation over time that could be classed as statistically significant (Table 41). This is surprising as there is often a widely cited abandoning of the uplands in the Later Middle Bronze Age (Amesbury, Charman, Fyfe, *et al.* 2008; Burgess 1984 p.153, Burgess 1985; Turney, Jones, Thomas, *et al.* 2016). While it is clear such settlements do disappear in certain regions such as Dartmoor, the overall distribution of sites remains consistent. This is true of radiocarbon dated settlements and those that have been excavated (Table 41).

6.4.2 People and water

6.4.2.1 Rivers

It has been suggested that rivers provided key means of transport that were negotiated and controlled (Luke 2008; Mullin 2012; Sherratt 1996). It is not uncommon for clusters of archaeological features (particularly settlements) to be discussed as being purposefully placed to control riverine locations or to exploit the opportunities they provide (*ibid*). Similarly, rivers have frequently been discussed as providing a primary route for transportation and a realm of interaction between communities (Bradley 1980, 67; Fox 1946, 66-7; Lambrick 2009, 225-8; Yates 2007, 41). Such interpretations may be accurate, however, they rely on a contextual understanding of each site beyond the possibility of studying such a large dataset. Similarly, there is frequently the issue of confirmation bias in identifying such use, such that a formal assessment of whether settlements were frequently placed to control rivers, or whether these are isolated examples, is necessary. If such rivers were positively selected for settlement location, there should be an identifiable bias to these locations.

6.4.2.1.1 Method

6.4.2.1.1.1 Defining rivers

Before assessing the location of Bronze Age settlement in relation to rivers, a dataset must first be defined for the rivers in question. Britain has a dense number of rivers across almost the entire country. It would be beyond the scope of this research to reconstruct the Bronze Age river network of Britain, such that it is only able to use modern proxies. To this end, the it has been possible to make use of the Ordnance Survey Strategi vector dataset for Britain (Ordnance Survey 2019). This dataset includes details on all major, secondary and minor rivers and also canals, although it is only current until January 2016. From Strategi, all major, secondary and minor rivers were exported as intendent shapefiles allowing analysis of the distribution of Bronze Age settlement sites to be compared to these separately and as a combined dataset. These represent the major rivers in the country and may be expected to form the key tributaries for movement in the Bronze Age, if such models are accurate. As such, if these were controlled or exploited extensively by Bronze Age settlers we would expect a denser quantity of settlements along their edge than elsewhere.

These rivers will not reflect the exact course of those in the Bronze Age as the majority will have changed their course slightly since that time, although it has been suggested that major rivers have moved course less than 500m over the last four millennia (Andrew Howard pers. comm.). However, these changes are likely to have affected the navigability of smaller rivers. As such, only those main and secondary rivers have been chosen analysis excluding those minor rivers.

6.4.2.1.1.2 Buffering

To assess the number of sites close to the coast, a series of buffers were created that were able to define how many sites were within bands of Euclidean distance to the coast. As with the study of uplands, there were three datasets that were able to comment on the applicability of an upland-lowland division of sites. Those 316 Bronze Age settlement sites that have associated radiocarbon dates, those 1488 potential Bronze Age settlement sites which are likely to have been excavated and those 6866 sites that potentially have a Bronze Age settlement structure.

6.4.2.1.2 Results

6.4.2.1.2.1 Main rivers

The analysis found that the majority (>70%) of Bronze Age settlements, both potential (70%), those excavated (72%), and those radiocarbon dated (83%) are placed *over* 5km away from those rivers categorised as “main rivers”. The results for high resolution and coarse dataset suggest there is little change in this pattern over time (Table 42).

Distance (m)	Proportion of Britain	Potential sites (6866 sites)	Coarse sites (316 sites)	High Resolution sites (1488 sites)	Coarse sites (EBA) (81 sites)	Coarse sites (MBA) (164 sites)	Coarse sites (LBA) (181 sites)	High Resolution sites (EBA) (147 sites)	High Resolution sites (MBA) (219 sites)	High Resolution sites (LBA) (403 sites)
100	1%	0%	1%	1%	1%	1%	2%	0%	1%	1%
500	3%	2%	5%	6%	7%	6%	5%	9%	5%	5%
1000	5%	5%	11%	12%	14%	11%	11%	14%	10%	12%
1500	7%	7%	15%	16%	18%	13%	16%	17%	12%	15%
2000	10%	9%	18%	18%	22%	16%	20%	17%	15%	19%
2500	12%	11%	22%	20%	23%	19%	25%	17%	16%	22%
3000	14%	12%	24%	22%	25%	21%	29%	19%	18%	24%
3500	17%	13%	26%	24%	28%	24%	31%	22%	19%	26%
4000	19%	14%	27%	26%	28%	24%	32%	22%	20%	29%
4500	21%	15%	28%	27%	29%	25%	33%	23%	21%	29%
5000	23%	17%	30%	28%	31%	28%	36%	26%	24%	30%

Table 42 The proportion of the three datasets within distance bands of a main river. This also shows the proportion of Early, Middle and Late Bronze Age settlements from the high resolution and coarse dataset within distance bands of a main river

Distance (m)	Proportion of Britain	Potential sites (6866 sites)	Coarse sites (316 sites)	High Resolution sites (1488 sites)	Coarse sites (EBA) (81 sites)	Coarse sites (MBA) (164 sites)	Coarse sites (LBA) (181 sites)	High Resolution sites (EBA) (147 sites)	High Resolution sites (MBA) (219 sites)	High Resolution sites (LBA) (403 sites)
100	2%	3%	2%	2%	2%	2%	3%	2%	2%	1%
500	12%	20%	13%	14%	16%	13%	11%	17%	14%	12%
1000	23%	35%	27%	29%	31%	26%	25%	32%	29%	31%
1500	33%	47%	36%	39%	43%	34%	34%	41%	38%	40%
2000	42%	57%	44%	47%	50%	41%	44%	44%	46%	50%
2500	51%	64%	51%	53%	55%	48%	49%	48%	52%	55%
3000	57%	70%	56%	58%	59%	54%	57%	53%	57%	61%
3500	64%	75%	61%	62%	65%	58%	59%	60%	59%	62%
4000	68%	78%	64%	66%	67%	60%	62%	64%	62%	66%
4500	73%	81%	68%	70%	69%	66%	66%	68%	68%	70%
5000	85%	83%	81%	71%	71%	69%	70%	69%	70%	71%

Table 43 The proportion of the three datasets within distance bands of a main or secondary river. This also shows the proportion of Early, Middle and Late Bronze Age settlements from the high resolution and coarse dataset within distance bands of a main river

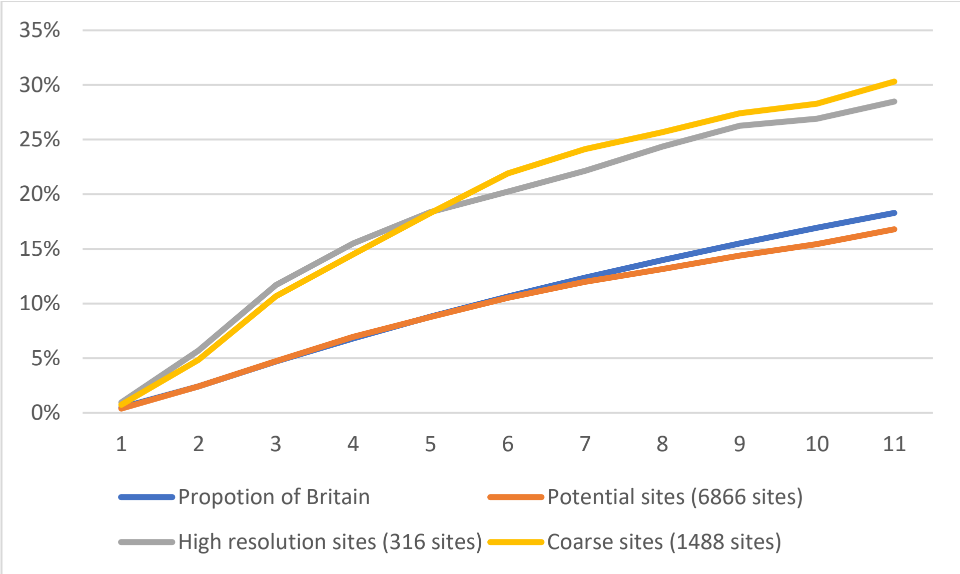

Figure 87 The proportion of the three datasets within distance bands of a main river compared to the proportion of Britain's landmass to a main river. Note how closely the potential data set aligns to this latter estimation compared to the coarse and high-resolution datasets which are placed closer than would be expected

6.4.2.1.2.2 Navigable rivers

Contrary to the result for main rivers, the analysis has found the vast majority (>70%) of Bronze Age settlements, both potential (83%), those excavated (81%) and those radiocarbon dated (71%) are placed *within* 5km distance to those rivers categorised as "main and secondary rivers". In fact, the majority for each data sample are placed within 2.5km (Table 43). These distances would only decrease further if including those rivers termed as "minor rivers". For example, of those 1488 Bronze Age settlement sites that have been excavated, 66% are within 1km of a river of any form. As with main rivers, the results for the high resolution and coarse datasets suggest there is little change in this pattern over time.

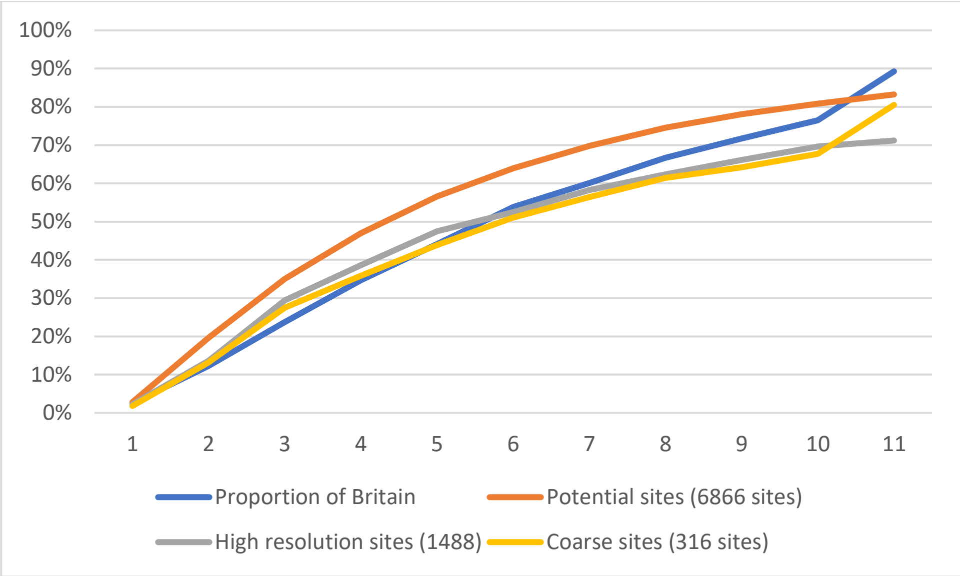

Figure 88 The proportion of the 3 datasets within distance bands of a main or secondary river compared to the proportion of Britain's landmass to a main river. Note how closely all the datasets align to this latter estimation compared to the previous analysis

6.4.2.1.2.3 To what extent are these numbers expected?

The conclusion from these results, as presented above, must be that all Bronze Age settlement sites were placed close to readily available free-running water supplies/potentially navigable rivers. However, these results in isolation do not indicate whether locations were selected for exactly this purpose. It is possible to estimate this by looking at the proportion of Britain that is within the distances studied to main and secondary rivers. In the case of main rivers for instance, 23% of Britain's landmass is within 5km of a "main river". If Bronze Age settlements sites were evenly distributed across the country, it would be expected that 23% of these sites would similarly be within 5km of a "main river".

The comparison of these expected values to actual values has produced notable results (Figure 88). Those excavated sites, both with and without radiocarbon dates, are uniformly closer to main rivers than would be expected (with statistical significance Table 44), yet those potential sites are further away. At a fundamental level there is a difference between the potential Bronze Age settlement sites and those Bronze Age settlement sites excavated. The reason behind this difference defines the significance of the results above. For example, it may be that unexcavated sites are placed further away from rivers as it is these locations that have been rarely excavated as part of the development process. In this instance the difference would be a result of uneven archaeological recovery which has the implication that any models stressing the connection of Bronze Age sites to rivers are the result of selective data. Alternatively, it may be that these settlements are not all Bronze Age, in which case the closeness to main rivers may be a genuine observation of a Bronze Age reality.

Main rivers	High Res 316		Coarse 1448		Potential 6866	
Distance	**Expected**	**Observed**	**Expected**	**Observed**	**Expected**	**Observed**
100	2	3	8	11	39	27
500	9	18	41	72	188	166
1000	17	37	79	159	364	325
1500	25	49	116	216	534	477
2000	32	58	152	272	703	603
2500	40	64	189	326	870	722
3000	48	70	225	359	1036	823
3500	55	77	260	382	1200	903
4000	63	83	295	408	1363	988
4500	70	85	330	421	1523	1060
5000	77	90	364	451	1681	1153
	P Value	**>0.99**	P Value	**>0.99**	P Value	**>0.99**

Table 44 Chi-squared test proving that each of the distributions are significantly different to the expected profile if distributed across the country at greater than 99%

In this regard, it is of note to observe that, when looking at the quantities of settlements sites in relation to main and secondary rivers combined, the expected values of settlements close to rivers is very similar to those expected for all datasets, those 316 Bronze Age settlement sites with radiocarbon dates, those

1488 that have been excavated and those potential 6988 sites, yet they are statistically distinct from the expected distribution if evenly spread across the country (Table 45). Combined, these results would suggest that the closeness of Bronze Age settlements to main rivers is a consequential finding either for understanding the Bronze Age or in understanding the bias in archaeological excavation.

Main and secondary rivers	High Res 316		Coarse 1448		Potential 6866	
Distance	**Expected**	**Observed**	**Expected**	**Observed**	**Expected**	**Observed**
100	8	7	38	27	173	193
500	39	43	183	196	845	1346
1000	75	93	354	409	1631	2404
1500	109	122	516	533	2379	3224
2000	140	150	657	653	3032	3884
2500	170	166	801	760	3698	4391
3000	190	184	894	840	4127	4794
3500	211	197	993	914	4580	5121
4000	227	209	1068	955	4926	5361
4500	242	220	1138	1007	5249	5547
5000	282	225	1328	1198	6130	5715
	P Value	**>0.99**	P Value	**>0.99**	P Value	**>0.99**

Table 45 Chi-squared test proving that each of the distributions are significantly different to the expected profile if distributed across the country at greater than 99%

This latter finding also indicates that Bronze Age settlements show the same closeness to main and secondary rivers as if they had not been placed intentionally to be close to this source and so that there was no universal rule governing settlement location that required them to be particularly close to water. Yet, this is not to say that settlements were far away from moving water sources. They were in fact found to have all been placed very closely. While most settlements are within 5km of fresh running water as defined by rivers, there are likely to be many more even closer sources. What this figure therefore represents then is that in Britain, most areas of land are close to fresh water sources, such that placing a settlement directly near a water source was not difficult.

6.4.2.2 Can a preference for coastal regions be detected?

There has been discussion of the importance of coastal areas during the Bronze Age and the possibility that areas such as the English Channel could be seen as their own occupied landscape/seascape, much like any other part of the mainland (e.g. Clark 2004, Needham 2007). As with the uplands, it is worth considering to what extent settlements were placed near or far from coastal regions. Defining a coastal zone can be complex. To date, no analysis has covered the entirety of the country. Possibilities first envisioned of how to determine coastal regions included:

- Those landscapes below 50m which when projected were not separated from the sea by insurmountable features such as cliffs and major rivers.
- Every area in the country that is less than one hours walk from the sea.
- A buffered area from the sea.

To accurately identify sites with access to the coast would take more time than available in this size of study, while the time taken to reach the coast depends on the skill of the individual traversing terrain. As such, the latter option was chosen. This comes with the benefit of allowing comparison with later analyses (see below). Any analysis of the British coast in prehistory needs must recognise that this area has undergone significant coastal erosion since the Bronze Age and sea level change (ScARF 2012). Mapping the extent of such change is beyond the study, such that any numbers generated must be interpreted with caution, with weight not being given to small variance in the data.

This analysis has found the majority (>66%) of Bronze Age settlements, both potential (from the coarse dataset) (68%), those excavated (66%), and those radiocarbon dated (from the high resolution dataset) (66%) are placed *over* 5km away from the coast (Table 46). The results for the high resolution and coarse datasets suggest that Early Bronze Age settlements are possibly placed slightly closer to the coast than those of the Middle and Late Bronze Age, although in all three periods the majority of sites are placed inland (Table 46).

To assess how significant the number of sites close to the coast are, a series of buffers were created to define how many sites were within bands of Euclidean distance to the coast. As with the method for analysing rivers, expected values were calculated for the proportion of settlements that should be found near the coast. Unlike the analysis of main rivers, but similar to that of studying main and secondary rivers, when these were compared to the expected proportion of sites, typically twice as many settlements than would be expected were found in coastal locations.

Distance (m)	Proportion of Britain	Potential sites (6866 sites)	Coarse sites (316 sites)	High Resolution sites (1488 sites)	Coarse sites (EBA) (81 sites)	Coarse sites (MBA) (164 sites)	Coarse sites (LBA) (181 sites)	High Resolution sites (EBA) (147 sites)	High Resolution sites (MBA) (219 sites)	High Resolution sites (LBA) (403 sites)
100	0%	2%	2%	2%	5%	0%	1%	2%	1%	0%
500	2%	7%	8%	7%	11%	9%	10%	6%	7%	5%
1000	5%	12%	13%	13%	19%	14%	15%	12%	11%	8%
1500	7%	16%	16%	18%	23%	17%	18%	15%	16%	11%
2000	9%	19%	19%	21%	26%	20%	21%	17%	19%	14%
2500	11%	21%	21%	24%	28%	21%	23%	21%	21%	18%
3000	12%	24%	24%	27%	28%	21%	27%	22%	24%	21%
3500	14%	26%	28%	29%	32%	27%	31%	23%	28%	24%
4000	16%	28%	30%	30%	33%	30%	33%	25%	30%	25%
4500	17%	31%	33%	32%	37%	34%	35%	27%	33%	26%
5000	18%	32%	34%	33%	38%	35%	35%	27%	34%	28%

Table 46 The proportion of the three datasets within distance bands of the coast. This also shows the proportion of Early, Middle and Late Bronze Age settlements from the high resolution and coarse dataset within distance bands of a main river

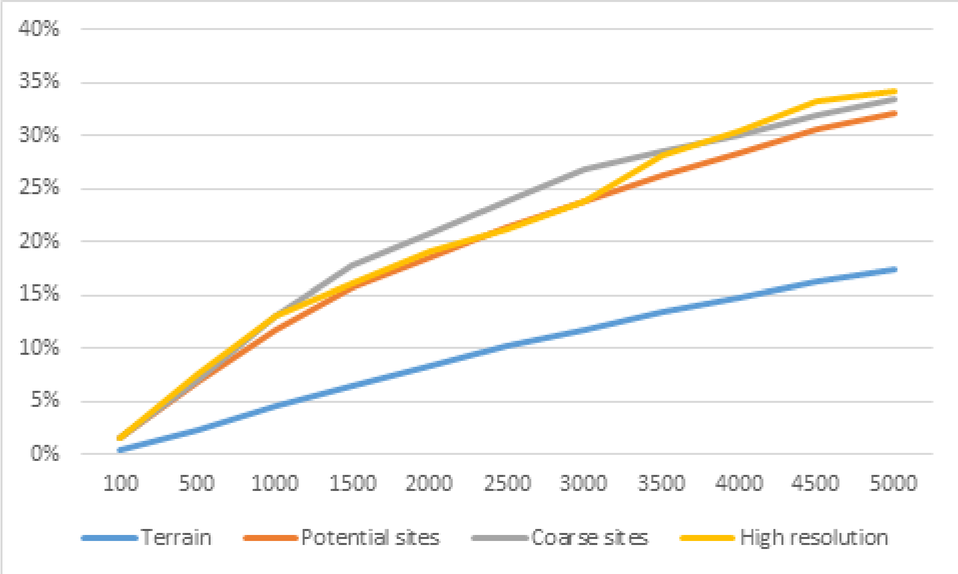

Figure 89 The proportion of the three datasets within distance bands of the coast. Note all the datasets are closer to the coast than would be expected

Coast	High Res 316		Coarse 1448		Potential 6866	
Distance	**Expected**	**Observed**	**Expected**	**Observed**	**Expected**	**Observed**
100	2	5	7	23	34	105
500	8	24	36	105	166	463
1000	15	41	70	193	322	810
1500	22	51	101	263	468	1074
2000	28	60	131	310	603	1271
2500	34	67	158	354	730	1468
3000	39	75	184	398	849	1638
3500	44	89	208	425	960	1796
4000	49	96	231	447	1065	1943
4500	54	105	252	475	1163	2097
5000	58	108	272	496	1256	2205
	P Value	**>0.99**	P Value	**>0.99**	P Value	**>0.99**

Table 47 Chi-squared test proving that each of the distributions are significantly different to the expected profile if distributed across the country at greater than 99%

Unlike main and secondary rivers, the coastal data shows a strong signal, regardless of dataset or time slice (Figure 89), that there are typically twice as many Bronze Age settlement sites placed close to the coast than would be expected if evenly distributed across all parts of England, Scotland and Wales. These distributions are also statistically significantly distinct from the expected distances if evenly distributed across the country (Table 47).

6.4.2.3 Conclusion

The results above present an exploratory analysis of the relationship between Bronze Age settlement location to rivers and the coast. Both analyses are complementary in indicating only a little change in settlement location over time. As such, it does not appear that the preferences for being near rivers or the coast changed in their priority over time in these datasets.

The results together provide a stark image of how close most locations in England, Scotland and Wales were to fresh water sources, though admittedly measured as the crow flies. This is unsurprising as one of the primary resources needed for any habitation would be fresh water. What this analysis has shown however, is that there are so many potential water sources for settlements in Britain within a relatively short distance that placing settlements near these need not be a key priority when constructing a settlement.

The results do somewhat indicate that settlement sites are placed more closely than would be expected to the coast and potentially main rivers. The extent to which these might represent observation bias is unknown, while those data for the main river would caution against underrepresenting the potential of this bias.

6.4.3 Land use

The landscape character of Britain has regularly been studied and provides a means of identifying which environments have been overly researched. As such, it is possible to combine this data with those 316 Bronze Age settlement sites that have associated radiocarbon dates, those 1488 potential Bronze Age settlement sites which are likely to have been excavated, and those 6866 sites that potentially have a Bronze Age settlement structure, in order to understand where these have been identified.

6.4.3.1 Results

Land type	Potential Settlement sites	Radiocarbon dated sites	Excavated sites	Expected values
unknown	2%	0%	0%	
Acid grassland	23%	6%	6%	9%
Arable and horticulture	7%	23%	22%	24%
Bog	6%	0%	1%	4%
Broadleaf woodland	4%	3%	5%	6%
Calcareous grassland	0%	1%	1%	0%
Coniferous woodland	7%	2%	2%	6%
Fen, marsh and swamp	0%	3%	0%	0%
Freshwater	1%	3%	3%	1%
Heather	6%	1%	2%	4%
Heather grassland	17%	4%	4%	6%
Improved grassland	17%	22%	22%	29%
Inland rock	0%	1%	1%	1%
Littoral rock	0%	0%	0%	0%
Littoral sediment	0%	2%	1%	0%
Neutral grassland	0%	1%	0%	0%
Saltmarsh	0%	1%	0%	0%
Saltwater	0%	0%	0%	0%
Suburban	4%	15%	15%	6%
Supralittoral rock	1%	2%	1%	0%
Supralittoral sediment	1%	2%	2%	0%
Urban	3%	12%	12%	2%

Table 48 Locations and proportions of Bronze Age settlement sites as found on specific types of land

The results of this analysis highlight in bold that for each dataset a disproportionate number of sites have been found in Arable, Grassland, Suburban and Urban contexts (see Table 48). Notably those unexcavated sites are found disproportionally on acid and heather grassland and have not been excavated to the extent that might be expected.

What these results indicate is that there is potentially a large number of understudied sites in the uplands of England, Scotland and Wales and that these are likely to be underrepresented for their number in general surveys due to their low excavation rate. The results of this analysis have shown that not only has modern development been focussed away from these areas, but so has modern excavation. As such, the dataset does not appear to fully represent the past reality.

6.4.4 Soils

It has been proposed that during the Middle Bronze Age the use of cultivated crops becomes far more common, with the implications being that the crops provided an important source of nutrition from that point forward (Stevens and Fuller 2012 but see Bishop 2015). This being the case, it is relevant to investigate the quality of the land occupied by Bronze Age domestic sites.

As with land use, identifying soil quality/suitability for arable purposes is not without issues. For such an analysis, pollen records may provide an accurate and contemporary representation of land use (e.g. de Gruchy, Deckers & Riehl 2016) yet these are not widely accessible. This project has been unable to find a single repository that holds this information, making the compilation of a Bronze Age land use map based on a comprehensive set of this data impossible within the bounds of the research. Broader analyses similar to those in the above sections have used modern proxies to understand the placement of settlements on high quality soils. As such, wider datasets were sought to allow a national analysis. A specific problem with these sources is the accuracy of soil quality estimations, as those soil maps that do exist are dependent on an element of prediction. As it is impractical to measure all soils across the country, any soil maps procured are usually produced by interpolating values or sample points from across the country. As such, they only estimate the values of the soils between these points, such that the physical reality of some soils may differ to what is stated in such maps.

Soilscape data was identified from two resources; the National Soil Map for England and Wales (LandIS 2019) and the Scotland's Soils database (Scotland's environment 2019). Unfortunately, the data housed in these records have varied access options and are not presented in complementary formats. For example, those details for England and Wales are made available on a web viewer, making a study of all 6800 potential sites unfeasible. While this data source contains information on drainage and soil fertility, those data available for Scotland omit this information. This study relies on being able to study all of England, Scotland and Wales. The results above have highlighted the necessity of being able to compare all three datasets. As such, only a provisional survey has been possible in this study, however, this presents a method that could be in future applied across soilscapes for the whole of Britain, once such data is compiled in compatibly comparable formats.

The results of this analysis, conducted by identifying the soil drainage and fertility of those Bronze Age settlement sites in England, present interesting results which do help contextualise the priorities behind these sites' locations. The vast majority of sites were placed on freely draining soils (Table 49), although this has not prevented areas which were more likely to flood having been occupied (such as the areas around the Norfolk flood plain). Similarly, not insignificant numbers of sites were placed on naturally wet locations. More surprisingly, however, has been the finding that a substantial number (55% of the potential dataset, 42% of the coarse dataset and 39% of the high resolution dataset) of settlements have been located on low fertility soils, with only a minority being identified on high fertility locations (Table 50).

Further analysis of soil quality would be valuable for understanding the priorities of Bronze Age settlements. Previous analyses have suggested settlement sites are placed on particularly fertile soils (Bradley 2019 p.209). This study is unable to comment on the validity of this interpretation but has been able to identify pilot data that suggests that soil quality and drainage were not always prioritised in settlement location. These results do indicate the value of environmental records to settlement studies, and in future it would desirable and highly valuable therefore to collect a comprehensive database for such a study in future.

Row Labels	Potential sites	Potential sites %	Coarse sites	Coarse sites %	High resolution sites	High resolution sites %
Sites omitted	4633		457		103	
Freely draining	1313	56%	591	57%	135	63%
Impeded drainage	343	15%	116	11%	21	10%
Naturally wet	251	11%	192	19%	33	15%
Slightly impeded drainage	124	5%	97	9%	16	8%
Surface wetness	308	13%	33	3%	6	3%
Variable	3	0%	2	0%	2	1%

Table 49 The percentages of Bronze Age settlements found on differently draining soil types across England

Row Labels	Potential sites	Potential sites %	Coarse sites	Coarse sites %	High resolution sites	High resolution sites %
Sites omitted	4633		457		103	
High	141	6%	106	10%	12	6%
Lime-rich	211	9%	186	18%	52	24%
Lime-rich but saline	1	0%	1	0%	6	3%
Lime-rich to moderate	28	1%	26	3%		0%
Low	1288	55%	436	42%	84	39%
Low to high	29	1%	18	2%	3	1%
Low to moderate	2	0%	2	0%	2	1%
Mixed, lime-rich to very low	8	0%	5	0%		0%
Mixed, low to lime-rich	5	0%	5	0%		0%
Moderate	149	6%	133	13%	29	14%
Moderate to high	80	3%	54	5%	14	7%
Very low	400	17%	59	6%	11	5%

Table 50 The percentages of Bronze Age settlements divided by soil fertility

6.5 Conclusion

This chapter set out to meet the study's fourth objective:

Objective 4 To characterise the distribution patterns of Bronze Age settlements across Britain.

It has identified that Bronze Age structures have been found across the majority of England, Scotland and Wales barring only a few regional locations (RQ 4.1) (Chapter 6.2). These show no geographical traits common to each region (RQ 4.2), however there is reason to suspect these represent genuine areas with little to no Bronze Age settlements.

It is notable that almost all regions see an increase in the numbers of settlement over time (RQ 4.1.1). While there are more settlements in the south of England, this may simply be due to observation bias in the record (RQ 4.2.2). Similarly, Early Bronze Age structures can be found across Britain, such that if a regional core of structural building by a certain group of people did exist, it is possible to speculate that is had diffused far earlier than the Early Bronze Age (RQ 4.2.3).

No difference between upland and lowland settlement location can be identified across Britain that cannot be explained through observation bias (RQ 4.3). The reality that this dataset shows instead is that the entirety of Britain was occupied with permanent settlements during the Bronze Age and that height above sea level was not a barrier to their construction, despite the advantages and disadvantages each of these landscape zones would present. While there may be an upland-lowland divide in settlement quantity, such analysis is hampered by the observational biases in the archaeological record. It is notable that the uplands cannot have been abandoned wholesale in the Late Bronze Age (contra Amesbury, Charman, Fyfe, *et al.* 2008; Burgess 1985; Turney, Jones, Thomas, *et al.* 2016) as settlements from this period are still identified.

There does however appear to be a genuine preference for building settlements that could access maritime resources (RQ 4.4).The chapter has demonstrated how readily available running water sources were to the majority of locations throughout the Bronze Age (RQ 4.4.1). It has also demonstrated that a larger than expected number of settlements were placed near the coast and potentially Britain’s major rivers (RQ 4.4.1 and 4.4.2).

The chapter has been unable to conduct a comprehensive study of geology (RQ4.4), however, it has indicated that while many sites are placed on well-draining soils, it appears that a majority of sites were placed on less fertile locations (RQ 4.4). This last result must be treated as provisional, since the study has been unable to study the locations of those 6800 potential Bronze Age settlements sites. Such an analysis is vital as the chapter has been able to indicate that there are several biases affecting the record which, while difficult to fully account for, have demonstrably shaped the excavated archaeological record to be different from the Bronze Age reality that created it (RQ 4.2).

Overall, the results present a compellingly consistent record. When observing the distributions of settlements at a national scale, few differences could be identified over time or location in the distribution of settlements defined by natural landscape factors such as height above sea level, closeness to water, drainage or soil quality. None of these factors proved insurmountable obstacles for the construction of Bronze Age settlements with structures. As such, it can only be concluded that throughout the Bronze Age the majority of Britain was settled. These results can be contrasted with those regions that do show a notable absence of settlement which themselves show unifying geographical traits. As such, their absence may be due to cultural preferences at the time. This understood, it is now possible to further contextualise settlements based on their context (Chapter 7).

Chapter 7: Discussion - Getting closer to the *whys* of settlement

The following objectives have been accomplished:

Objective 1. To design, create and enter data into a comprehensive database of Bronze Age settlement sites in England, Scotland and Wales whose occupation has been radiocarbon dated (Chapter 3).

Objective 2. To characterise the architecture of Bronze Age settlement structures (Chapter 4).

Objective 3. To produce a diachronic model of the appearance, use and disappearance of Bronze Age settlement structures using radiocarbon dates (Chapter 5).

Objective 4 To characterise the distribution patterns of Bronze Age settlements across Britain (Chapter 6).

In addition to these objectives, the Chapter 1 set out a series of themes that the thesis could contribute towards using the results of these analyses (Chapter 1.5.2). These themes themselves were defined by debates regarding settlement size, purpose and coherency identified in Chapters 1 and 2. As such this chapter's aim is to present qualitative and quantitative observations from the project database addressing discussion themes relevant to Bronze Age settlements in Britain in order to move one step closer to understanding ***why*** they were used. These debates centre on:

DT 1. The dispersal of Bronze Age settlement structures.

DT 1.1 Can Bronze Age villages be identified?

DT 1.2 To what extent are Bronze Age settlement sites dispersed or nucleated?

DT 1.3 How closely related are Bronze Age settlements to one another?

DT 2. The activities occurring on settlements

DT 2.1 Enclosing areas around and within settlements?

DT 2.2 The association of metalworking with settlements?

DT 2.3 The association of burials with settlements?

DT 3. The extent to which the definition of a “British” Bronze Age settlement tradition is appropriate?

7.1 Bronze Age villages?

The size of Bronze Age settlement *structures* has been discussed in Chapter 4, however, overall settlement size has yet to be discussed. Within his work on villages, Rathbone (2013 pp.46–52) has suggested that there is no compelling evidence for a Bronze Age settlement in England, Scotland or Wales that can be accurately described as villages (*ibid*). This research arose from his excavation of one of the few convincing cases of a Bronze Age village in Britain and Ireland, the often-cited Middle Bronze Age example of Corrstown, Northern Ireland (Ginn, Rathbone & Akeret 2012). As this study has collated a large corpus of data in England, Scotland and Wales, it is possible to investigate whether this position can still be maintained, in order to contribute towards understanding how such settlements were used by their inhabitants.

7.1.1 Village definition

The definition of village that is used in this instance is largely influenced by that of Rathbone, who also used research by Flatrés ´ (1971) to state that “rural settlements were made of clusters of over 20 houses or 50 inhabitants” (Rathbone 2013 p.40). A similar definition was also used in the work of Roberts (1996 p.17) as a means to identify villages, although it does identify a number of buildings required. As it is clear this is now the accepted definition used in relevant Bronze Age studies, this study will follow the same criteria.

7.1.2 What is the average number of houses in a Bronze Age settlement?

Of the 316 Bronze Age settlement sites with evidence for both Bronze Age structures and at least one radiocarbon date, 238 produced evidence for a definite Bronze Age domestic structure, although other domestic features such as isolated postholes and pits were identified from 53 other sites. From these sites, a total of 1085 domestic structures which could be dated to the Bronze Age were identified, 386 of which whose date was indirectly or directly supported by radiocarbon dates and 257 of which were dated using radiocarbon dates taken from samples from those specific structures themselves.

It should be noted that if solely studying those structures that have radiocarbon dates, the average number of structures found per settlement site would reduce significantly. However, the proportion of those directly radiocarbon structures is so low as to be both unhelpful and unrepresentative of the reality of settlements. As such, this section also relies on those structures that have been dated through other means (see Chapter 3).

Using this high-resolution dataset, it has been possible to identify that the majority of sites (>50%) have between 1 and 4 domestic structures. While the average number of structures identified per settlement sites in this database is 4.6 (Table 51). This is skewed by the presence of 8 sites with particularly large numbers of structures (20 or more) and also the large number (c. 30% of the total number of sites) of sites with only one confirmed Bronze Age structure (Figure 90). Yet it is notable that this average value decreases only slightly when decreasing the number of potential structures (e.g. by excluding four posters, probable structures or rectangular post built structures). These numbers only decrease further if limiting the study to those structures that may confidently be dated using directly or indirectly related radiocarbon dates.

Table 51 represents the minimum number of confirmed Bronze Age structures at these sites. However, further structures dating to the Bronze Age may exist, for example outside the bounds of the excavated area, yet this speculation can be neither confirmed nor denied within this study. Similarly, if structures did not produce evidence for a Bronze Age date, they are used in this analysis meaning that those numbers may under represent the number of structures.

Settlement size	All	Excluding four posters	round structures	definite post rings
count	238	228	198	188
average	4.6	4.0	4.0	4.1
min	1	1	1	1
max	86	80	79	79
1st quartile	1	1	1	1
3rd quartile	5	4	4	4
Decile statistics				
0.1	1	1	1	1
0.2	1	1	1	1
0.3	1	1	1	1
0.4	2	1	2	1.8
0.5	2	2	2	2
0.6	3	3	3	3
0.7	4	4	3	3
0.8	6	5	4	4
0.9	8.3	7.3	7	7
1	86	80	79	79

Table 51: Table showing the minimum number of confirmed Bronze Age settlement structures on sites in the high-resolution dataset

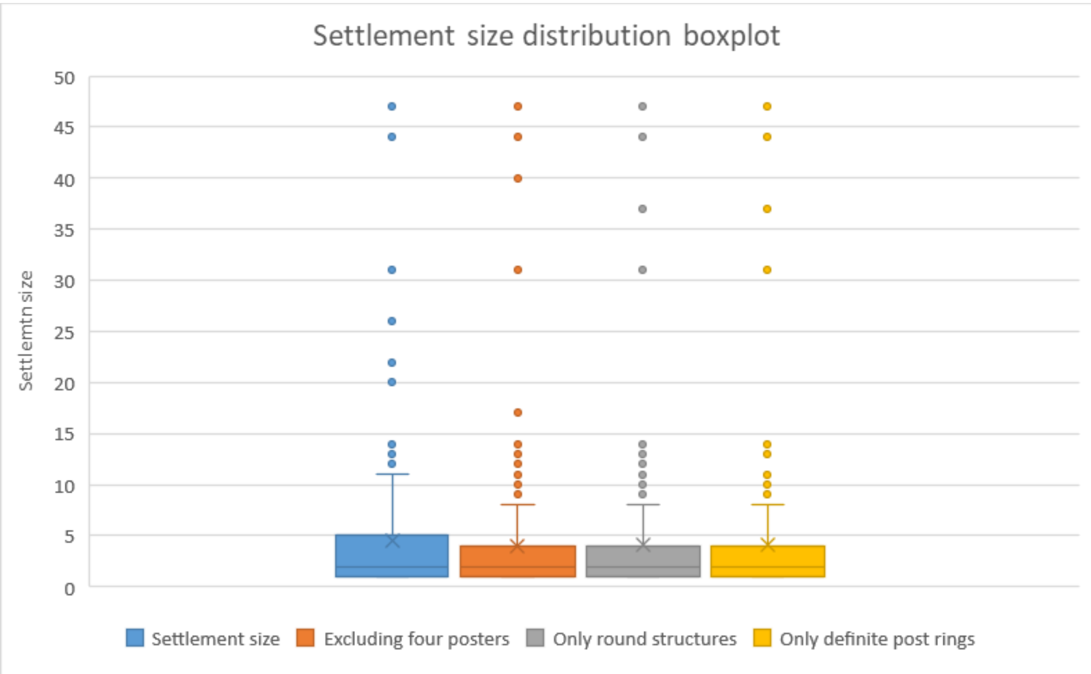

Figure 90 Settlement size box plots distribution

These results (Table 51, Figure 90) make it clear that the majority of sites are made up of one or two Bronze Age structures. While the number of structures at these sites is likely to be underrepresented, the majority of settlements (over 66%) would need to increase in size by at least five times in order to reach a suitable number of structures to meet Rathbone's definition. Th conclusion here is clear – the vast majority of sites cannot be classed as villages.

This same analysis indicates that there are at least 8 sites from the 316 that have a suitable number of buildings and structures that might fit Rathbone's definition of a Bronze Age village, and potentially more if including those undated structures within the analysis. These sites are:

- Cotswold Community (Powell, Smith & Laws 2010a)
- Reading Business Park (Brossler 2001; Brossler & Allen 2013, 2013; Brossler, Early, Allen, *et al.* 2004; Moore & Jennings 1992)
- Leskernick Hill (Bender, Hamilton & Tilley 2007)
- Moel y Gaer (Guilbert 1982b)
- Sands Of Forvie (Ralston & Sabine 2000)
- West Heslerton Site 1 (Powlesland, Haughton & Hanson 1986)
- Huntsman's Quarry, Kemerton (Jackson, Bayliss, Templeton, *et al.* 2015)
- Hampshire Easton Lane Excavations (Fasham, Farwell & Whinney 1989)

Rathbone recognised that it is only possible to comment on settlement size when the internal chronology of a settlement is well known (Rathbone 2013 p.41). Davies (2016, 423-430) in his re-evaluation of the sites of Reading Business Park and Cotswold Community has identified how this is problematic for Bronze Age settlements. Regardless, he was able in each case, as with other smaller settlements, suggest that the most likely interpretation of these sites are of multiple phases of settlements made up of only a few houses in any one period (*ibid)*. The large number of structures in these instances are therefore akin to those wandering house settlements noted as leaving an archaeological imprint that is very difficult to distinguish from a larger settlement where multiple buildings were occupied simultaneously. This has been evidenced in the Netherlands where such settlement sites are formed from the periodic re-occupation of the same location (Fokkens & Arnoldussen 2008, 3–4). Such interpretations may also apply to other larger sites excavated in the past, which may also prove to be palimpsests should they be revaluated.

The presence of a suitable number of structures, even at sites that initially appeared as likely candidates for being deemed villages, is not sufficient. For instance, Itford Hill was found to represent a series of occupation events with house being occupied at different times. In practice few of the houses were occupied at one time (Ellison 1978 p.36). From this qualitative and quantitative analysis it appears that there are still no convincing examples of Bronze Age villages in Britain (DT 1.1) using the widely accepted definition. In addition, it should be noted that the size of Bronze Age settlements was often very small.

7.1.3 Summary

The above discussion has shown that, through an early exploration of the database considering settlement size, there are no convincing settlement sites that can suitably be termed as Bronze Age villages in Britain, using the definition set by Rathbone. Those larger settlements that were identified were found to mostly be of multiple phases. The average settlement size appears to be made up of 4.6

structures, while the vast majority have less than 7 structures (90%) and most are made of single post-built roundhouses (40%). It does appear that many settlements may be made up of pairs of houses, the second most common number of structures excavated being two.

7.2 DT 1.2 How dispersed are settlements?

Understanding that there are no Bronze Age villages in Britain (see above, DT 1.1), it is appropriate to describe Bronze Age settlements as being primarily dispersed, rather than nucleated (DT 1.2). This accepted, it is important to assess what dispersal means within this context, both quantitatively and for those individuals that occupied those settlements (DT 1.2).

Current research on the dispersal of known settlements in the Bronze Age, in order to characterise how dispersed or agglomerated such settlements are, rely upon having a suitably representative and comprehensive database of these sites (Roberts & Wrathmell 2000). Other studies of prehistoric settlement have also attempted to study dispersal (Ginn 2012), however such analyses are limited by the extent to which settlements are known to be contemporary or not. Beyond the high-resolution dating of a larger sample of settlements with the aim of identifying both the start and end date of these sites, it will not be possible to understand fully the number of contemporaneous settlements in Britain at one time. As such, any analysis must be general in approach.

7.2.1 Method

Having access to several datasets (Chapter 3), it is possible to explore the level of dispersal despite these limitations. The first dataset is the 316 Bronze Age settlement sites that form the core of the thesis. These sites have temporally known locations, allowing a study that more closely reflects the reality of which settlements may have been contemporaneous, although it should be noted that the periods used are long enough such that not all houses within a period were necessarily occupied at the same time. However, this database is only a sample of the larger 1488 Bronze Age settlement sites which had good evidence for Bronze Age structures, and so is likely to over-represent the level of dispersion. There is naturally a high chance that there were far more Bronze Age settlement sites than is indicated by these two datasets, however these could not be absolutely determined using the parameters of the study.

This larger sample from the coarse dataset can also be assessed, although the temporal security of these dates is not as well understood, meaning that even less confidence may be rested on the assumption that these sites were occupied contemporaneously. Notably, this sample of sites only records those structures that show signs of excavation, and those that have been identified as such. It is a sample of the potential sites data set representing a possible 6975 Bronze Age settlement. Even if these 6975 were not all in reality Bronze Age in date and not even evenly distributed across the entirety of the Bronze Age (which they may not be, see Chapter 5) the addition of any of these 6975 sites to the analysis would reduce the level of dispersion seen. As such, any figure placed on the scale of this dispersal may also be over exaggerated. This is brought into particular contrast when studying the standing structures of Dartmoor. This third dataset, which represents 998 groupings of roundhouse structures, may better reflect the density of Bronze Age settlement, although it should be noted that even this distribution will not reflect those roundhouses that are not currently visible at the ground surface. The presence of such roundhouses has clearly been demonstrated at Holne Moor (Fleming 1988, 2007) and the extent to which these houses were occupied during the same period or even in the Bronze Age is far less certain.

In summary, three datasets exist;

firstly a temporally secure sample which will likely overly exaggerate how dispersed these settlements were;

secondly a coarse dataset that has several biases likely to both exaggerate and under-represent how dispersed these settlements were,

and finally a dataset that, on balance, is likely to underestimate dispersal. The biases inherent in each of these methods coupled with the scale of the study area prevents the useful application of statistical measures of dispersal, as seen in Ginn's (2012) research. However, when studying the minimum distance from each site to another for each dataset, I will show that it is still possible to present a compelling picture of Bronze Age settlement dispersal.

7.2.2 Results

The results of examining the distances between settlement sites (Table 52, Figure 91) indicate that the majority (90%) of those 316 Bronze Age settlement sites that form the core of the thesis analysis are all placed within 27.5km of another similar settlement.

	High resolution data				Coarse Data				Dartmoor clustered data
Category	**All sites**	**EBA sites**	**MBA sites**	**LBA sites**	**All sites**	**EBA sites**	**MBA sites**	**LBA sites**	**Dartmoor sites**
Distance	Km	Km	Km	Km	Km	Km	Km	Km	Km
Count	316	81	166	182	1488	147	219	403	997
Minimum distance	0.0	0.6	0.2	0.0	0.0	0.0	0.0	0.0	0.0
Maximum distance	70.0	130.7	141.4	85.5	83.1	130.7	86.9	96.2	4.2
Average distance	12.1	29.6	17.0	16.7	4.1	19.1	13.4	7.9	0.3
Standard Deviation	11.5	22.4	18.9	16.2	5.7	20.7	16.0	12.9	0.3
1st quartile	3.8	17.3	4.0	4.5	0.7	4.2	2.7	0.8	0.2
3rd quartile	17.0	36.1	25.6	24.6	5.5	24.5	18.0	10.3	0.4

Table 52 Summary statistics of the minimum distance between Bronze Age settlements

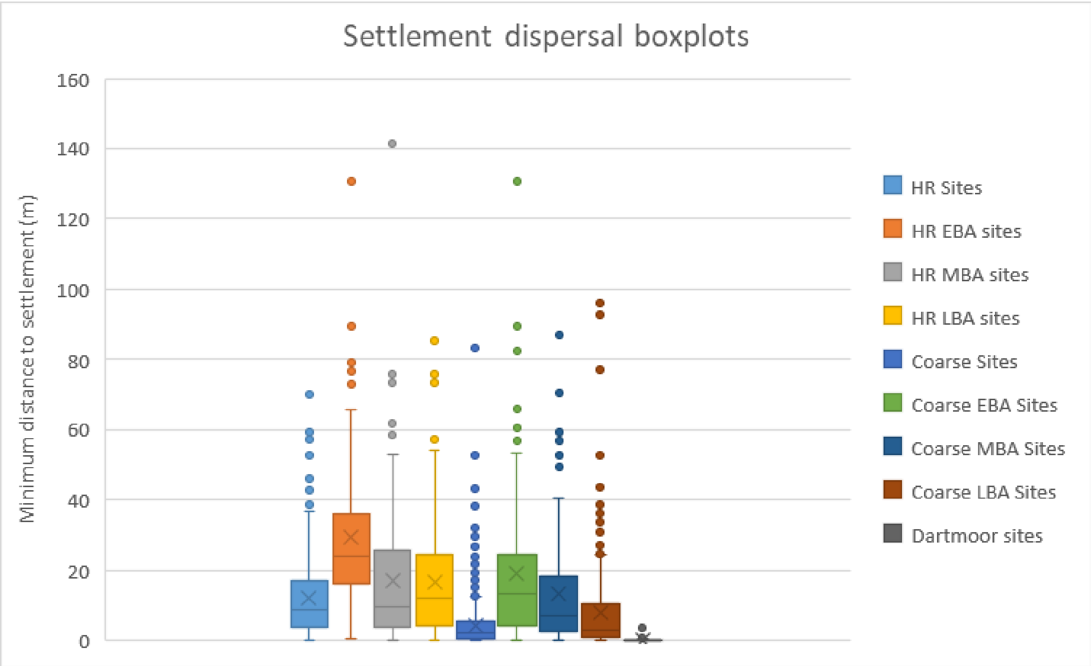

Figure 91 Boxplots of the minimum distance between Bronze Age settlements

This maximum distance increases when segmenting the databases into three periods with sites dating to the Early Bronze Age (of which there are fewer) being more dispersed. Yet even in these circumstances, a large proportion (>60%) of those settlement sites are found less than 30km from another settlement. The degree to which these are likely to overly exaggerate the dispersal of these settlements is seen clearly through the coarse dataset, which typically suggests those settlements are up to half as far away again. This is even further reduced when studying those 997 of 1022 grouped Bronze Age settlement sites (Chapter 4) from Dartmoor, which all placed within 4.2km of each other, but with the majority being within 0.6km of another similar settlement.

7.2.3 Discussion

It is understood from the preceding section that Bronze Age villages have yet to be identified in Britain, such that settlements by their definition were dispersed (DT 1.2). Yet this dispersal does not mean they were isolated. Through a different method detailed above, Ginn (2016) has suggested that settlements may have been clustered within units as small as 5km to each other, with the nearest, broadly contemporary neighbour typically being less than 10km away (Ginn 2016 pp.82–86). This is broadly comparable to the distances settlements were dispersed in Britain. The analysis above has provided a general picture of settlement. It has also demonstrated that placing any number on the typical distance between settlements would be speculative and risks being overly deterministic. At most then it can be concluded that for the region of Dartmoor and the thesis' study datasets most settlements were less than 35km away from each other, with more being much closer than this (DT 1.2). While on first impression this seems like a large distance to be placed from another settlement, the human experience of traversing this needs to be understood and tested (DT 1.3).

7.3 How far is far?

The above section suggests that Bronze Age settlements were generally highly dispersed (DT1.1, 1.2), with some exceptions in upland landscapes, notably around Dartmoor. While there are no distinct villages (DT 1.1), it may be that structures not immediately within the same settlement were in close communication. For instance (Drewett 1982 p.399) has suggested Middle Bronze Age (c.1600-1150 cal BC) settlements in Sussex were placed approximately one hour and 40 minutes' walk away from one another. An estimate for the maximum distance needed to reach these locations has been discussed. The average walking speed of a human across level ground is approximately 4-5km an hour (Bohannon & Williams Andrews 2011), such that distances of 35km travelling "as the bird flies" and without obstacles might be reached and then returned from within a day's walk depending on the season. However, humans are not able to travel this way, namely in straight lines and avoiding terrestrial obstacles.

A fundamental critique of landscape-based studies is that they do not adequately consider the true landscape of the sites discussed (See Chapter 3.2.3). For example, some post-processualist perspectives suggest that the depiction and analysis of sites on flat or digital maps views archaeological sites exclusively through a modern Cartesian lens, which bears no relationship to the embodied experiences of the sites' occupiers (Thomas, 2004, 2008). A similar critique, albeit one proposed through a processualist school of thought, is that these methods rarely accommodate the real-world topography within models, instead preferring Euclidean distance, as the use of distance within any archaeological study must be carefully considered and justified regardless on the theoretical stance of the researcher (Chapter 3.2.3). A solution to these critiques is possible by altering any depiction of space such that it depicts the "cost" of movement over the surface instead of straight-line distance, as demonstrated. A vital component of such models is accounting for the "friction of terrain" in movement (de Gruchy, Caswell & Edwards 2017). This allows the experience of moving through the landscape to be mapped, while also quantifying space in such a way as to allow mathematical modelling.

As part of research into this process (*ibid*), it has been possible to conduct a pilot study to assess how far settlements were dispersed in human terms. Ten circular areas with a radius of 20km were selected across mainland Britain (Figure 92). These were chosen to contain different sloping terrains (e.g. flat, hilly, mountainous and mixed) and varied landcover types (Grassy, bog, sand, mixed). Cost surfaces for each of these zones were calculated using the ArcGIS "PathDistance tool" using a 50m digital terrain model and a vertical factor table created using the Tobler Hiking Formula (Tobler 1993). This method calculates a time value from a centre point to any other point in the surface measured. However, it does not indicate the time taken to return which, due to the asymmetric effects of slope, may not be identical to the outward journey. My own experimentation has found an efficient means to calculate the cost of travelling to and from *all* points in the landscape, while previous studies cite equally computationally intensive methods of finding this value between *only two* points. By inverting the DEM used for the analysis a new surface calculating the return journey can be produced, this can be summed with the original cost surface to produce a true catchment area (Caswell 2016).

The results of this analysis, which study multiple control points across multiple terrains, indicate that, unless in particularly mountainous regions, a distance of 33km could be travelled within one days walk (Figure 93 to Figure 96). The distances possible to reach in a day is therefore significantly larger than that needed to be travelled to reach the nearest settlement in most cases. While it should be noted that these represent maximum distances, other factors undoubtedly would have affected travel including: landcover (de Gruchy, Caswell & Edwards 2017), knowledge of the route taken; permissions to travel the route; safety; weather; and the individuals walking (Herzog 2014 Section 5.7; White & Surface-Evans 2012a p.2).

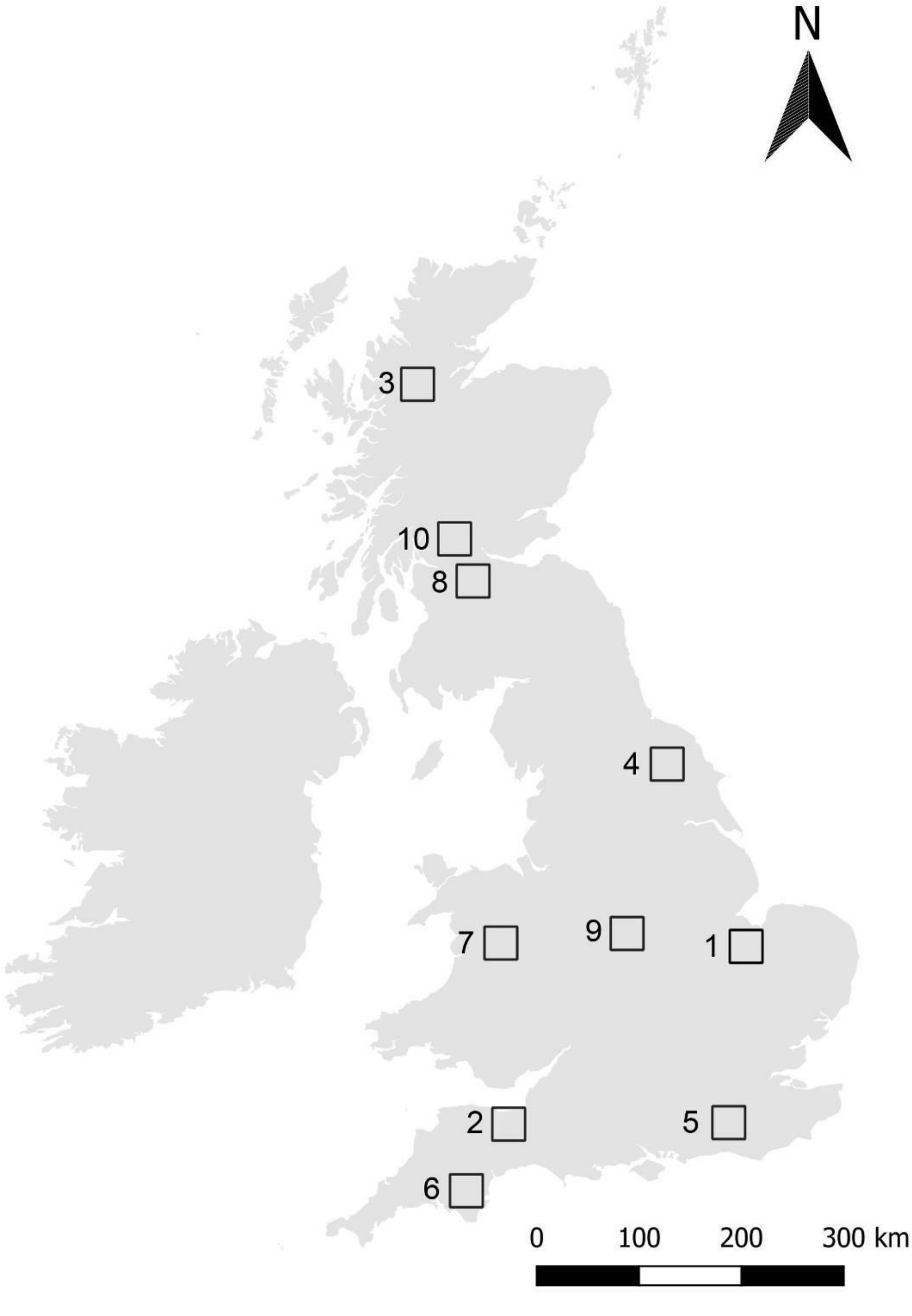

Figure 92: The 10 control points used to assess the distance that might be reasonably accessible to a Bronze Age settlement. Each Square is 32km wide and tall. Contains OS data © Crown copyright and database right 2019

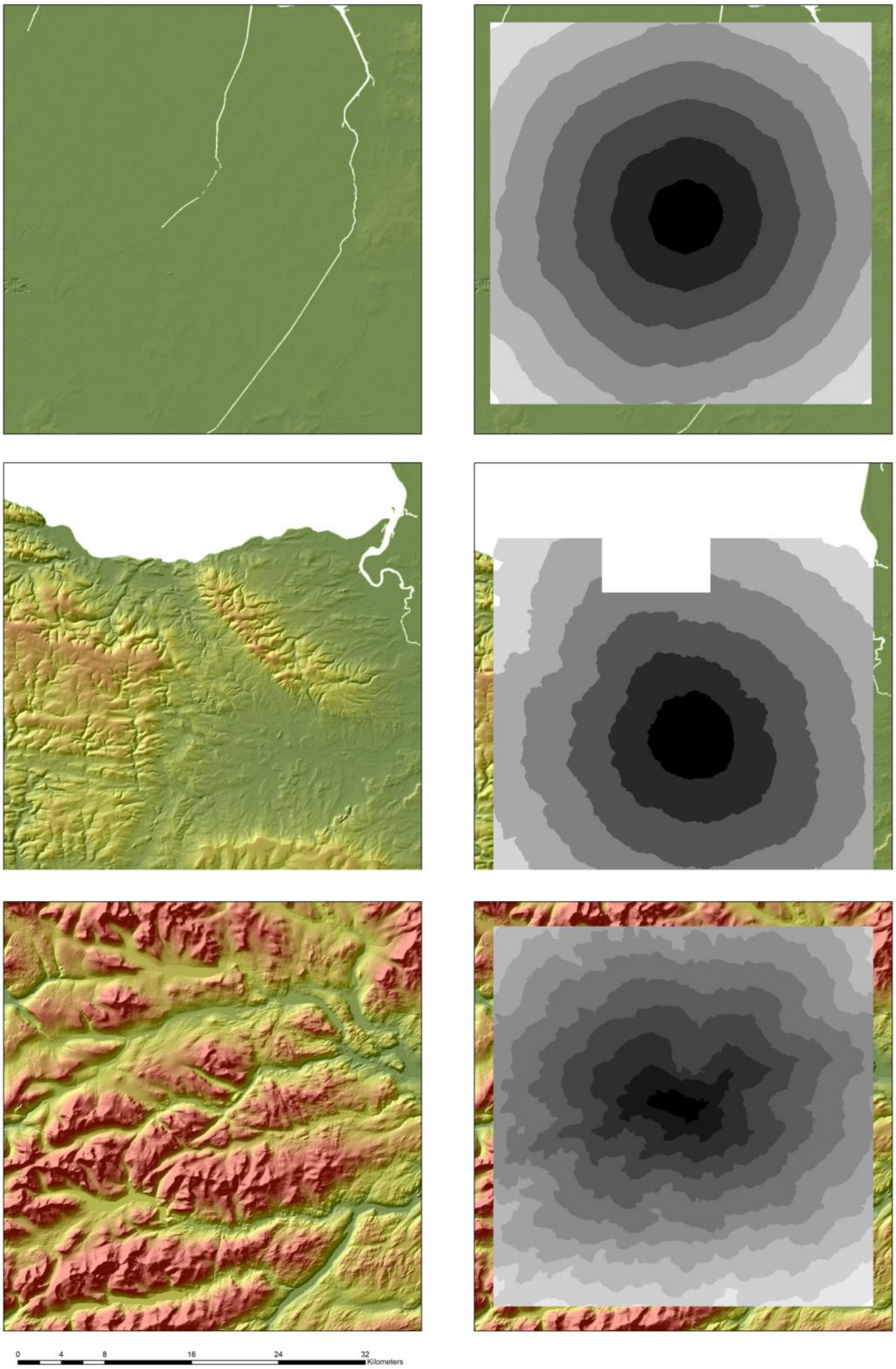

Figure 93: Control points 1 (top) 2 (middle) and 3 (bottom). Each row depicts the form of terrain traversed (left) and the distances attainable within one-hour isochrones (right). Note that in each case almost 15km can be reached with four hours of travel. Contains OS data © Crown copyright and database right 2019

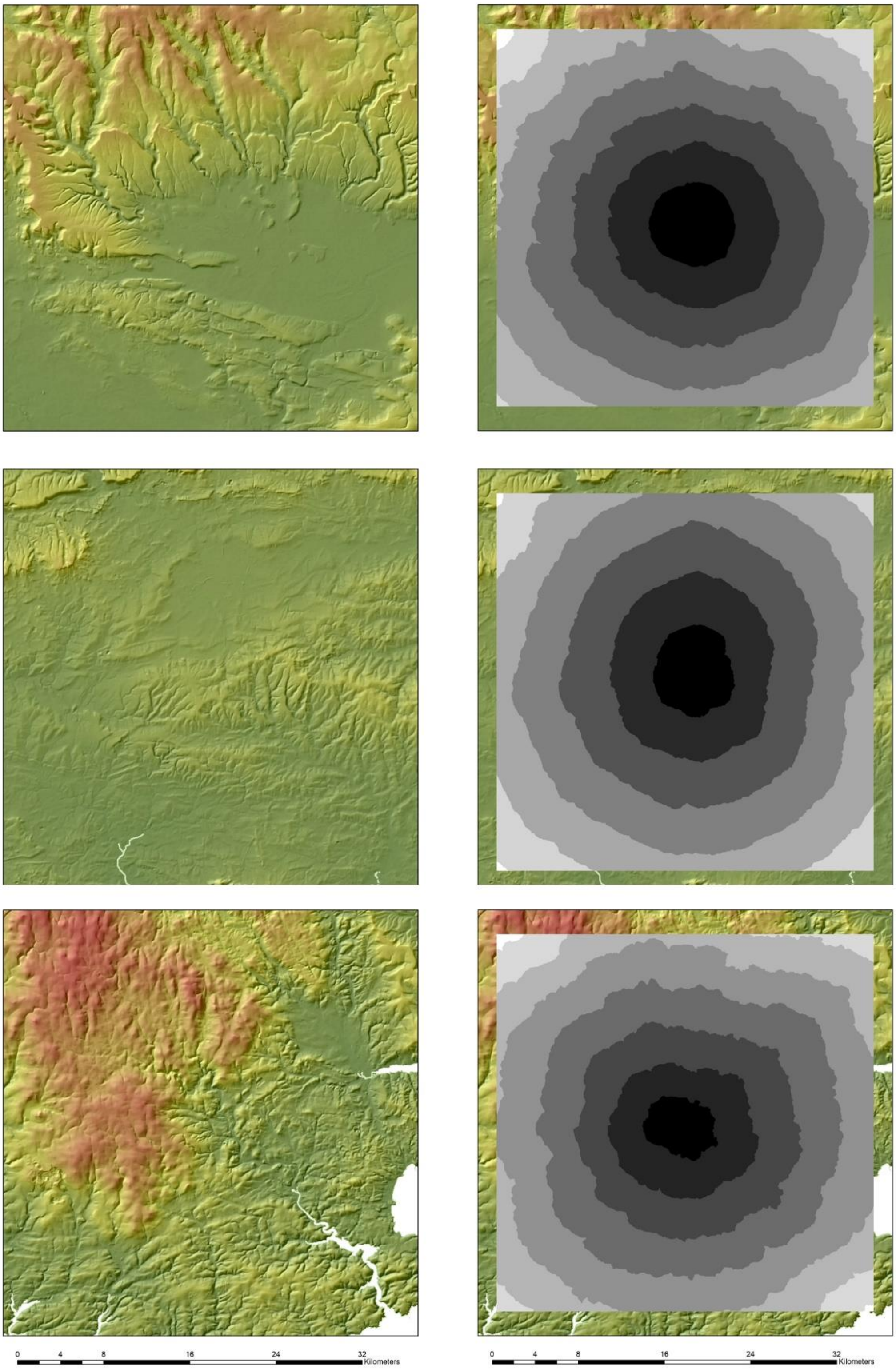

Figure 94: Control points 4 (top) 5 (middle) and 6 (bottom). Each row shows the form of terrain traversed (left) and the distances attainable within one-hour isochrones (right). Note that in each case almost 15km can be reached with four hours of travel. Contains OS data © Crown copyright and database right 2019

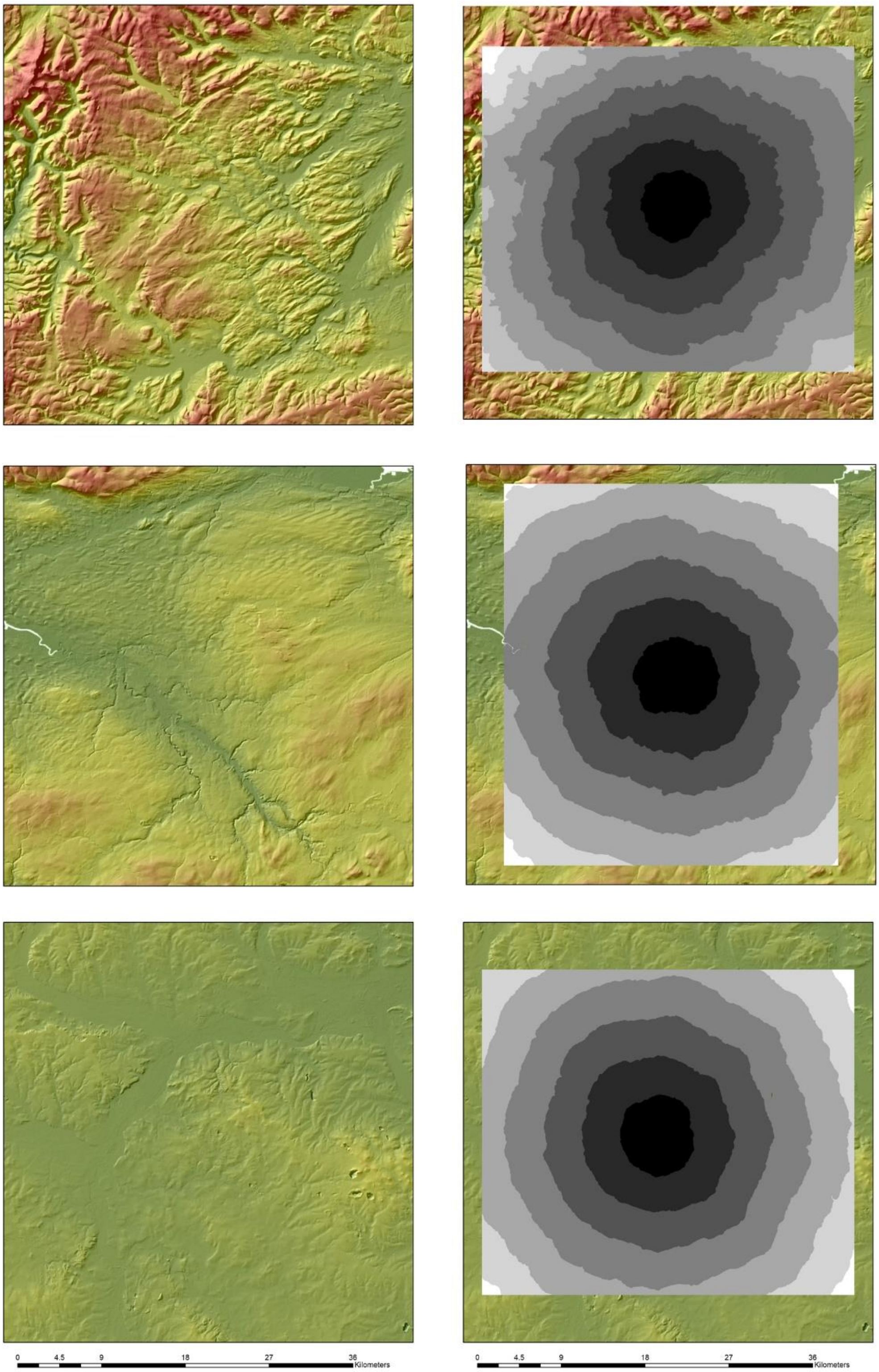

Figure 95: Control points 7 (top) 8 (middle) and 9 (bottom). Each row shows the form of terrain traversed (left) and the distances attainable within one hour isochrones (right). Note that in each case almost 15km can be reached with four hours of travel. Contains OS data © Crown copyright and database right 2019

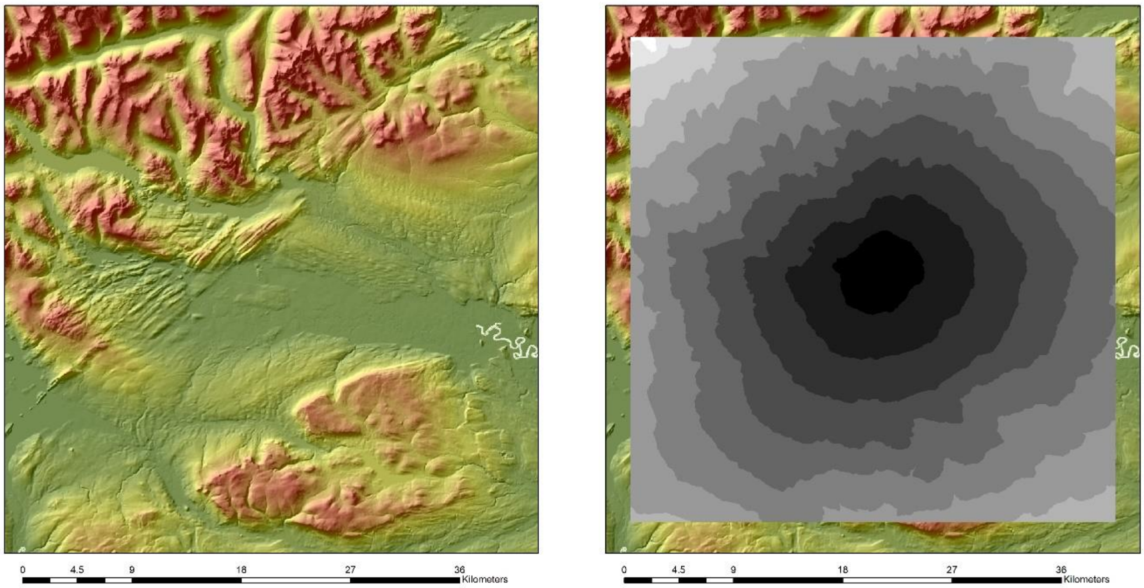

Figure 96: Control points 10 Note that in each case almost 15km can be reached with four hours of travel. Contains OS data © Crown copyright and database right 2019

This section has identified that by definition, the lack of confirmed Bronze Age villages (DT 1.1) requires their settlement to be described as dispersed (DT 1.2). However, it has also indicated that the majority of settlements had the potential to be placed within a one day's walk or at least one other settlement (DT1.3). As such, bearing in mind the caveats on settlement density stated above, and the additional frictions not calculated, it is possible to tentatively to suggest that while settlements are dispersed (DT 1.2), they were not so isolated to prevent regular interaction between settlements spread across Britain (DT 1.3). It can only be concluded then that settlements were not placed in isolated locations and that the degree of their dispersal is likely to have been limited. Furthermore, the distance accessible from a single settlement makes it likely that local considerations are likely to be of value rather than what are within the full catchment of that site. It may also mean that Rathbone's (2003) definition of a village is too restrictive in understanding Bronze Age settlements and their communities.

7.4 What are settlements associated with?

The above discussion has identified that Bronze Age settlements could not be defined as villages and instead were dispersed across the landscape. It has then been able to suggest that the level of this dispersal was limited, and in human terms, no house would likely have been placed more than a day's walk away from another contemporary settlement. This same analysis has also been able to indicate the maximum distance inhabitants of a settlement could access during a day's walk. The scale of such a range would suggest that extremely local factors, rather than those a day a way, are likely to have impacted on the choice of settlement location. This supports the findings made in Chapter 6 that locations need not be selected to provide closeness to water, the majority of the country being within 5km of a flowing water source. This understood, it is of value to explore qualitatively what evidence from the database is able to suggest about the activities that occurred in close proximity to these sites (DT 2).

Chapter 1 and 2 have identified that particular phenomenon discussed in this regard have been the presence or absence of field systems, burials and craft production. A full assessment of the proximity and relationship between these phenomena would require similarly comprehensive studies to this thesis which provided their data in a format allowing easy comparison. As these do not exist in a full manner such analysis here can only be general however it is still able to demonstrate the value of integrating large gazetteers of archaeological phenomena (DT 4).

7.4.1 Enclosures

It is not uncommon within reconstructions (See the covers of Garner, Allen, Wenban-Smith, *et al.* 2007; Brown & Medlycott 2013; Bell 1990; and Burstow, Holleyman & Helbaek 1958 p.209; Collard, Darvill, Watts, *et al.* 2006 p.407) of Bronze Age settlements to see field systems, enclosures or defences. These features would appear to be favoured in the perception and understanding of Bronze Age settlements and their immediate environs. As such, evidence within the excavation reports accessed for any features that might represent the enclosure of nearby settlements, was recorded. While these should not be treated as comprehensive, as any such discussion may miss features within the vicinity of settlements or might not be identified during the same phase of investigation, the statistics generated are of value for a qualitative and partially quantitative estimation on the priorities of Bronze Age settlements.

The data collection phase of this study has been able to identify 154 sites of 316 Bronze Age settlement sites with radiocarbon dates which had information recorded on the evidence of enclosures; including field systems, defences, lynchets, palisades and more. Nearly half (48.7%) of all sites have information within their excavated report listing these features, which as stated above is likely to be, if anything an underestimation of their quantity (DT 2.1).

7.4.1.1 Enclosures for food?

At least 108 sites contained enclosure features that may have been associated with farming. It was beyond the scale of this study to characterise each field system on its primary purpose. Qualitative analysis suggests these were mixed in form, some being rectilinear of the form expected if crops were being cultivated (Fleming 1988), while many others were irregular and presumably indicate the rearing of animals (Coggins & Fairless 1984) although there has been relatively little study into the particulars of prehistoric field use (Arnoldussen 2018 p.308). These forms of enclosure have been found in sites across the entirety of England, Scotland and Wales. In this regard it is notable that while those rectilinear enclosures characteristic of the Middle Bronze Age in Britain are limited to the south of England (see for instance Smith, Coppen, Wainwright, *et al.* 1981 p.208; but also discussions within Fleming 2007; and Yates 2007), similar practices may have been occurring in less extensive but still regular field systems in the north of Britain as at Tulloch Wood, Morary (Carter 1993 p.230) and in a more limited extent at Standrop Rigg, Northumberland (Jobey 1983) and Manor House Farm, Lancashire (Adams 2009).

7.4.1.2 Enclosures for security?

In direct contrast to the large number of enclosures potentially used for domestic production, only 24 sites show enclosures that might be interpreted as providing a possibly defensive purpose. These are found inland and near the coast across England, Scotland and Wales but with an absence in the north of England and south of Scotland. While the low number of sites with such features may suggest that defence was not a priority for Bronze Age permanent settlement sites, it is important to recognise that such a role may have been played by natural features. Such a role is emphasised by the site of Must Farm, which appears to have been intentionally placed within a river and surrounded by a palisade (Must Farm 2019; Knight, Ballantyne, Zeki, *et al.* 2019). Similarly, it may be that houses were placed in hidden locales, or in regions with poor accessibility. Analysis of these features is unfortunately beyond the scope of this project.

The low number of built features clearly designed for defence from the 316 radiocarbon dated sites does show that the traditional fortification of homes was not a priority for Bronze Age settlements. The low number of these features is surprising, especially due to the scale of weaponry evidenced in this period strongly implying that it may have been one of intensive violence and competition (Colquhoun & Burgess 1988; Davis 2012, 2015, 2006; Treherne 1995; Mörtz, Horn & Kristiansen 2017; Uckelmann 2012). Yet the statistic produced here is also unlikely to underrepresent the number of settlements with potentially defensive features, as defences are typically visible within a site's environs and so recorded. Instead, it may even be that this quantity is overstated as, while these enclosures may look defensive, their role, much like Iron Age hillforts, may have been primarily intended for a quite different purpose such as the projection of power and social status (Bowden & McOmish 1989; Hamilton & Manley 2001).

7.4.1.3 Enclosures for status?

A particularly good example of enclosures for status is seen in the ringworks found in the east of England. It is clear that their scale, number and layout and their internal features varies. For example, some ring works have only a single roundhouse as at Mucking North ring (Jones & Bond 1980) and Thwing (Manby 1983), while others have several roundhouses such as at Springfield Lyons (Brown & Medlycott 2013) and Rams hill (Bradley & Ellison 1975) as well as other ancillary structures in addition to what have been interpreted as screens. These sites may be traditionally seen as surrounded by defensive earthworks yet their closeness to one another (see for instance Mucking North and South Rings) and the presence of presumably high status manufacturing has led to suggestions (Brown & Medlycott 2013; Manby 2007; Bradley 2007 pp.209–210) that the earthworks surrounding these structures were not primarily defensive but more to emphasise status. In this same vein, it may be that many of those enclosures seen as defensive features were in fact designed for status enhancement.

7.4.1.4 Unenclosed settlements

The qualitative analysis of enclosures related to settlements appears to stress production, as seen in the presence of enclosures used in farming practices, above defence. However, it should also be recognised that a large portion of the corpus did not have enclosures at all. Houses without enclosure features have been found across England, Scotland and Wales. While these may be the result of the study's data collection strategy (Chapter 3.5), closer regional studies of settlement provide support for this observation. For example, Feachem (1965,) and later Pope (2015) identified a form of settlement that Pope (2015, 161-3) terms the "Unenclosed Platform Settlement". First thought to be Iron Age, these have now been confirmed as dating to the Earliest Bronze Age (*ibid)* and have been found across northern Scotland (*ibid*). The defining features of such a type is the creation of a platform for a subsequent roundhouse to be built upon following the double post ring style.

7.4.1.5 Conclusion

It can be tentatively concluded that settlements do show evidence for enclosure, potentially indicating the exploitation of crops and animals, and that this practice shows little regional differentiation, although the forms of field systems used may vary (Yates 2007) (DT 2.1). There are only a limited number of sites that may be described as what is traditionally understood as being defensive, although further research of this matter would be of value. It may be that these earthworks show some evidence for hierarchy through earthwork complexity (as at ringworks e.g. Brown & Medlycott 2013; Jones & Bond 1980; Manby 1978; or hillforts such as Rams Hill Bradley & Ellison 1975), but it is notable these enclosures are not necessarily tied to particularly large settlements. More importantly, there are a significant number of unenclosed Bronze Age settlements (possibly 162 from the 316 sites in the high resolution dataset).

7.4.2 Food

Previous analyses have looked at the evidence for food processing and consumption at Bronze Age settlement sites. Typical evidence used for such discussions are the grains from pits and features within settlement sites, animal bones identified on settlement sites, processing materials and tools that might indicate what was consumed and features within the environment suggesting what resources were exploited. A full analysis of these categories has been avoided as many sites within the domestic archaeological record do not have faunal and charred plant remains. The dearth of faunal remains is best demonstrated by the size of the Late Bronze Age midden assemblages (Lawson 2000; McOmish & Field 2010; But note these now appear to more cloesley linked to the Early Iron Age Waddington, Bayliss, Higham, *et al.* 2018) which indicate the disparity in what has been seen in Bronze Age settlement sites, and only serves to emphasise the likelihood that most assemblages of material found within settlement sites are primarily a result of their abandonment process, which is known to have been formalised in many cases. It was thought that this limitation would prevent a suitably rigorous analysis of these variables without requiring a comprehensive search of supporting material well beyond the scope of the project. Yet from reading those site reports which do include such information it is clear that a mixed economy was practiced nationally. Some sites show clear evidence for the rearing of animals as at Eldon's Seat, Dorset (Cunliffe & Phillipson 1969) Reading Business Park, Berkshire (Moore & Jennings 1992; Brossler, Early, Allen, *et al.* 2004; Brossler 2001) and Cotswold Community, Wiltshire which may have relied on large numbers of cattle, (Powell, Smith & Laws 2010a). Others show clear evidence for cultivation as at Springfield Lyons, Essex (Brown & Medlycott 2013 p.127), and still more show mixed economies relying on domestic animals and plants as at Cheviot Quarry (Johnson, Waddington, Baker, *et al.* 2008), Trethellan, Cornwall (Nowakowski 1991) and North Shoebury, Essex (Wymer & Brown 1995).

7.4.3 Manufacture

While it is clear that domestic consumption and production was practiced on Bronze Age settlement sites, it was beyond the scope of this study to assess the ratios of this practice. Luckily, due to a recent high-quality study, combined with the publication of their data, the same is not true for the manufacturing of metal. Adams *et al.* have recently (2017) published the results of a survey of the remains of all non-ferrous metalworking in Britain across prehistory. This research has been able to use the Bronze Age data from this study to assess the presence and absence of metalworking, the results of which are informative to understanding the roles of Bronze Age settlements.

Bruck's database lists 414 sites which contain evidence for non-ferrous metalworking. Of these 147 displayed non-ferrous metalworking that may have dated to the Bronze Age, 115 of which came from either England, Scotland or Wales. A total of 93 of these 115 sites can be paired with sites with the project's gazetteer of all sites from Britain's historic environment records. Of these, 73 could be associated with a site from the project's coarse dataset and 38 could be identified from the study's high-resolution data.

Further to these sites, 18 settlements were noted during the data recording stage as having potential evidence for metalworking 12, of which could be related to a site within the study's coarse dataset, and six of which could be related to the project's high resolution dataset. In Summary, metalworking appears to be present in 6% of all excavated Bronze Age settlements sites known to this thesis (85 examples). This ratio increases to 14% when studying the 316 Bronze Age settlement sites with radiocarbon data (44 examples).

Broad Period	Count (coarse database sites)
EBA	1
EBA-MBA	2
MBA	5
MBA-LBA	12
LBA	16
LBA-EIA	8

Table 53 Provisional date of settlements with metalworking

The high-resolution database and coarse dataset present an aligned picture that, at a minimum, indicates that one in twenty Bronze Age settlement sites, and potentially one in 7, show evidence for metalworking. These metalworking settlements are distributed across the entirety of the England, Scotland and Wales, and are predominantly found on sites dating to the Late Bronze Age (Table 53). These results may suggest for instance that access to metalworking knowledge was not limited and that production was not centrally controlled. The number of sites showing metalworking evidence appears to increase over time (Table 53). While this may reflect simply the expansion of settlement seen from 1700 cal BC, it indicates that metalworking was not being centralised in one particular region (DT 2.2).

Assessing the full ramifications of these two databases' combination is not within the scope of this project, which is aiming to look at the whole of Britain broadly. To explore this more fully a full re-analysis of the radiocarbon dates and the nature of metalworking manufacture on these sites requires investigation. Similarly, it would be interesting to compare the quantity of metalwork to number of settlements.

7.4.4 Burials

The analysis of radiocarbon dates for selected Bronze Age settlement sites have suggested, in the main, that structures have limited use-lives. Similarly more extensive work on settlement phasing has suggested that structures had limited periods of occupancy (Davies 2016). The limited re-building of structures may also imply that there was little desire, as expressed through structures, to set out long-term ownership of these settlement sites.

It is possible to support this idea through a brief qualitative analysis of the use of burials in regard to settlements. In other periods, the placement of burials has been seen as suggesting declaring ownership, for example the placement of later burials surrounding central Neolithic long barrows (Edmonds 1999). Settlements have been understood as having cemeteries, suggesting an agenda to stay within a region for a certain amount of time (Barrett, Bradley & Green 1991; Holden 1972; Ellison 1980a). In British Bronze Age research, the connection between settlements and burials has only been studied briefly. As such, it was deemed important to conduct a broad analysis to determine if any distinct behavioural patterns could be discerned from the datasets.

Mentions of burials were recorded while assessing the 316 Bronze Age settlement sites. Of these only 48 sites had records directly mentioning burials in their reports. It should be noted that, as with enclosures, this does not mean burials were not placed nearby. Those burials with settlements are often seen in one of two ways; burials before the settlement was used e.g. in nearby cairn or burials used in closing of sites found in postholes, or burials (typically cremations) placed during the occupation or abandonment of the settlement. Many of these cremations date to the Middle Bronze Age and are placed in cemeteries. Until recently, Middle Bronze Age funerary sites containing cremation burials have invariably been interpreted as cemeteries for nearby communities and settlements (Ellison 1980a p.198; Bradley 1981; Boyer 2007; Cooper & Edmonds 2007; Finn & Bayliss 2011). As I have previously examined the distribution of Middle Bronze Age cremation cemeteries (Caswell and Roberts 2018), it was decided that this relationship would be worthy of interrogation.

Cremation burials have invariably been interpreted as cemeteries for nearby communities and settlements due to two influential publications (Ellison 1980; Bradley 1981) which relied upon two observations. Relevant to the use of Bronze Age settlements sites is the second assumption that Middle Bronze Age cremation burials sites were placed near, and had been linked to, contemporary settlements (Bradley 1981). The pairing of Middle Bronze Age settlements and cemeteries in Britain is frequently asserted (Bradley 2007 p.185; Darvill 2010 p.222) usually on the basis of spatial proximity, such as at Down Farm, Cranborne Chase (Barrett, Bradley, Green, *et al.* 1981). There is also the frequent comparative analogy to Itford Hill, Sussex (Ellison in Holden 1972, 110) where two sherds of pottery were found to re-fit– one from a Middle Bronze Age barrow and the other in a nearby Middle Bronze Age settlement. The spatial proximity argument for pairing settlements with cremation cemeteries is based primarily on Bradley (1981, 100), who asserts that the majority of Middle Bronze Age cremation cemeteries are found within 700 m of a settlement, with a peak between 50 and 300 m.

It has been possible to test this assertion by comparing 372 of a known 378 Middle Bronze Age cremation burial sites to the location of potential Bronze Age settlements known to all historic environment records within mainland England, Scotland, and Wales, recorded in the thesis' gazetteer. The list of settlements includes sites that might be Early or Late Bronze Age and some sites which are only speculated as being Bronze Age. It is therefore a generous distribution that would be expected to skew results towards a smaller distance between Middle Bronze Age cremation burials and Middle Bronze Age settlements.

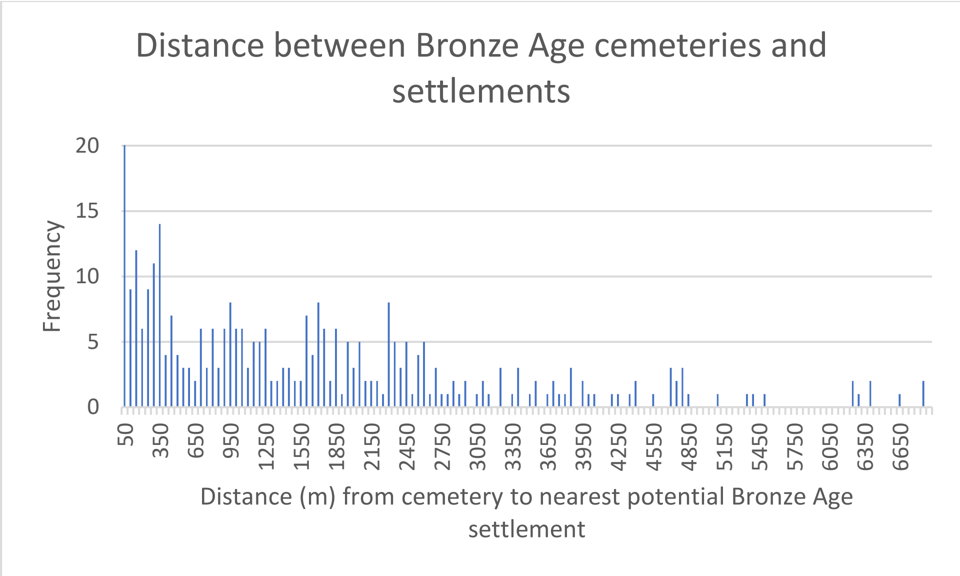

Figure 97 Number of confirmed Middle Bronze Age cremation burial sites by distance to their closest potential Bronze Age settlement site. NB: the broken scale accounts for the high number of burials that were recorded as being in or around a settlement (the Y axis has been capped at 20 to better depict the distribution of sites, 49 sites were found less than 50m distant from a settlement).

This analysis (Figure 97) found that there is a peak of 96 (26%) Middle Bronze Age cremation burial sites placed within 300 m of a potential Bronze Age settlement site – in both northern and southern Britain – which might in part support Bradley's assertion that in some cases settlements are paired with cemeteries (Bradley 1981). However, only 139 (37%) cremation cemetery sites were found within 700 m of a potential Bronze Age settlement, 201 (54%) cremation cemetery sites were located over 1 km away, and the average distance between the cemetery and their nearest *potential* settlement was 1787m. Therefore, from the data available from the author's previous research and that gathered in this thesis, it can only be concluded that Middle Bronze Age cremation burials do not show a universally strong spatial connection to occupation sites as has been suggested (Darvill 1996 pp.116–117; Bradley 1981 p.185).

Furthermore, the contemporary chronology of settlements and nearby cemeteries is often assumed rather than demonstrated. Yet, similarly to cremation sites in

Ireland (Spillane 2017), when the radiocarbon dates for well-excavated Bronze Age settlements and cemeteries within 500 m in Britain are compared, they frequently reveal that it is Late Bronze Age settlements that are placed in close proximity to pre-existing Middle Bronze Age cremation cemeteries. This occurs at Dunch Hill, Wiltshire (Andrews 2006); Game Farm, Suffolk (Gibson, O'Brien & Baxter 2004); and Biddenham Loop, Bedfordshire (Luke 2008) and has also been observed across the Netherlands (cf. Gerritsen 2007). Directly contemporary Middle Bronze Age settlements and cemeteries in close proximity, such as at Shorncote Quarry, Gloucestershire (Barclay, Glass & Parry 1995), are very rare according to the radiocarbon dates, are rarely discussed in site reports, and, bar the much-cited Itford Hill example (Holden 1972), never directly evidenced through material culture.

The available evidence for Early and Middle Bronze Age burials on Bronze Age settlement sites suggest that their primary role may have been in helping to mark a region upon which to build. It appears that this purpose may shift in the Late Bronze Age at which point Brück has already identified that many burials can be found in settlements often in token quantities within settlement features such as postholes (Brück 1995). However, while the majority of these burials are found on settlements, this thesis' dataset indicates that the majority of these settlements do not have these token burials. A recent re-analysis of Late Bronze Age burials in the north east of England (Warden, Caswell & Roberts 2016) suggests Brück's original works are consistent with those burials known today. As such, it can only be concluded that in the Late Bronze Age, there are generally not many sites with archaeologically identifiable contemporary burials.

The results of studying burials in relation to Bronze Age settlement sites has been informative to understanding their use. It is clear that the majority of settlement reports do not discuss burials, to the extent that few are found within Bronze Age settlements. Middle Bronze Age cremation cemeteries which have previously been associated and seen as community cemeteries for settlements can no longer be interpreted as such and rarely have their connection demonstrated. In these instances, it is not uncommon to discover that these cemeteries pre-dated occupation. Those burials that do not predate settlements typically appear in limited numbers as part of the ritualised abandonment practice of some houses (Bell 1990; Gingell & Cleal 1992 p.103; Pearson, Chamberlain, Craig, *et al.* 2005; and see Brück 1995). As such, it seems that if a connection can be made with burials and settlements, it is in the placing of the settlements (supporting Eve & Crema 2014), and occasionally in their closing (DT 2.3) (Nowakowski 2001). At the risk of over-interpretation, I would therefore suggest that burial's relationship to settlements is in providing the potential justification for their establishment in much the same way that Early Neolithic long barrows have been suggested as providing justification for a living presence within the landscape.

7.5 Continental comparisons

It has long been recognised that the sea between Britain, Ireland and mainland Europe was not a barrier in the Bronze Age, but a region that facilitated trade and communication, which was frequently exploited by Bronze Age communities from every region (Clark 2004; Lehoërff & Talon 2017; McGrail 1997; Needham 2009). There is now a wealth of recent cross-border scholarship comparing Chalcolithic and Early Bronze Age funerary evidence (Needham 2000b, 2005, 2009; Vander Linden 2006; Wilkin & Vander Linden 2015) and, to a lesser extent, Middle Bronze Age metalwork, ceramics, and settlements (Bourgeois, & Talon 2009; Ehrenberg 1983; Kleine 1999; Needham 2013; O'Connor 1980). Work has also been done to collate and synthesise the large number of developer-funded fieldwork reports from the last two decades in these regions (Bradley 2007; Bradley, Haselgrove, Vander Linden, *et al.* 2016), a good degree of accesible data is now available to help compare and contextualise the British settlement record.

While it is beyond the scope of this study to comprehensively and systematically compare the results of the preceding chapters to the entire archaeological record of north western Europe (indeed whole doctoral theses have been dedicated to small regions from these areas, see for example Sites 2016), the number of syntheses existing in the region make it possible to identify *some* of the similarities and differences to the findings presented in this thesis from Britain and by doing so suggest to what extent the notion of a "British" Bronze Age settlement tradition is appropriate (DT 3). Of particular note is a recent thesis that studied the Middle and Late Bronze Age (1750-1250 cal BC and 1250-600 cal BC respectively) settlement sites and structures in Ireland using a similar approach to this study, thus enabling a more thorough comparison between Ireland and Britain to be carried out. For the state of clarity north western Europe is defined here as; Denmark; the northern regions of France; particularly the regions of Brittany, Normandy and Hauts-de-France; the Low Countries, understood here as Belgium, the Netherlands, and Luxembourg; Germany, particularly the region known as Nordic Germany and finally the island of Ireland, grouping both Northern Ireland and the Republic of Ireland (Figure 98).

Figure 98 The region understood as north western Europe. Made with Natural Earth. Free vector and raster map data @ naturalearthdata.com

7.5.1 Comparing Early Bronze Age architectural forms

Settlement structures in the Early Bronze Age are more irregular in form and less numerous than those seen in the Later Bronze Age in Britain. It is first worth comparing these few settlements before comparing those structures seen in the Middle and Late Bronze Age. In Britain these Early Bronze Age structures tend to be variable, made of smaller stake-built structures in a variety of typically rounded forms. Parallels exist for these structures in near continental Europe, for example House 23 at DeventerEpse Noord in the Netherlands (Hermsen & Van der Wal 2016) is similar to the plan suggested by Bradley for Belle Tout (Bradley 1970). There are also clear similarities between the quite differently shaped structure at Northton in the Western Isles of Scotland (Simpson, Murphy & Gregory 2006),and Beg ar Loued in Brittany, France (Bradley, Haselgrove, Vander Linden, *et al.* 2016 p.139), in addition to a number of “almond-shaped buildings” now identified in Atlantic France (Nicolas, Favrel, Rousseau, *et al.* 2019). However, it is also notable that some of those Bell Beaker settlements are more regular in form than those seen in Britain typically being rectangular in the Netherlands (Kleijne & Drenth 2019) and Denmark (Bradley, Haselgrove, Vander Linden, *et al.* 2016 pp.136–137). It appears then that Bell Beaker settlements across north western Europe indicate that the settlements in all regions adhere in part to local architectural traditions (Besse & Desideri 2005) but that connections in Early Bronze Age architectural forms can be identified in the use of stake holes, sunken floor and often irregular forms.

7.5.2 Comparisons to Irish Later Bronze Age settlement structures

Following the Early Bronze Age, Britain’s settlement structures become more regular and robust in design (Chapter 4). This study has identified that the dominant architectural form was circular throughout all periods and all regions in England, Scotland and Wales, although 20% of those structures found were rectangular (the majority of which were four poster granary structures used in the Late Bronze Age).

The architectural forms of structures found in Britain are most closely paralleled in Ireland. Within this region, Ginn identified that approximately 91% of all Bronze Age settlement structures are circular in form (Ginn 2012, 159; 2016, 97). While this is a higher proportion than that in Britain, this may be somewhat down to sample selection within Ginn's study, which targeted sites with roundhouses. Unlike for Britain, a formal typology for all Irish roundhouses has been suggested based on the presence of certain architectural features including post rings, banks, ditches and supporting walls (Figure 99).

This schema identified a differentiation in the location of type GP4, GP5 and GP6 structures, these being different form of roundhouse structures which were predominantly coastal, and those rectangular structures, termed GP7, that generally had a southern distribution (Ó Néil forthcoming, 40, in Ginn 2012, 159). Ginn (*ibid)* suggested that this trend was caused by the varying availability of wood rather than factors directly relating to the accessibility to the sea. This assertion would appear to be supported in Britain by the limited distribution of houses with stone components to upland and coastal areas. Ginn's results diverge slightly from this thesis in finding that in Ireland porches were regionally specific, while in Britain they are found throughout England, Scotland and Wales.

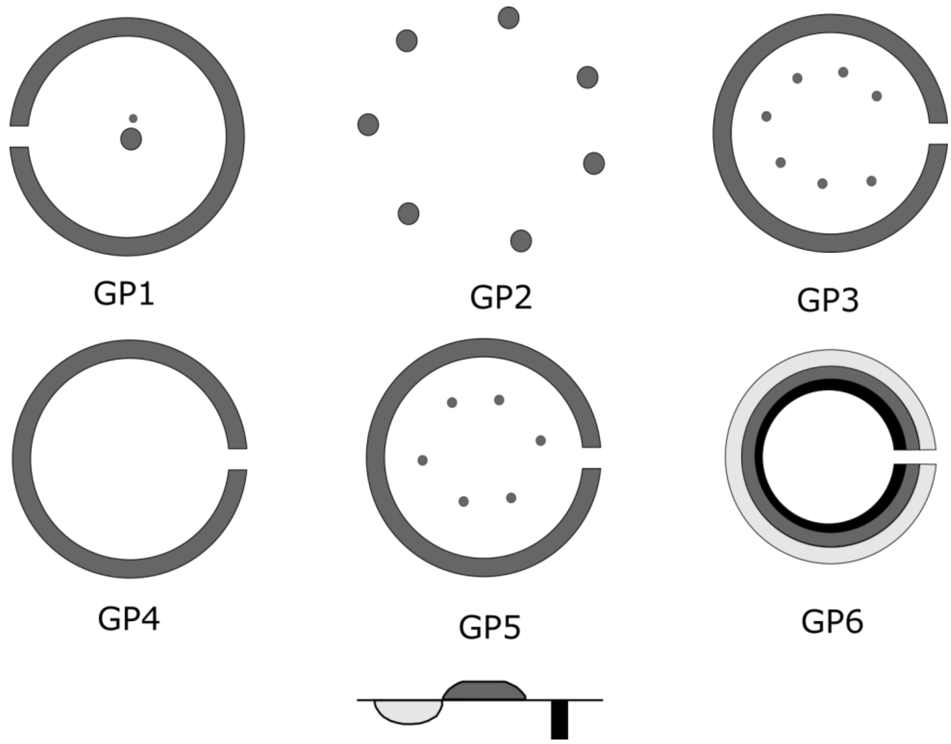

Figure 99 Schematic ground plans of Irish roundhouses traced from Ginn 2016, 160

7.5.3 Comparisons to north western european Later Bronze Age settlement structures

Beyond Ireland, the closest similarities in the settlement record to Britain are found in the coastal areas of northern France which also feature post-built roundhouses as at the sites of Cahagnes, Malleville-sur-le-Bec, Lauwin-Planque-ZAC Les Hussards, Escaudain-Erre and Roeux-Château d'Eau (Bradley, Haselgrove, Vander Linden, *et al.* 2016 pp.188–192). However, it should be noted that these settlement sites occur in fewer numbers than seen in England and that rectangular layouts also existed in the region, as at Nonant (Marcigny and Ghesquière 2008). While the rectangular structures in northern France differ to those in Britain in the arrangement of their post holes, it is notable that many of those structures in the Rhineland, which are also rectangular, are somewhat more similar in form and scale to those Bronze Age rectangular structures seen in Britain, as at Inden-Altdorf

(Wendt & Päffgen 2003), although they are interpreted as outbuildings. In contrast, rectangular settlement structures which are of a different form entirely make up the majority of settlement seen in the remaining regions of northwest Europe (Low Countries, Denmark and Nordic region of Germany).

7.5.4 Structure size

It may be suggested that, while different regions may have different numbers of structures within their settlements, they may maintain similar roofed surface areas. As such, it is appropriate to assess the floor areas of each region's structures to better compare and understand their use. The results of the thesis may be compared to the general results in Bakels' research which suggests that the average floor area in north western Europe would be less than 200 square metres and more often between 50 and 100 hundred square metres (Bakels 2009; in Bradley, Haselgrove, Vander Linden, *et al.* 2016 p.336). This would support the notion that near continental European settlement structures were on average larger than those found in Britain, although further research assessing the make-up of each settlement on its own merits including ancillary buildings and enclosures is required to confirm this.

Yet, and somewhat unsurprisingly, those regions with roundhouses, Ireland and northern France, show similar surface areas. In France this is not fully quantified, but those sizes suggested are consistent with those in England, Scotland and Wales as at the settlement of at Malleville-sur-le-Bec which contained potentially 24 roundhouses whose diameters are between 6 and 10 m (Mare 2006). Research on the size of Bronze Age structures in Ireland has presented somewhat contrasting views with Doody (Doody 2000 p.143) suggesting an increase in structure size over time and Ó Néill suggesting a sizable decrease over time (Ó Néill forthcoming, 42–4 in Ginn 2012). Ginn's analysis meanwhile suggested that on average house size increased over the Bronze Age with large houses peaking between *c*. 1600–1400 BC when a considerable number of structures have floor spaces of over 80m². However, this analysis also identified that while this may be visible as a trend, in actuality large and small houses are visible across the Bronze Age. As such, the results, while not stating this, would support the study's assertion that there is no straightforward connection between house size and time. Ginn (2012) also suggested that Irish roundhouses were smaller than their British counterparts using the average floor area determined by the Welsh Roundhouse Project at 51 m² (Ghey, Edwards, Johnston, *et al.* 2007). As this has now decreased to 47.17m, or even less if quadrilateral architecture is included, in this research, it may be that such a difference is negligible. Instead, then it is more appropriate to recognise that in both Britain and Ireland houses of variable size existed across all periods.

While less extensively studied than Ginn's review of Ireland, there has been some work on settlement structure size further afield in north western Europe. In the eastern regions of France those rectangular structures found show a comparable area to those roundhouses of Britain. Similarly relatively small (4–6 m by 4–6m), rectangular, one-storey, predominantly one- and two-aisled, sometimes three-aisled buildings have also been identified in Germany (Bradley, Haselgrove, Vander Linden, *et al.* 2016). These structures by description appear to be very similar to those rectangular buildings in Britain in both form and scale and, are marginally smaller than those found elsewhere. For example in the Netherlands, rectangular structures typically measure 20m x 6m long (Arnoldussen 2008 p.206) while in Denmark rectangular houses are far more structurally developed than seen in Britain (Bradley, Haselgrove, Vander Linden, *et al.* 2016 pp.136, 176–177).

7.5.5 Settlement numbers over time

Two possible diachronic models for the intensity of use of Bronze Age settlement structures have been suggested with the model formed using radiocarbon dates being suggested as the more reliable of the two (Chapter 5.8). The radiocarbon dating derived model marks a key transition point at 1700 cal BC after which there is a large increase in the number of visible settlement structures. This model contrasts with the pattern proposed by Gills and Frank (Gills & Frank 1992). Their models suggest almost pan-European patterns of expansion and contraction which, during the Bronze Age, is seen as expansion episodes between 1400–1200 BC and 1000–800 BC and contraction phases between 1700–1500/1400 BC, 1200–1000 BC and 800–550 BC. While the radiocarbon model argues for similar expansion and contraction episodes in Britain, it appears that each of these episodes requires back dating by approximately 300 years (see above).

It is notable then that the boom in Bronze Age settlement identified in this study has been recognised in many coastal regions of north western Europe. For example, in the Low Countries the numbers of known settlements increased from a low number of disputed sites (Arnoldussen 2008 p.167) to well over 300 individual structures (Arnoldussen 2008 p.167; Bradley, Haselgrove, Vander Linden, *et al.* 2016 p.177). Similarly, while there are still comparably few settlements within northern France, those new Bronze Age sites that have been discovered, notably near the English-French Channel, are now typically dated around 1500 cal BC (Bradley, Haselgrove, Vander Linden, *et al* 2016, 188-192). This boom is not seen throughout north western Europe and does not take the same form in all regions. For example, while the Middle Bronze Age in Germany is now seen as a period of settlement expansion the increase in the number of settlements is more humble (Bradley, Haselgrove, Vander Linden, *et al* 2016, 175). Further north in Jutland it is structure size that increases rather than settlement numbers (Holst, Rasmussen, Kristiansen, *et al.* 2013). Bradley et al. (2016) have suggested that the increase in settlements in north western Europe continues into the Late Bronze Age, with a peak of settlement intensity in the Iron Age at around 500 cal BC. This differs from Chapter 5's diachronic model, which suggests a collapse in settlement numbers before a slight recovery. However, it is possible that the overall trend seen by Bradley et al. (2016) subsumes the same trend identified in this thesis (the results seen in Figure 68 would certainly support this theory). For example, in Arnoldussen's work on the Low Countries, the majority of settlements studied date to the Middle Bronze Age B 42%) (1500-1050 cal BC) whilst the number of Late Bronze age (1050-800 cal BC) settlements is far smaller (Arnoldussen 2008 p.167).

Ginn (2012) has identified a boom in Irish settlement at 1600 cal BC followed by a collapse and recovery in settlement numbers similar to that this study's radiocarbon model for Britain (Figure 100). While Bradley et al. (2016) suggest that the reason for the decline seen in their database may be due the poor material culture typologies for the period in Ireland, Ginn's model is based on radiocarbon dates which, barring any selection bias by excavators, should not be affected to the same extent and would suggest that this decline is a real reflection of the region's settlement intensity. The similarity between Ginn's diachronic model and in this thesis for England, Scotland and Wales is striking. Both show similarly scaled increases and decreases at broadly the same periods (Figure 100). These similarities may further reinforce the validity of both the Irish and British settlement models.

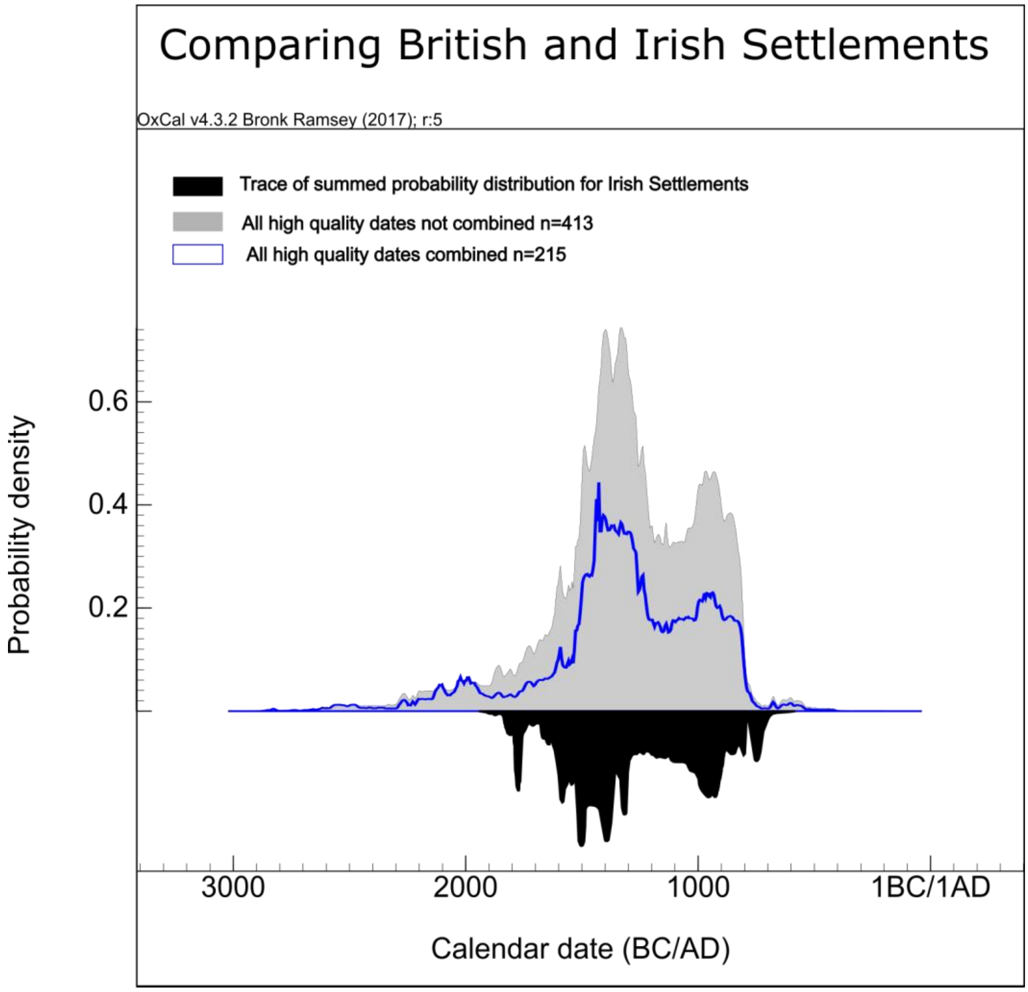

Figure 100 A comparison of the SPD models from this thesis and Ginn 2012. Lower curve traced from Ginn 2012, 83.

Regardless of (developer-funded) fieldwork methodologies, there is a dearth of visible settlement structures across much of north western europe in the Early Bronze up until the settlement boom at c. 1600 BC. This has been independently identified in Ireland, the Low Countries, northern France and Germany. The only exception being the areas around Jutland. It appears then that, while there may be variations in diachronic models, a broad narrative may be suggested for the majority of north western Europe of a boom in settlements in the Middle Bronze Age (c.1600 cal BC depending on region) which *may* then have been followed by a crash.

7.5.6 Conclusions

There are now several summaries of Bronze Age settlements in north western Europe and several focussed settlement studies tackling single regions within this zone. While some regions lack such syntheses and those that do, do not all conduct the same analyses, it has been possible to identify the similarities in Britain's settlement record to its neighbours.

The Bronze Age settlement architectural forms in near continental Europe show far more variation in structure design than settlements seen in England, Scotland and Wales, which are instead far more closely aligned with the settlement architecture seen in Ireland (DT3). Selected regions in northern France and the Rhineland also show similar architectural forms. It is of note, however, that those structures in the Middle Bronze Age appear to mirror and develop the forms of structures seen in the Early Bronze Age, which themselves have been suggested as being rooted in existing regional architectural traditions. This has been noted in Britain and beyond (Besse & Desideri 2005; Bradley, Haselgrove, Vander Linden, *et al.* 2016).

It is also increasingly being made clear that those settlements found are all primarily small homesteads/hamlets made up on isolated pairs of structures with little evidence for settlement hierarchy hinted at in the material record. The only region in north western Europe that does show this settlement hierarchy appears to be in Denmark which has been noted as having closer affinities to central Europe.

It is interesting that such a large area may show similar increases in settlement intensity, although increases in radiocarbon dating programs may indicate that what seems to be a relentless increase in settlements may not have been as linear as first appears. Identifying the underlying causes for the expansions and contractions in settlement in these models across north western Europe is not simple. Wholesale demographic change may exist in the Early Bronze Age, but this occurs several centuries before the expansion of settlement (Olalde, Brace, Allentoft, *et al.* 2018). The boom of settlements appears to be synchronous with a period, at least in the north of Britain (Tipping 2016), of milder winters and more stable seasons in the north of Britain. Yet, these warmer more stable conditions continued until c. 800 cal BC such that there cannot be a straight forward connection between settlement quantity and climate (Bevan, Colledge, Fuller, *et al.* 2017) (also see Chapter 8.3.1.4). The fact that the settlement record in Britain shows synchronous transitions across much of the country, and that these transitions are also contemporaneous with the often very different settlement record throughout near continental Europe, may suggest the existence of a broader underlying event that was felt across north western Europe, but it may equally be the result of very different processes resulting in similar outcomes. Identifying or being certain of either of these possibilities is beyond the work of this study (although see Chapter 8.3 for a discussion around the potential explanation for those settlements within Britain) but would likely be a fruitfull subject for further research.

7.6 Summary

This chapter has aimed to discuss the results of the thesis through the integration of its data with existing datasets. It has shown qualitative and quantitative observations from the project database in order to address discussion themes identified in chapter 1 relevant to Bronze Ages settlements in Britain in order to move one step closer to understanding why they were used.

It has identified that settlements can be characterised as being dispersed (DT 1) as there are still no convincing settlements that may be termed villages (DT 1.1). It has also identified the maximum distance contemporary settlements were likely to be placed away from one another was 35km (DT 1.2) and that, while this may appear to be a large distance, this meant it was likely that settlements were placed well within a day's walk of one another (DT 1.3).

It has been able to identify that close to half of the settlements identified from the high-resolution dataset were associated with enclosures and that these appear to have functioned as a means of production, rather than defence (DT 2.1). Such discussion has had to be general there not yet being a single dataset of field systems available to allow a large comparison of these phenomena.

Contrastingly, such datasets do exist for the evidence of metalworking and burying the dead of the Middle Bronze Age. Through integrating these datasets it has been possible to argue that up to one in ten settlements may have been location for metalworking (DT 2.2), and that the often cited connection between Middle Bronze Age cemeteries and settlements is inaccurate (DT 2.3).

The chapter concluded with a comparison of those settlements identified within the thesis and those seen in north-western Europe (DT 3). This has identified that, while variety exists in British settlements, they show their closest affinity to those in the Ireland, although there are interesting parallels in the proposed boom and bust of settlement construction and the scale of Bronze Age settlements seen in north western Europe.

Chapter 8: Conclusion

8.1 Introduction

This chapter summarises and concludes this study of Bronze Age settlement in Britain. It begins by providing a brief summary of the results of its analysis (Chapter **Error! Reference source not found.**). In particular it identifies how these results compare to those pre-existing narratives of Bronze Age settlements, the entirely new observations of this study and the significance of these findings. Doing so it is able to identify how its results provide a systematically quantified baseline for Bronze Age settlements in the British Isles, thus significantly progressing Problem Statement 3. Readers looking for a concise overview of the thesis' results are directed to this section (Chapter **Error! Reference source not found.**).

The chapter then provides a demonstration on how the results of this study have wider significance to scholarly knowledge and understanding of the Bronze Age by attempting to progress solutions to Problem Statements 1 and 2 identified within Chapter 1 (Chapter 8.3). It then presents an argument for the value in the collation and subsequent open dissemination of syntheses of legacy datasets (Chapter 8.4). Recognising this it provides several recommendations of future avenues of this form of research that may be most conducive to developing our understanding of Britain's Bronze Age (Chapter 8.5).

8.2 Results summary and significance

8.2.1 Settlement form

The form of settlements was determined in Chapter 4 to largely consist of round or sub-round houses (Chapter 4.2). These houses have a number of architectural traits, including porches (single and double), hearths, terraces (Chapter 4.3.3), ring banks and post and stone built walls (Chapter 4.3.2.4). There is a degree of variety in the forms of settlement structures seen across Britain. However, the majority of those excavated are single post ring structures (Chapter 4.3.2). Other forms of structure include stone-walled roundhouses, ring banks, double post ring roundhouses and ring groove roundhouses. Rectangular structures are also visible (Chapter 4.4) some of which are of sufficient area to potentially be classed as houses (Chapter 4.6.3).

8.2.1.1 Existing theories that the thesis supports

These results support existing impressions of the form of Bronze Age settlement (Bradley 2007; Bradley, Haselgrove, Vander Linden, *et al.* 2016; Pope 2015) which suggest that substantial roundhouses of stone and timber formed the majority of structures in the Middle and Late Bronze Age, while earlier Bronze Age settlement was similarly circular but more ephemeral (agreeing with Gibson 2019; Simpson 1971) as seen at sites such as Porthcurno (Jones, Taylor & Sturgess 2012) Yarnton (Hey, Bell, Dennis, *et al.* 2016), Stackpole Warren (Benson, Evans, Williams, *et al.* 1990) and Oversley Farm (Garner, Allen, Wenban-Smith, *et al.* 2007).

This study has been able to further these general discussions by quantifying the dominance of roundhouse architecture. Any subsequent studies of this form of structure, in site reports, period discussions or research into contemporary phenomenon will now be able to easily quote, using the supporting database, structures of a similar form and then compare their distribution.

8.2.1.2 New observations

Earlier summaries of Bronze Age settlement structures have recognised that other forms of structure exist. In the case of Bradley's (2007, 2015, 2019) work this range has had limited description. In others (e.g. Gossip and Jones 2008, Pope 2015) more detail has been given to these regional traditions and in the work of Gibson it has been restricted to a single period (Gibson 2019). This thesis's differs from each of these by elucidating the full range of architectural features seen across Britain, across the Bronze Age, and has highlighted that grouping of these features into regional silos prevents their shared traits being identified. The study has been able to provide a baseline of this variation.

In addition to these rounded forms of architecture, a large number (albeit only one fifth of the structures studied) were rectangular (Chapter 4.2). Many of these were certainly ancillary buildings likely to have been used for storage (see Gent 1983). However, it has been possible to identify a number of structures whose area is greater than, or equal to, the surface area seen in roundhouses such that these structures may also represent domestic houses (Chapter 4.6.3). This thesis extends broad national and regional summaries of settlement, by expressing the extent of this variety. It also highlighted that those sub-square structures of the Neolithic period have areas similar to that of other square structures emphasising that such forms should not automatically assumed to have been granary structures.

It has cautioned against overly relying on spatial distributions of structure forms identified, both in terms of regional variants (contra Bradley 2007, Jones and Quinnell 2011, 218-9, Pope 2003) of structures and in the distribution of rectangular structures (contra Bradley 2007).

It has not been able to identify a chronologically significant typology of the architectural traits of Bronze Age settlements. It is notable instead that, while fluctuations in their intensity exist, Bronze Age architecture of all forms can be identified in most periods. Similarly, there is no straightforward relationship between structure size and time (contra: Gardner, Savory & Williams 1964; Jobey & Tait 1966; Parsons 1961; Radford 1953). For example, it is clear that houses of all sizes exist across the Bronze Age with only a modest trend towards structure enlargement over time (Chapter 4.3.1.3).

8.2.1.3 The significance of these results

The baseline study has served to support existing summaries of Bronze Age settlement but also to identify that the settlement record is more varied than they allow, even if this is due to size constraints of such general texts. It emphasises that regional scholarship of structure forms may too readily separate similar architectural traditions. It is therefore suitable to discuss a British Bronze Age architectural tradition (Chapter 7.5). However, it demonstrates that the often cited example of Itford Hill (Burstow, Holleyman & Helbaek 1958; Ellison 1978 pp.35–36) as the archetypal Later Bronze Age settlement, while accurate in its representing the vast majority of settlement structures, does not suitably reflect the variety also seen.

While variety has been seen in structure size and form, those differences are not so great as to allow a suggestion that architectural form, as seen in the archaeological record, displays evidence for social differentiation (but see Wiseman 2014, 2016 for examples where settlement scale social clusters may be identified). Instead I would suggest that the results of the study of settlement form seem to unify rather than stratify occupants of Britain at this time. While they also share similarities in structure form to settlements in Ireland and parts of north western Europe it appears that settlement structures in Britain may be more internally coherent to the island than outside it (Chapter 7.5). Confirmation of this would require more thorough contextualisation of the variety discussed in this thesis than the scope of this study has allowed in Chapter 7.

8.2.2 Settlement intensity and dates

Chapter 5 established two diachronic frameworks describing the appearance and changing intensity of Bronze Age settlements with structures in Britain. The first based on radiocarbon date (Chapter 5.4) is as follows:

Phase Name	Time period	Description
Phase 1	2400 - 1700 cal BC	There are few domestic structures in Britain, although they are found throughout England, Scotland and Wales (see below for a more detailed discussion of geographical analysis)
Phase 2a	1700 -1400 cal BC	There is rapid expansion in the number of domestic structures in Britain.
Phase 2b	1400 -1300 cal BC	The number of structures in use stabilises at a peak which lasts c.100 years.
Phase 3a	1300 -1200/1100 cal BC	Following this peak, there is a collapse of settlement albeit not to a level as low as in Phase 1.
Phase 3b	1200/1100 cal BC	Settlement levels again stabilise at a level which is above that seen in Phase 1 but is considerably lower than that seen during Phase 2.
Phase 4	1100 - 800 cal BC	Eventually settlement numbers begin to increase again to a level at which they may stabilise before the Iron Age begins.

Table 54 The thesis' radiocarbon diachronic model

While the second scheme suggested continued linear expansion in settlement numbers across the Bronze Age (Chapter 5.6), although it is possible that this masks variation in settlement intensity within periods (Figure 68).

8.2.2.1 Existing theories that the thesis supports

Both schemes agree with the works of Bradley suggesting Later Bronze Age settlements have their origin in the Early Bronze Age (Bradley 2007 p.184) and that it is appropriate to see a divide in the record between Earlier and later Bronze Age (See Chapter 8.3.1 below). However, the quantification of this narrative has revealed far more nuance than has been seen in previous studies of Bronze Age settlement expansion.

The results of the summed probability distributions of settlement occupation and abandonment are extremely consistent. As such, it may be possible to suggest that the majority of domestic structures were used for a consistent period and, in the main, were not occupied for more than a few generations (agreeing with Davies 2016 p.59; although Brück 1999a p.149 recognises the difficulty in estimating this).

8.2.2.2 New observations

The radiocarbon model proposed suggests that structure construction underwent a boom at 1700 cal BC which, if accepted, emphasises that the traditional centre of 1600 cal BC that divides the Earlier and Later Bronze Age, should not be seen as an impermeable barrier (Problem Statement 1). After 1700 cal BC there was a period of high levels of settlement construction (1400-1300 cal BC) which was then followed a bust during which the numbers of houses constructed dropped dramatically (c.1300-1100 cal BC) before rallying somewhat in the Late Bronze Age

(1100-800 cal BC). It is notable that this boom–bust cycle appears across the entirety of England, Scotland and Wales and that there is apparently no core from which this originates. This result demonstrates the importance of quantified assessment as it disagrees with the assertion of Bradley that settlements increased in density primarily in the South of Britain (Bradley 2007, 224).

It also demonstrates the possibility of new observations being gained as the even increase in density has been interpreted as suggesting that the causes for such a cycle were not exterior to these regions. Instead they are likely to have their origin in events occurring in the Early Bronze Age. This is further supported by the similarities in form, location and use of these structures across the regions of England, Scotland and Wales (see above), and to a certain extent Ireland which are more consistent with one another than those seen in continental north western Europe (Continental comparisons 7.5).

Similarly, from the findings made above, it has been possible to develop an understanding of the overall pattern of when settlements were most frequently being built (Chapter 4), their general distributions across Britain (Chapter 6.2) and what the typical size of Bronze Age settlements was over time (e.g. Chapter 4.3.1). These have shown that while settlements are at their greatest density in the south of Britain, settlements increased in number throughout the Bronze Age in the entirety of Britain and that there is no straight forward relationship between structure size and time.

8.2.2.3 *What is the significance of this?*

The significance of these results to Bronze Age studies is clear. Firstly a new diachronic model for settlement change has been produced which presents a more nuanced narrative of settlement change over time than has previously been recognised. This emphases that there is not a linear increase in settlement density and that potentially significant changes to the settlement record occurred around c.1200-1100 cal BC). This period aligns closely with existing metalwork typologies such that the nature of this transition requires further investigation (see Chapter 8.3.1 below).

In understanding social transformation in the Bronze Age this model agrees that there is wide spread social change in Britain centring around 1600 cal BC, but that this change has its origins in the Early Bronze Age. It therefore further evidences that the placement of a division at 1600 cal is somewhat an artefact of the primary material used to date archaeological sites (Problem Statement 1).

The thesis also has wider significance to archaeological study through identifying two possible of models of settlement change, using radiocarbon dates and more traditional dating methods. Neither of these have been quantified before. It has not been able to identify which is most likely model to be true but has highlighted that the radiocarbon model is unlikely to change. As such, this study highlights the caution needed in the use of summed probability density models (either including complex modelling or not) and the importance in a full accounting of their own bias.

8.2.3 Settlement location

The distribution of settlements has been discussed within Chapter 6, and the results of which can be generalised under two statements. First that Bronze Age settlements are found across Britain, with only select geographical regions having no identified Bronze Age settlement sites. Secondly that the scale of observation bias must always be considered when understanding the distribution of Bronze Age settlements.

8.2.3.1 Existing theories that the thesis supports

The study has identified that there are fewer excavated Bronze Age settlements in the north of Britain (Chapter 6.2.1) as suggested by Bradley (2007, 210), however it is notable that this bias is lessened when looking solely at radiocarbon dated settlement (Chapter 6.2.2) which may suggest that this bias is related more to intensity of investigation rather than a reflection of a past reality.

This study has also recognised that fewer settlements sites exist in the uplands of Britain (Chapter 6.4.1). Yet it has identified settlements in this region which supports growing opinion that talk of an abandonment of these zones (Burgess 1980) is overstated (Tipping 2016).

It has been suggested that the English Channel was less a barrier than a zone allowing the transmission of knowledge and material (Needham 2009; Clark 2004). Similarly, the importance of rivers to Bronze Age societies has been discussed. This thesis is able to further contribute to these discussion by quantifying that settlements were intentionally placed close to main rivers and disproportionately near the coast (Chapter 6.4.2). This further enhances the importance of these zones.

8.2.3.2 Entirely new observations

However,somewhat contra to these findings the study has also found that despite possibly being placed closer to the ocean and major rivers, Bronze Age settlements are not placed particularly closely to secondary rivers (Chapter 6.4.2.1.2.2). Through doing so it was also able to demonstrate that the location of settlements was probably not necessitated by the requirement to be close to running water, there being sources as close as 5km in most areas of the country. Similarly despite the boom in settlements occurring contemporaneously with a potential explosion in farming of domestic crops (Chapter 8.3.1.3), settlement sites are not disproportionally placed on high yield soils (Chapter 6.4.3). Similarly counter to Bradley's impression of Bronze Age settlement numbers in Britain differing between the south and north of Britain (Bradley 2007, 224), almost all regions see an increase in the numbers of settlement over time of broadly similar rates (Chapter 6.3).

8.2.3.3 The significance of these results

These results have wide consequences for our understanding of the Bronze Age. They demonstrate that no particular geological or topographical traits appear to have provided a barrier to the construction of settlements as seen by the occupation of both upland and lowland regions or wet and freely draining soils. Yet certain regions do appear to have been rejected for settlement (6.2.1.1). These regions do not share any particular geological or topographical characteristics such that the reason may be cultural. A full assessment of the consequence of such a finding are beyond the scope of this thesis. Future investigation should target whether these regions show a similar dearth, or instead dominance of other archaeoogical features.

Chapter 7 has proposed that it was extremely local factors which were considered for settlement placement purposes (Chapter 7.3). If accepted, the fact that the majority of settlements are not placed on high fertility soils would suggest, just as access to running water was not prioritised, that high agricultural yields were not considered the highest priority. This is not to say producing crops was not important, merely that the need to maximise output by placing settlements on high yield landscapes does not appear to have occurred nationally. Instead settlements do appear to be more closely placed to navigable rivers and the coast indicating that access to the opportunities these provided was a higher priority.

Of wider significance to understanding the Bronze Age, the increase in settlement numbers across the UK have been characterised as more clustered distributions. For example, Bradley (2007) has suggested that settlement in the north of Britain was less dense than the south and that the growth in settlements may have been restricted only to this region. This thesis has been able to demonstrate that while this appears to be the case, any such observation is largely impeded by bias in recovery. This finding is significant as it suggests that there is no diffusion from a regional centre of the forms of settlement seen in the Middle and Late Bronze Age. Instead it may be suggested that the settlement increase seen during this time has its origins in an existing settlement tradition found across the country (supporting

Besse & Desideri 2005; Bradley, Haselgrove, Vander Linden, *et al.* 2016). It also makes change less likely to be the result of an incoming population (Chapter 8.3.1.5).

Finally Chapter 6 and 7 make clear at multiple point the issue of bias within the archaeological record and have helped elucidate the wide effect these can have on any summary statistics (e.g. Chapter 7.2). It is hoped that it provides further demonstration that such observation bias do not prevent interpretation so long as they are recognised, and by representing the extent of their effect using datasets who bias may be opposite to one another.

8.2.4 Baseline significance summary

Chapters 1 and 2 outlined how recent analyses of Bronze Age settlements have been regionally focussed. While there have been many extensive studies of Bronze Age settlements, none have studied all Bronze Age structures nationally as their primary subject. The closest exception to this would be Bradley's study of Bronze Age settlement within his overview of developer funded fieldwork in Britain and Ireland (Bradley 2007; Bradley, Haselgrove, Vander Linden, *et al.* 2016), although within these works settlements in the Bronze Age were one small part of a much larger study. However, both these works supported their narratives with only limited case studies and provided no quantitative assessment or suitable a supporting material to reconstruct their analysis. As such this thesis provides a valuable contribution to the study of Bronze Age Britain, Ireland and near continental Europe simply by providing just such a national synthesis of the variability of Bronze Age settlement sites with structures in Britain, the results of which can easily be integrated within future projects.

This chapter has illustrated how the production of such baseline data has:

1. Supported and quantified existing observations of the archaeological record while demonstrating that a quantitative approach is better able to identify and distinguish the variability in the record.
2. Produced results differing to what contextual analyses reliant on impression of the material may first indicate.
3. Identified new trends not previously recognised at all.

The significance in this thesis as a whole is therefore the reinforcement that that an analysis relying on a quantitative data allows progress in understanding to be made that may not be recognised if solely providing contextual narratives based on a selected number of case studies.

8.3 Understanding the Bronze Age and its settlements

Chapter one identified two problems in understanding the Bronze Age societies of Britain (Problem Statements 1 and 2) and suggested that these may be resolved using settlements as a medium to unify the various datasets of artefacts, burials, monuments and scientific analyses becoming available (Chapter 1.3). Crucially, it also identified that the base line study of settlements, required for such integration, was lacking (Problem Statement 3). It was for this reason that the thesis has explored the structural characteristics (Chapter 4), intensity of use (Chapter 5), location (Chapter 6), and activities occurring around (Chapter 7) the built Bronze

Age settlements in England, Scotland and Wales dating to between c. 2400-800 cal BC. By doing so it to primarily aimed to provide a solution to Problem Statement 3. Having now provided such a baseline (Chapter **Error! Reference source not found.** and see the results throughout), subsequent research will be able to integrate this more fully with existing legacy datasets of contemporary archaeological phenomena. While a full such analysis was beyond the scope of the project Chapter 7 has attempted to demonstrate some of the outcomes that can be achieved and the gains possible through this method. However, the results of this thesis are also able to contribute in part to beginning to solve Problem Statements 1 and 2, which while not directly targeted can be progressed with the results of this study. Finally, this section will discuss firstly what the Chapter 5's radiocarbon diachronic model may contribute to the validity of a divide being placed tween the Earlier Bronze Age (c.2400-1600 cal BC) and the Later Bronze Age (c.1600-800 cal BC) before concluding on how it might also progress our understanding of the Later Bronze Age

8.3.1 How does the diachronic model fit established models of transformation in the Bronze Age?

Chapter 1 argued that the mechanisms behind, significance of and in fact the differences in social structures in Britain between the Earlier Bronze Age (c.2400-1600 cal BC) and the Later Bronze Age (c.1600-800 cal BC) are poorly understood and it is unclear to what extent the divide placed at 1600 cal BC is an artefact of the material available to study in the archaeological record. A chronological model has been developed using radiocarbon dates that is independent of such chronologies it is therefore possible to assess this against those existing typological schema and also other changes in the archaeological record to assess the suitability of a divide at 1600 cal BC (Problem Statement 1).

8.3.1.1 Metalwork and ceramic chronology

The diachronic model has been used to define six periods of time based on the changing intensity of settlement use. This can be compared to existing metalwork stages and assemblages built on typology which have helped define the current divisions of the Bronze Age (Burgess 1979, 1980; Colquhoun & Burgess 1988; Needham 1996; Needham, Ramsey, Coombs, *et al.* 1997; Gerloff & O'Connor 2019). The synchronicity of the diachronic model's periods to those argued to exist for metalwork assemblages is striking (Figure 101). Almost all of the phases suggested closely align for the start and end dates of current metal artefact assemblages (Needham 1996; Needham, Ramsey, Coombs, *et al.* 1997). Those exceptions are the start of phase 2, which is placed at 1700 cal BC, only 50 years later than the start of metal assemblage VI, and the transition between period 3a and 3b offset only slightly from the Penard Wilburton transition. The close alignment of these phases demonstrates that Bronze Age seriation schema are theoretically able to detect the changes seen in the radiocarbon model for settlements developed by this study. It is therefore possible to conclude that divisions of the Bronze Age using metalwork may be able to depict social change. Unfortunately, the reverse is true of ceramic typologies (Figure 2, Figure 101). No single form or combination of forms suitably reflect the divisions identified within the thesis' chronological schema, although Beakers and Food Vessels are restricted to only a single period (P1). This is significant as ceramics are regularly the primary means of dating a settlement. In particular it appears that Deverel-Rimbury pottery, often used to only define a single phase in archaeological narratives, subsumes a large degree of change in the settlement record, namely a boom, stabilisation, collapse and recovery phase. This grouping of four sub phases may explain the discrepancy in diachronic models identified in Chapter 5.7.1 and demonstrates that studies solely relying on this dating evidence are likely to cluster potential social transformations.

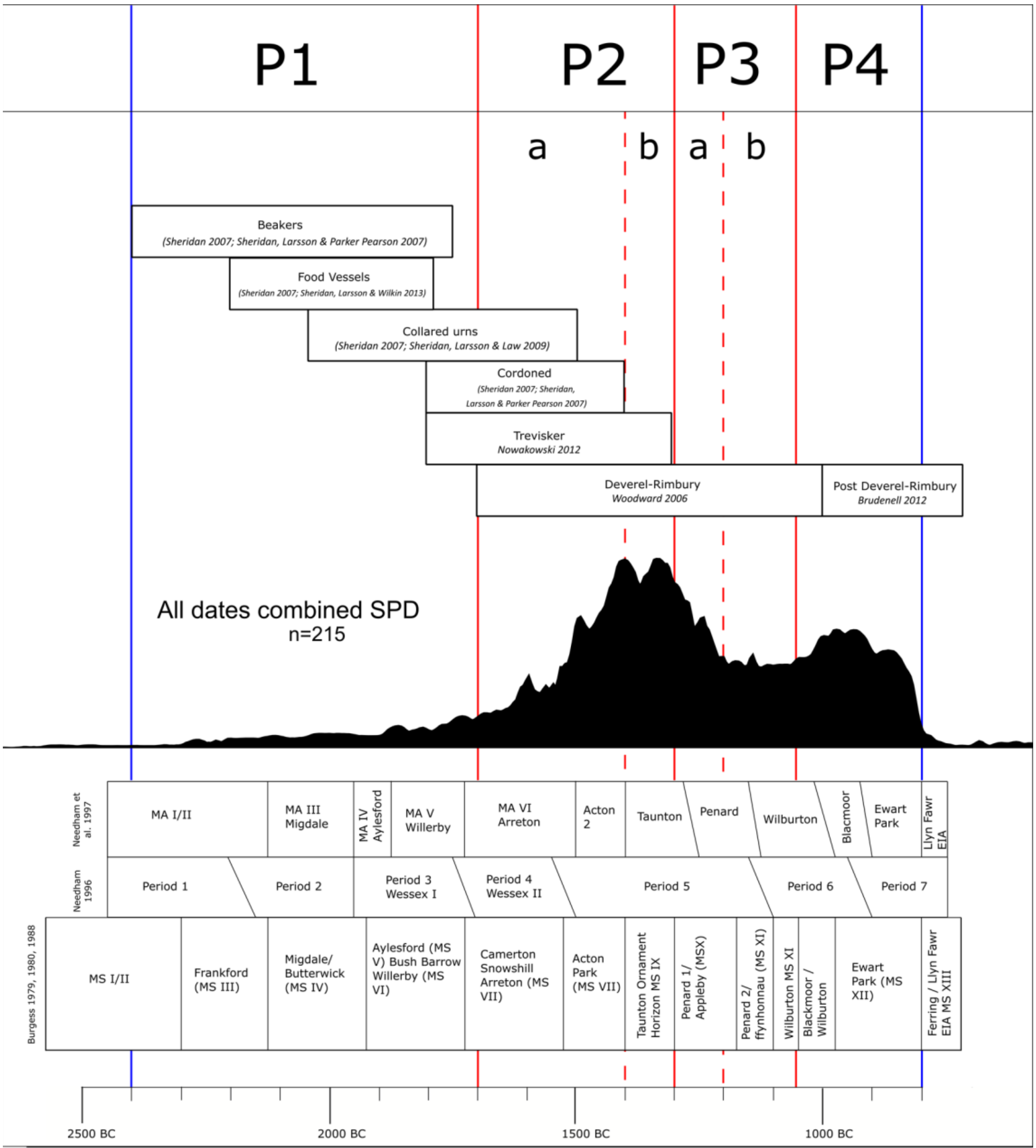

Figure 101 Comparison of established typological frameworks of ceramics (above) and metalwork (below) to the thesis' diachronic framework.

8.3.1.2 Metal production

The accurate mapping of metalwork stages to the thesis' diachronic model of settlement intensity allows further comparison of the schema to a new study of metal production at the Great Orme mine (Williams & Veslud 2019). This mine has long been recognised as a source of copper in British metal during the Bronze Age (Dutton, Fasham, Jenkins, *et al.* 1994). However, up until recently it has been thought that this mine was exploited over a period of 800 years (Williams & Veslud 2019 p.1180). Recent research comparing the isotopic signature of this mine's copper with diagnostic artefacts from the Bronze Age has now been used to suggest that this mine was primarily used between 1600 and 1400 cal BC (Williams & Veslud 2019 p.1192). During this "golden period" (*ibid)* the equivalent of 2200–8900 palstave axes worth of copper were extracted per year (Williams & Veslud 2019 p.1189). Such a boom in production has been suggested as requiring a large investment of resources and potentially significant social organisation (Williams & Veslud 2019 p.1193) but more compellingly to this study is that the boom and bust cycle, indeed even the language within the article describing it, are identical in timing and scale as that model suggested by the thesis for settlement intensity (Figure 102). It may therefore be that these two events are linked (see Chapter 8.3.2.1.3 below).

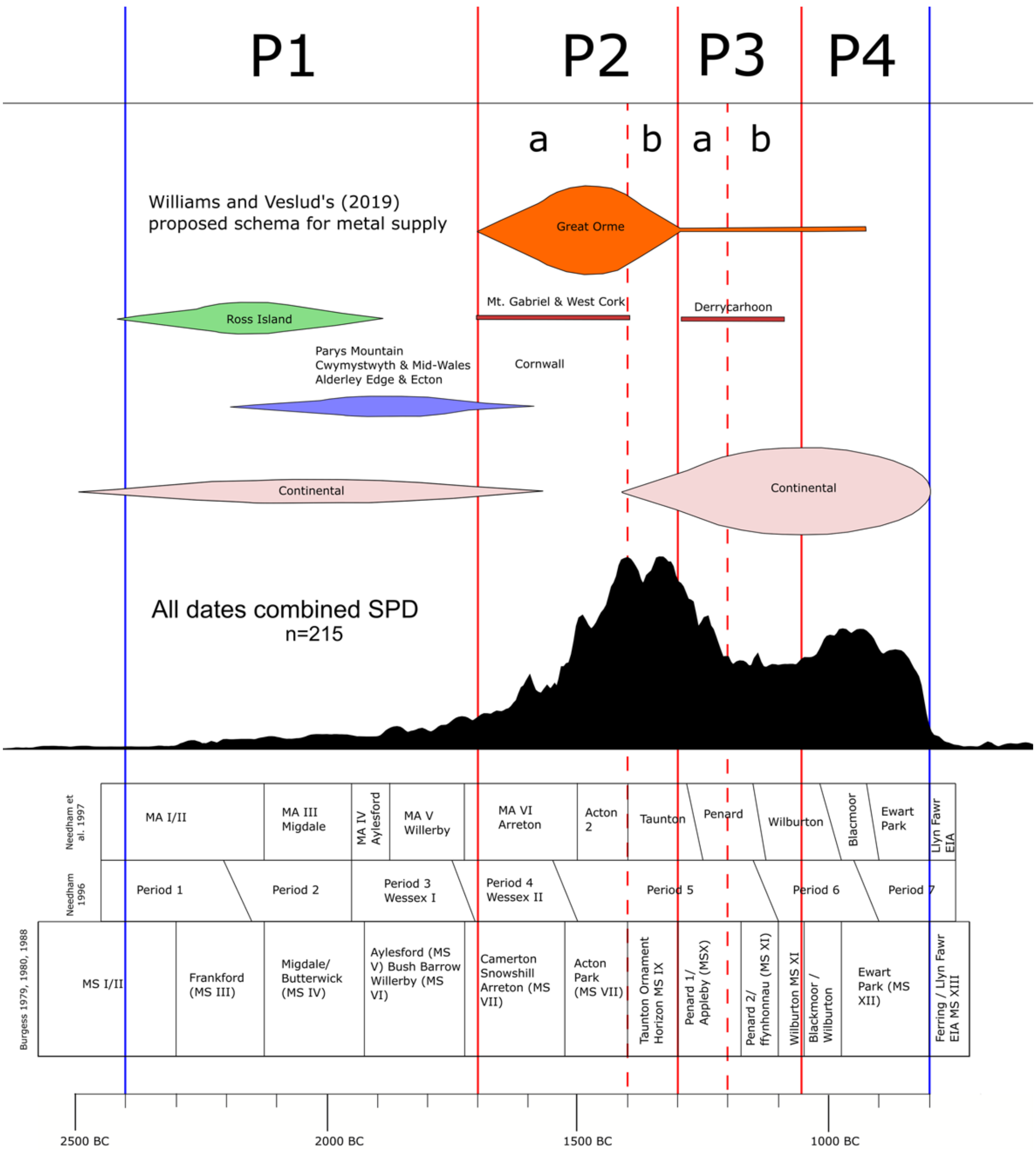

Figure 102 Comparison of established typological frameworks of metalworking (above) and metalwork (below) to the thesis' diachronic framework.

The close link between metal production, potentially metalwork design and the diachronic model of this thesis suggest that contemporary archaeological phenomenon may reflect the settlement record. As such it is appropriate to ask whether this model shows similarities or differences with other archaeological phenomena. Ideally this study would compare the relative number of settlements to all other archaeological phenomena such as monuments (Cummings

Forthcoming), field systems (Yates 2007) and hoards (Taylor 1988). Unfortunately, similar datasets of these material, require development to allow a like with like analysis while others have little data to allow a study over time (see for instance Yate's 2007 study of field systems). However, it is possible to compare the thesis' diachronic model with several other datasets; the evidence for cereal cultivation, the evidence for change in the British climate, evidence for change in demography, population size and finally burial.

8.3.1.3 Use of domestic cereals

The diachronic framework used in this thesis has been built by modelling and then summing the probability distributions of radiocarbon dates associated with settlements. This method has also been applied on domestic cereals (Stevens & Fuller 2012), such that the two models can easily be compared. This study of arable farming practices, has suggested that, between c.3000 cal BC and c.1500 cal BC, the number of cereals was low and consequently that farming was less popular than other means of food production (Stevens & Fuller 2012 p.714). Following this point the use of cereals rapidly increased. The results of this study are notable as they present a complementary picture to the thesis' diachronic model. The increase in the number of arable domestic species occurs at the same time and in a similar magnitude to that of Bronze Age settlement (Figure 103, Figure 104). They similarly suffer a downturn before recovering in the Late Bronze Age. These very similar results may indicate that the results of both studies are valid (although see Bishop 2015). As such it is possible to tentatively suggest that the rise in Bronze Age settlements is synchronous with the uptake and use of domestic cereals in Britain.

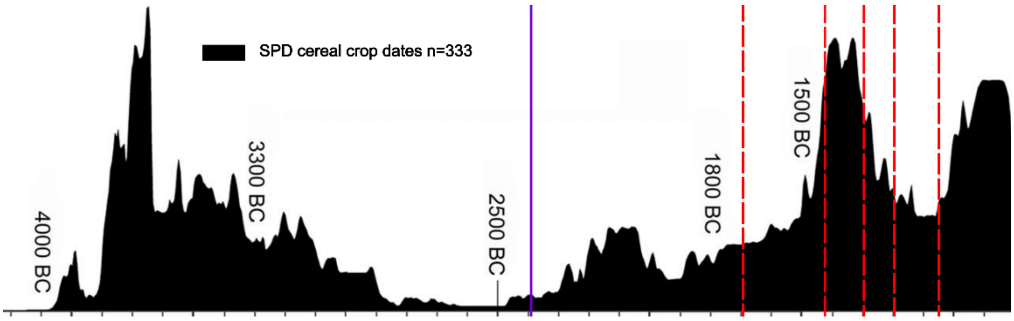

Figure 103 The summed probability model of direct crop dates in the British Isles. The thesis' diachronic phases are indicated in red and blue lines (traced from Stevens and Fuller's 2012, 716).

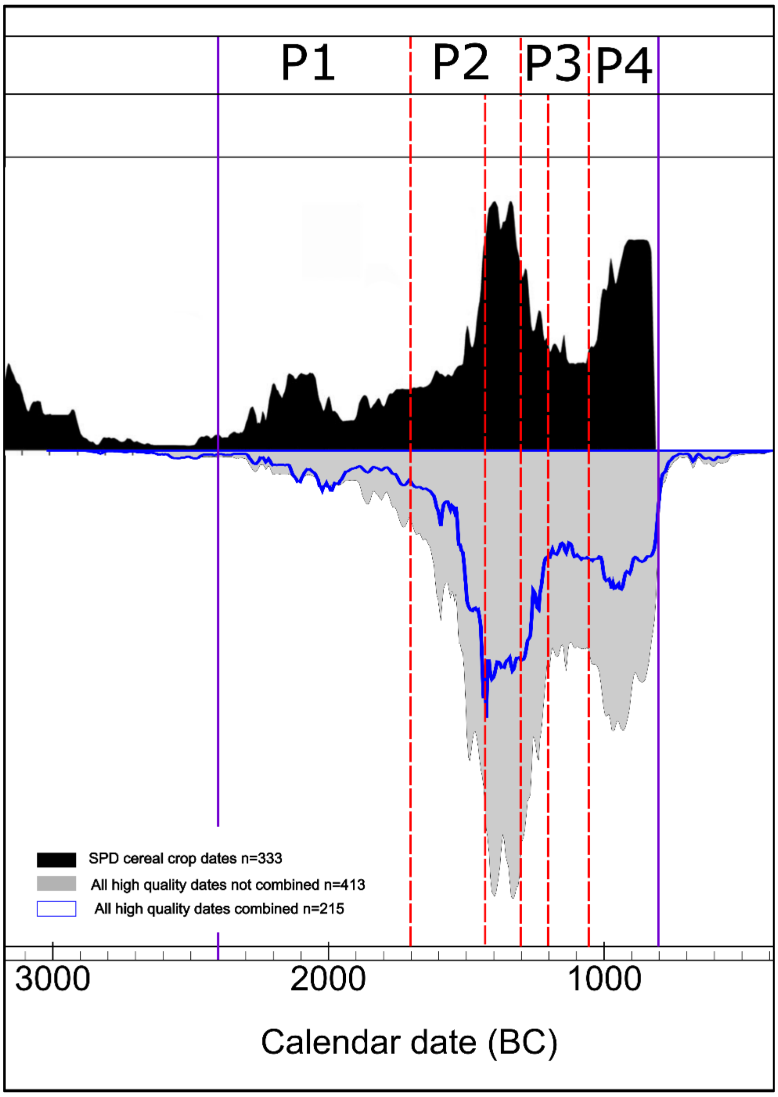

Figure 104 Comparison of Stevens and Fuller's (2012) postulated resurgence in cereal use compared to the thesis' radiocarbon diachronic model. Upper curve traced Stevens and Fuller's 2012, 714.

8.3.1.4 Climate change

As the boom in settlement may be linked to a change in subsistence practice it is suitable to assess to what extent the model is synchronous with changes in the environment. Environmental changes are frequently cited as being a driver of change in society (Burgess 1985; Caseldine 1999; Finsinger & Tinner 2006; Taylor 1975) or at least providing events that required reacting to in ways that can be seen in the archaeological record (Tinner, Lotter, Ammann, *et al.* 2003; Magny 2004). Similarly other have suggested the role of the environment in affecting change is overstated (Dark 2006; Tipping 2002, 2016; Young & Simmonds 1995). Yet a wetter period has been suggested as a potential reason for the upland abandonment in Britain during the Late Bronze Age (Caseldine 1999; Burgess 1985; Taylor 1975). While it is not within the scope of this thesis to provide a total environmental reconstruction of Britain during the Bronze Age, it is possible to review several works' investigation into this subject to identify potential warmer or wetter periods in the Bronze Age.

Nine studies have been identified (Amesbury, Charman, Fyfe, *et al.* 2008; Anderson 1998; Barber, Chambers & Maddy 2003; Barber & Charman 2003; Brown 2008; Chambers, Barber, Maddy, *et al.* 1997; Charman, Blundell, Chiverrell, *et al.* 2006; Hughes, Mauquoy, Barber, *et al.* 2000; Langdon & Barber 2005) discussing the British climate, although these also cite further climate data. Dates suggested for the beginning of a climatic downturn vary slightly. Some papers suggest the beginning of a downturn placed at 1600 cal BC which reaches its peak at 1400 cal BC (Charman, Blundell, Chiverrell, *et al.* 2006 pp.343–347). Others choose to describe the downturn being centred around 1400 cal BC (Amesbury, Charman, Fyfe, *et al.* 2008 p.95; Chambers, Barber, Maddy, *et al.* 1997 p.397) or slightly earlier around 1500-1400 cal BC (Hughes, Mauquoy, Barber, *et al.* 2000 p.475; Langdon & Barber 2005) while other still identify a downturn around 1250 cal BC (Barber & Charman 2003; Barber, Chambers & Maddy 2003; Anderson 1998 p.222). The exact dating of each of these transitions are therefore not identical in each region although this should be expected due to regionally specific circumstances. Brown's (2008) summary of the data provides a useful structure with which to understand this data. He suggests that the period between 2000-1800 cal BC was a warm stable period. Between 1800-1500 cal BC the climate deteriorated to a colder wetter climate which then persisted until 1200 cal BC after which there as a short dry phase before another deterioration (Brown 2008 p.3).

Using this model (Brown 2008 p.3) it might be suggested that the downturn in settlement intensity at c.1400/1300 cal BC is linked to a wetter colder period. Yet it would seem then than the shift to an initially cooler period at 1800 cal BC is contemporary with the boom in settlement, while the short warmer period in the Late Bronze Age is contemporary with a stabilisation period. In summary there appears to be no straightforward or certain connection between the diachronic model proposed in this study and downturns in environmental conditions nationally occurring over the Bronze Age. Similarly, it has been possible to suggest that while settlements numbers are smaller in the uplands of Britain this lower proportion remains consistent through the Bronze Age (Chapter 6.4.1) such that there is no clear argument for an abandonment of the uplands (agreeing with Tipping 2016).

8.3.1.5 Changing demography

It has been suggested that there is a large demographic shift seen in the population in Britain, as seen through DNA evidence, during the Early Bronze Age (Olalde, Brace, Allentoft, *et al.* 2018). The reasons behind this shift are still contested (Furholt 2019), but the result of this transition was the replacement of approximately 90% of Britain's gene pool over only a few hundred years (Olalde, Brace, Allentoft, *et al.* 2018). This transition is suggested to have occurred between 2450-2000 cal BC with individuals after 2000 cal BC being more homogeneous and possessing less variation in ancestry proportions (Olalde, Brace, Allentoft, *et al.* 2018 p.4). The boom in Bronze Age settlement structures seen in this thesis cannot be said to have begun any earlier than 1700 cal BC, at least 300 hundred years later than the point at which those demographic shifts in the population appear to have settled.

It might be expected if a new incoming population were entering the British Isles with a genetic signature similar to that already in the country bringing with them a new form of settlement that this might be at first localised in the area in which they entered. However, there appears to be no regional core for the appearance of permanent settlements (Chapter 6.3). Instead settlement structures appear to have their origins in the Early Bronze Age (see above). It can therefore be concluded that that the boom in Bronze Age settlements suggested in this study does not appear to be linked to demographic change.

8.3.1.6 Burials

Often studies attempt to compare the cumulative distributions of their subject matter with the other phenomena already recorded. For example, in Ireland Ginn compared the presence of burials and burnt mounds to that of the settlements studied (2012, 88, 2016, 50). Unfortunately, no such comprehensive database already exists for Britain, preventing a similarly comprehensive analysis. However, as part of the research by the author that summarises almost all Middle Bronze Age (c.1600-1150 cal BC) cremation burials in Britain (Caswell & Roberts 2018) and that of Cormack (2018) on non-cremated burials dating to the Middle Bronze Age (c. 1600-1150 cal BC), this study has been able to compile a database of 2204 radiocarbon dates associated within a confirmed Bronze Age burial or human remains that should be comprehensive for Middle Bronze Age burials and potentially represents 75% of those from the Early and Late Bronze Age. Due to the nature of these studies, the radiocarbon dates collated were not modelled and it is beyond the scope of this study to do so for another dataset of similarly size to that of the thesis. As such, only a single plot (Figure 105) has been produced representing this data without modelling with the noted caveat that this may not represent all burials and that the result is likely to change if modelling is applied.

The cumulative frequency distribution is notable in its narrative, which is almost the opposite of that for domestic structures. Burials in the Bronze Age gain increasing prominence in the Early Bronze Age (which is the period likely to be underrepresented in the dataset) until 2000 cal BC, at which point the prominence of burials declines at exactly at the point that settlements vastly increase in number. Notably, this decline stabilises for a period of 200 years, after which point burial becomes less and less visible in the radiocarbon record. In summary it is possible to conclude that there is an inverse connection between the numbers of burials and settlements (see Chapter 8.3.2).

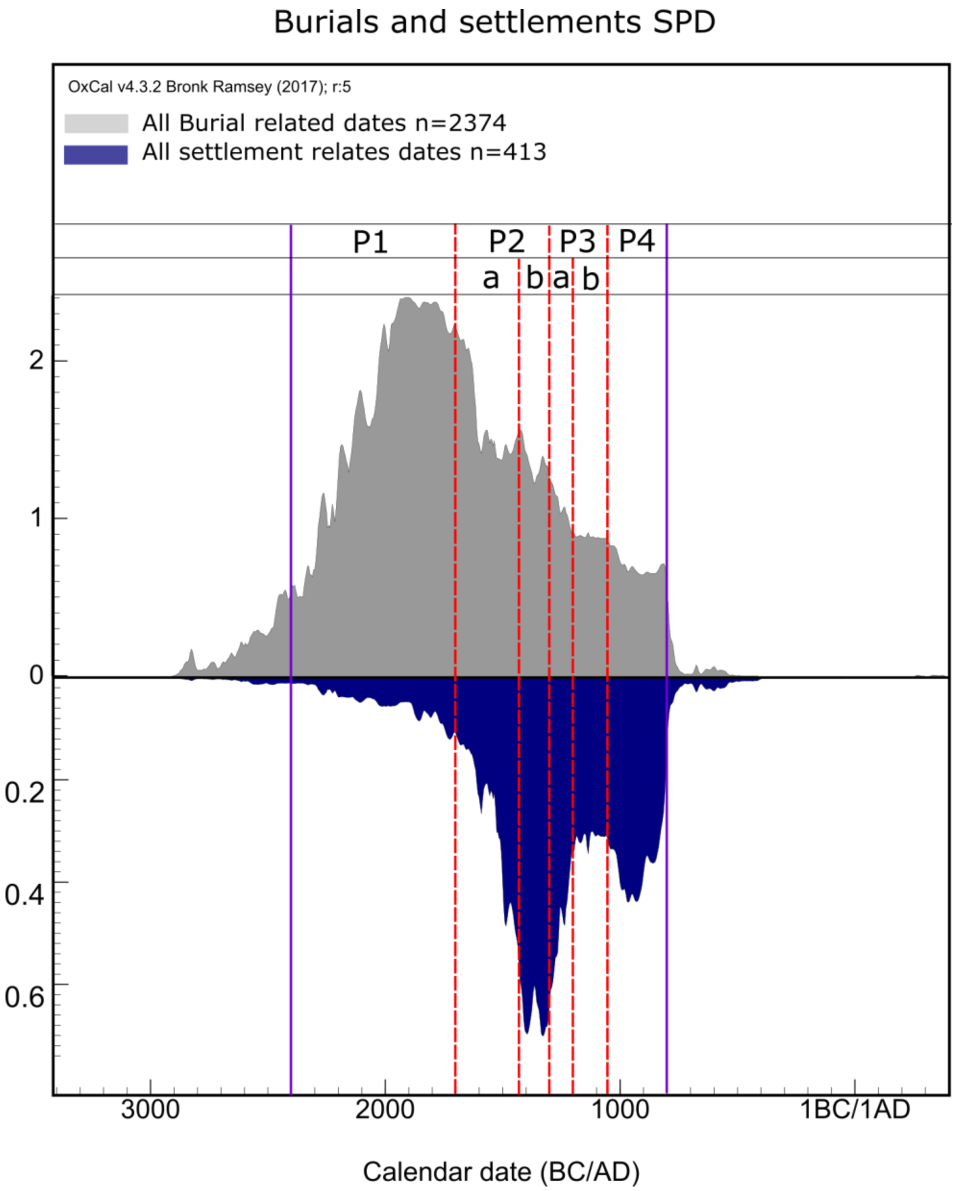

Figure 105 A summed probability distribution graph representing all identified Bronze Age radiocarbon dates associated with burials overlaid with this thesis' radiocarbon derived diachronic four stage model.

8.3.1.7 Population rise

More recently a study of all Bronze Age radiocarbon dates in Britain has been conducted as part of a wider project studying human activity in the Holocene across the British Isles (Bevan, Colledge, Fuller, *et al.* 2017). The overall trend of this model argues for a steady increase in dates, and by proxy a steady increase in the population in Britain across the Holocene, with some variations occurring over time. The Bronze Age occupies just 17.8% of the study period of this research and is part of a phase described as representing a Late Neolithic and Early Bronze Age recovery in population up to a new peak at c.2000 cal BC following a downturn between c.3500-3000 cal BC (Bevan, Colledge, Fuller, *et al.* 2017 p.2). The study then suggests a crash in population after 1000 cal BC (*ibid)*. This scheme within the article's text can be summarised as suggesting an increase in population, in the Early Bronze Age followed by a stable period followed by a crash near its end. This model is quite different from that proposed for settlements which suggests low numbers of structures in the Early Bronze Age followed by a boom, bust and then recovery (Figure 106).

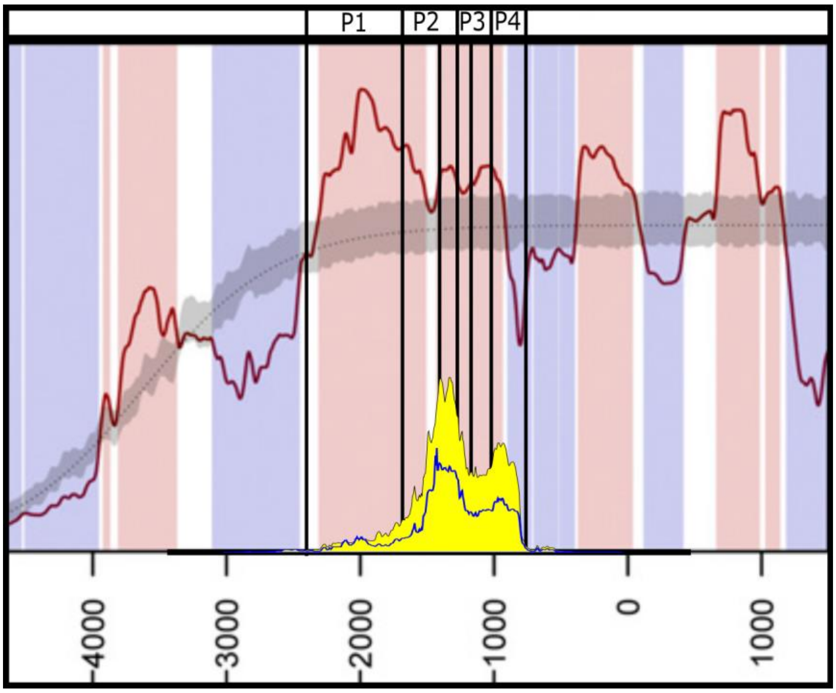

Figure 106 Comparison of Bevan et al. (2017) summed probability distribution of c. 75% of all radiocarbon dates dating to the Bronze Age in Britain and Ireland, and the thesis' diachronic model (yellow).

It may be suggested that such a population model may be at odds with the cycle seen in the arable products and permanent settlement structures. The reasons for this difference may be seen in this thesis' demonstration of dates associated with burials. These data, which are in many ways the inverse of the settlement data, are incorporated into Bevan et al.'s (2017) model as is the settlement data. In this instance then, a linear population level should be expected - as one phenomenon decreases, the other increases, creating a near horizontal signature of total activity. As such the two models may be compatible, indeed when the distributions are compared visually (Figure 106) there are some similarities in minor peaks and troughs within the model proposed by Bevan et al (2017).

The differences in models may also be explained by the fact that there need not be a link between population size and visible domestic modes of practice as argued for by Brück (1999b). In which case there appears to be no straightforward or certain connection between the diachronic model proposed in this study and changes in population numbers over the Bronze Age that can explain the boom and bust of settlements across the region. However, I would suggest the evidence of the inverse relationship between burials and settlements may indicate that such cumulative density distributions may not be suitable for estimating population or if so, require a more thorough engagement with the material dated, by further identifying the nature of what has been dated and the relative proportion of the phenomenon sampled.

8.3.1.8 *Progressing Problem Statement 1*

Chapter one argued that the mechanisms behind, significance of and in fact the differences in social structures in Britain between the Earlier Bronze Age (c.2400-1600 cal BC) and the Later Bronze Age (c.1600-800 cal BC) are poorly understood and it is unclear to what extent this is an artefact of the material available to study in the archaeological record. A chronological model has been developed within the thesis whose wider significance can be highlighted in relation to this problem statement. This discussion has identified that while metalwork chronologies do seem to correlate with changes in settlement intensity, almost all ceramic types are unsuitable for detecting change, due to their poorly matching those seen in the quantity of settlements. This may explain the difference in the two possible settlement models presented in Chapter 5 (Chapter 5.7.1).

It has been possible to compare these chronologies with further models which has identified that there are no straight forward correlations between settlement intensity and changes in climate and demographic change, while any connections between this model and population numbers are also uncertain. There does appear to be a correlation however with the rise of cereal use and in the decline in burials. However, in each of these three instances it is clear that there is no sharp break in tradition. The evidence instead is that the boom in settlements, metal production, and domestic cereal exploitation have their origins in the Early Bronze Age, albeit at least three centuries after the period during which the region's demography changed substantially. As such, this section would conclude that, while 1600 does appear to be an appropriate point to describe a social transition during the Bronze Age, it should be emphasised that the discussion above suggests that this divide is not a clean break. It is appropriate therefore to highlight the period of 1600 cal BC as the centre point of a transitional phase not a single pivot point which divides the period. This is of significance for Bronze Age studies as it is not uncommon for the period to be separated in discussions between an Earlier and a Later Bronze Age (see for example Parker Pearson 2009 and; Champion 2009; Hunter & Ralston 2009 or; the division of Bradley 2007; Webster 2007; Petts, Gerrard & Cranstone 2006; Barrowclough 2008; Bradley, Haselgrove, Vander Linden, *et al.* 2016 p.182). Such a practice may not be appropriate if attempting to understand the transition that occurs around 1600 cal BC.

8.3.2 Progressing Problem Statement 2

Chapter one argued that, despite the Bronze Age being of great importance (Chapter 1.1) we do not have a clear narrative or model for the social structures existing in the Bronze and particularly the Later Bronze Age (Chapter 1.2.2). The root of Problem Statement 2 is that those social models of Bronze Age Britain that do exist are often based on selected strands of evidence which produces disparate narratives (Chapter 1.2.2). This thesis has suggested that settlements may form a lens with which to unify this material (Chapter 1.3). The aim of the study has only been to provide a baseline of settlement (Chapter 1.5). It has not been to unify this material, the effort required being of a scale similar to another study of this size. However, it is possible to suggest a tentative model for how this information may be explained which, while possibly in error, does demonstrate how Britain's archaeological record may be explained within a single social model. It is able to do so by; commenting to what extent the thesis results support existing models of a competitive violent social stratified period; highlighting from the results above which events are synchronous with the changes in settlement in Bronze Age Britain and then concluding with a model that might explain these and unify these results.

8.3.2.1.1 Are models of complex social stratification and violent competition supported by the settlement record?

There have been suggestions that the Late Bronze Age is a period of social complexity (Kristiansen & Larsson 2005; Needham 2009), the region being part of a continental trade network (Radivojević, Roberts, Pernicka, *et al.* 2019; Needham 2009; Kristiansen & Larsson 2005) through which control of metal and the knowledge to shape it maintained power. The settlement record provides limited evidence for such social stratification in the martialling of power to construct those ringworks (Jones & Bond 1980; Manby 1978; Brown & Medlycott 2013; Guttmann, Last, Gale, *et al.* 2000) and the limited number of Late Bronze Age hillforts (Bradley & Ellison 1975; Hamilton & Manley 2001) which may indicate the large scale investment of time and resource. Instead, it is possible to argue the settlement record represents for a more simple social system.

In general settlements have a low number of renovation phases and there is evidence that many settlements had limited lifespans (Davies 2016) (Chapter 8.2.2.1). This may suggest settlements were established not to control land or territory but for the immediate needs of their occupants. This may also suggest the period was not one in which the dynastic control of a region or its resources was a priority. Furthermore, it is notable that manufacture occurs at many different sites (c. 1 in 10) and is seen across the country (Chapter 7.4.3). This would suggest, far from the knowledge or control of metalworking being negotiated by a series of elite communities, that this information was readily known and widely distributed. Combined this would suggest there was not fierce competition for space until after the Bronze Age. If hierarchical organisation existed, the settlement record in this thesis suggests it was weak and not clearly expressed in everyday settlement form.

It has also been suggested the Later Bronze Age is characterised as a more competitive period, both in ritual personal aggrandisement, and in violent warfare (Needham & Bowman 2005; Treherne 1995). Linked to these discussions has been the suggestion of the rising defensive character of Bronze Age settlements particularly in the East of England. In understanding the possible benefits of this new form of habitation it is necessary to critically assess the activities occurring within these settlements and the means by which these settlements were established.

Once again those ringworks in the east of England (Jones & Bond 1980; Manby 1978; Brown & Medlycott 2013; Guttmann, Last, Gale, *et al.* 2000) and the limited number of hillforts dated to the Bronze Age (Bradley & Ellison 1975; Hamilton & Manley 2001) may support that the period was a competitive one requiring the construction of defences. Yet the evidence from the high-resolution dataset has found the number of sites with these are in the minority (Chapter 7.4.1). Instead the evidence for enclosure suggests that what competition there was for land was not so intense as to provoke large scale or frequent violence.

It may be argued that the association of burials with settlements sites indicates competition, as it may suggest a need to justify the occupants' tenure of the land.

Such a placement has often been seen as a way of legitimising a long-held claim to a region, and the placing of new settlements might be seen in such a light. Yet, it is then notable that little investment can be seen in continuing to legitimise this right, for instance by continuing to place burials in and around the settlement, following the establishment of a settlement site. As such the benefits of founding permanent settlements had to be slight or even temporary, and possibly only related to their founders, otherwise it would be expected that sites would increase in size over time (Chapter 7.1.2).

I would instead suggest that the nature of habitation evidence suggests that most settlements were placed for the benefit of their immediate inhabitants and that there was little consideration/requirement/planning given to their long-term maintenance of these sites. It seems unlikely that these reasons were based around any form of expressed complex social hierarchy or increased social completion. If the interpretation of settlements is left here then the fundamental issue behind Problem Statement 2, remains unresolved, indeed the settlement record emphasises the disjunction between the available strands of evidence. Yet it *is* possible to indicate a direction of study that may contribute to its progress. To do so it is necessary to first re-iterate the synchronicity seen in this study with other forms of archaeological evidence.

8.3.2.1.2 Synchronicity in Bronze Age events

In attempting to understand the transitions in the Bronze Age it is notable which events do and don't appear to be synchronous with the diachronic model produced in Chapter 5. This has demonstrated a rise in settlement structures placed around

1700 cal BC which is likel to represent an acceleration of settlement trends in the Early Bronze Age. This is not linked to a change in demography (Chapter 8.3.1.5) nor is it related to a climatic event (Chapter 8.3.1.4), and possibly not population size (Chapter 8.3.1.7). Similarly I have argued against the development of permenant settlements being response to increased violent completion (Chapter 8.3.2.1.1). Yet the inverse relationship between burial and settlement numbers (Chapter 8.5.2.1) may suggest that there was a need to justify the founding of a settlement at a particular location. It should be emphasised however, that there does not appear to be a need to reinforce this right throughout the duration of a settlement's life (Chapter 7.4.4).

While change in settlement numbers is potentially linked to a change in food consumption (Chapter 8.3.1.3), this transition is debated (Bishop 2015). The clearest connection with the diachronic model then is the suggested exploitation of the Great Orme mine (Chapter 8.3.1.2). This has been suggested as following a similar boom bust cycle to that seen in settlements. This thesis has suggested that metalworking is found on a large proportion of sites and that their number increases over time (Chapter 7.4.3). Qualitatively these sites with metalworking evidence may have a larger number of structures than average. In unifying the Bronze Age archaeological record it seems appropriate then to combine metalwork and furthermore tempting to link the production of metalwork with settlements to understand their rise and fall.

8.3.2.1.3 What if the (later) Bronze Age really is all about Bronze?

If following the temptation to link the production of metalwork with settlements to understand their rise and fall it is possible to suggest the reasons behind this which may help unify the Bronze Age archaeological record in Britain. For instance, it might be suggested that those sites with larger numbers of structures grew because they were centres of manufacturing, particularly metals. If this is accepted it might also be suggested that settlements were built because of metalworking. This supposition is alluring as it can explain why permanent structures begin to increasingly appear. Perhaps, for instance, the increasing number of settlements represent the founding of workshops, many of which were for metal production, with other settlements then formed to exploit a growing industry around these. The reason these structures needed to be more developed and stable than those in the Early Bronze Age then might either be explained by their occupant's wealth from trade, or (in my view as is more likely) it may have been a necessity for their success. Specifically, a permanent stable location most easily facilitates the trade of product by removing the uncertainty of whether a specialist producer might be located or contactable. If needing to be more stable for this latter reason the relationship between burials and settlement (Chapter 7.4.4 and 8.3.1.6) might be understood as representing a means to secure what might be a risky venture in the time and labour of setting up a permanent settlement/workshop.

If these settlements were workshops it would explain why locations close to major rivers and the coast were prioritised (Chapter 6.4.2) rather than highly fertile soils (Chapter 6.4.3). It can be suggested in this instance that for workshops to be successful they needed to be accessible by customers, while their food production only needed to meet their occupants' requirements, defined by their success in trading, rather than providing a surplus if being the primary source of food security. This suitably accepts then that long distance trade networks existed (Rowlands 1976; Needham 2009; Radivojević, Roberts, Pernicka, *et al.* 2019), in fact it would require it, but I would argue that these do not require complex social hierarchies within Britain for their control or maintenance (Kristiansen & Larsson 2005) for which the settlement record only provides limited evidence (8.3.2.1.1).

It is important to state that not all settlements need to produce metalwork for this model to succeed. Instead many may have specialised in other materials such as pottery, which may be supported by Ellison's assertion of regional distribution centres of forms of Middle Bronze Age pottery (Ellison 1975, 1980b), or in food production. However, within this schema metal workshops may be the significant core of this economy with those other industries thriving because of it. It suggests this due to the collapse in settlements being synchronous with the collapse in production at the Great Orme. It may be that this collapse is linked either to new copper resources entering Britain (Williams & Veslud 2019) from the continent or due to a short term disruption between the supply of this replacement metal and the Great Orme no longer being exploited. This disruption would be felt by those workshops founded to exploit this economy such that the decline in settlements at this time would be expected, followed by a recovery once those new continental sources of metal had been secured.

The model also has value in that it solves many of the issues highlighted for the Later Bronze Age. It allows the existence of smaller settlements, their being workshops that only survived for one or two generations and then were abandoned with the loss of skills following their inhabitants' death. It also might explain larger settlements which represent site highly successful sites able to retain their specialist knowledge by passing this information down the generations. It allows for local agency and variation as within this schema certain areas may have been more successful than others, or developed rivalries at a local scale such that evidence for weaponry (Davis 2012; Brown, Davis, Hatton, *et al.* 2016; Colquhoun & Burgess 1988; Uckelmann 2012) and defences (Bradley & Ellison 1975; Allen, Hayden, Lamdin-Whymark, *et al.* 2009; Brown & Medlycott 2013; Manby 1978) need not be seen as mutually exclusive but instead part of regionally complex, not continentally complex (Kristiansen & Larsson 2005), social systems. Crucially this suggested model *is* possible to refute through testing. It relies on the principle that a choice to stay in more permanent settlements related to production, and that some of these settlements became larger if more successful. As such, the identification of particularly large settlements without any evidence for manufacturing (notably of metal, ceramic or agricultural surplus) would disprove it.

8.3.2.1.4 Finding a place to call home or setting up shop in the Bronze Age?

To summarise, I would tentatively suggest that the rise in settlement may in fact represent the rise in setting up small scale production centres in response to the possible wealth attainable through producing a new disruptive resource, namely Bronze. It should be stressed this is only a tentative suggestion of a model or a suitable direction of study in understanding the societies of the Later Bronze Age in Britain. More research beyond the scope of this thesis is required to integrate the strands of evidence now available, similarly further work would need to be done to assess the economic credibility of such a model, particularly recognising the fact that it appears large quantities of metal were recycled (Wiseman 2018). However, it is hoped by providing such a schema the study is at least able to provide a straw man that may be argued against whilst also demonstrating how settlements can form a lens with which to understand the Bronze Age. In doing so it is hoped that the thesis has made one step toward progressing Problem Statement 2.

8.4 Discussion on big data: The wider significance of the thesis' method and results

The thesis' research has demonstrably helped progress Problem Statement 3, while this chapter has demonstrated its significance to our understanding of the Bronze Age in Britain by progressing Problem Statements 1 and 2. It has reached its findings through a study of a very large dataset and through integrating other existing datasets into its discussion. Some of the most surprising findings have been a result of combining the thesis database with existing datasets of burials and metalworking. The opportunities to conduct future such analyses are increasing as the method employed by this study place it as part of a broader research context in British and European archaeology that has focussed on the collection and analysis of large quantities of data in order to further understanding of the past. It is therefore appropriate to discuss the significance of this thesis within this wider context.

8.4.1 Data collation method

The analyses within this thesis have only been made possible due to the increasing availability of data resulting from the boom in archaeological discovery since the early 1990s. To this end I would highlight the length and detail of Chapter 3 which has shown how its primary database was developed and the reasons for specific design choices made. It has discussed the initial aims of data collection at the project's outset, how this data was collected, and how the information gained necessitated a pivot in its data collection strategy. It then detailed how this dataset has been supplemented by existing databases before concluding with how information reviewed on each site was recorded. This is a somewhat lengthier chapter than comparable sections within similar data rich studies on Bronze Age material in north western Europe (Davies 2016; Heise 2016; Sites 2015; Smith 2013; Walsh 2013; Ginn 2016; Dunkin 2012; Pope 2003; Brück 1997; but see Lawrence 2012 for a non-European study which has such detail). These typically list the data identification strategy, often in less than one paragraph and then present a metadata table of the information recorded in a supplemental appendix. Some even avoid this entirely. To include such specific information in this thesis has been an explicit decision, the reason for which will now be discussed.

In Britain there are only a limited number of big data studies of solely Bronze Age material (Stevens & Fuller 2012; Olalde, Brace, Allentoft, *et al.* 2018). These have identified several large transitions occurring during the Bronze Age that require contextualisation with the known archaeological record. Yet, while such summaries exist for field systems (Yates 2007), certain forms of burials (Caswell & Roberts

2018), and categories of material culture (e.g. Needham, Davis, Gwilt, *et al.* 2015), no such synthesis has ever been produced for Bronze Age settlements. By providing a complementary settlement study, the results of these analyses may be combined and their results fully contextualised. Such synthetic works are vital if an understanding of the Bronze Age is to be reached.

Data collection evolves over the course of a research project. This is not uncommon, yet it is rare for this to be noticed or brought to the attention of readers within the publications of large data projects, presumably due to the pressure of presenting a facade that the project that occurred was the one that had been planned from the outset. However, these pivots in strategy inevitably affect statistics and the nature of the study, and has certainly done so here. By making these biases explicit it is intended that a critical reading of the thesis' study is enabled and possible, while a guide is also laid out to some of the issues likely to affect any similar research in future.

There is a now a growing trend in the study of big data (Olalde, Brace, Allentoft, *et al.* 2018; Allen, Brindle, Smith, *et al.* 2015; Bradbury, Davies, Jay, *et al.* 2016; Green, Gosden, Cooper, *et al.* 2017; Koch & Cunliffe 2016; Bevan, Colledge, Fuller, *et al.* 2017) although the literature review has showed how this has yet to be reflected in British Bronze Age studies. These have encountered similar issues to those stated above, and in order to share their experience with the wider community they have, on occasion, published their solutions to these issues to allow swifter analysis in future (Bradbury, Davies, Jay, *et al.* 2016; Green, Gosden, Cooper, *et al.* 2017; Crema, Bevan & Shennan 2017). This study follows this example and hopes that by making another solution to the use of legacy heritage datasets clear it will allow the method to be borrowed, criticised or adapted in future projects.

8.4.2 Why is this important?

In early studies of any archaeological phenomena, it is not uncommon to find distribution maps, purporting to represent the entirety of a particular material (e.g. Calkin 1962). In the past, these studies were possible within a reasonable amount of time, the existing literature being limited and well known. However, since the 1960s the quantity of remains to be documented in such scholarship has increased substantially. The reasons for this are likely to be connected to a dramatic increase in the quantity of archaeological research conducted through commercially funded excavation since this time (Darvill & Russell 2002). Similarly, never before has information been so readily available to so many individuals through the internet, for example in England the majority of Historic Environment Records are now searchable via www.heritagegateway.com, Scotland via www.canmore.co.uk, and Wales via www.archwilio.co.uk. The quantity of objects now recorded and made openly available via the Portable Antiquities scheme dwarfs the assemblages studying such material. A case in point is Rowlands (1976) review of Middle Bronze Age hoards in southern Britain. This recorded 176 hoards across southern Britain, recorded since the inception of the discipline (c. 376 years), a number now outpaced by the PAS database which has recorded over 250 Bronze Age hoards in under 20 years. Yet this quantity of evidence now requires even greater time and investment to collect, organise, analyse and synthesise. This makes it vital that any study is able to build upon earlier syntheses if meaningful progress is to be made in archaeological understanding.

This author's reading has found it very common for the data made available in publications to be formatted in such a way as to, presumably unintentionally, hamper easy re-use, with data at best provided as a gazetteer of sites with a bibliography (e.g. Ginn 2016; Davies 2016). It is therefore clear that future research is greatly limited and hindered when data is not made available or is not easily accessible for academic research, and where no discussions have been made about the limitations of datasets produced. It should be recognised that these are key issues that need addressing if archaeological research is to be re-evaluated and re-used and will become a necessity as the size of the archaeological record continues to grow. Maybe it is because of this data's inaccessibility that these types of studies appear to be falling out of fashion within archaeological studies of the British Bronze Age, despite their widely acknowledged value (see Chapter 3 or (see Chapter 3 or Wilkin 2013 p.23). If so, it highlights the necessity for all projects to increasingly emphasise the origins of their data, as this thesis has sought to. To this end, the thesis' data and its creation have been made as transparent as possible.

Regardless of data availability, it is worth highlighting that one of the primary issues this project has faced was the lack of a single gazetteer of the subject material. This makes the asking of apparently simple questions, such as "how many Bronze Age roundhouses are there in Britain?", or "which settlements are placed near burials?" impossible to answer without time consuming data collection and reorganisation to tackle such queries. This thesis is only able to do so using the results of this study's research and that of a multi-year research project studying Middle Bronze Age cremation burials which similarly gathered thousands of data points. It has been found that making a gazetteer from these experiences is a matter of years of work for an individual researcher and is likely to be so for almost any similar phenomenon to be investigated in archaeology. Such catalogues have yet to be created for major phenomena such as cairns, burnt mounds, hoards, field systems and burials from across the whole of Britain, and it is therefore clear from this research project that to do so would take a very large investment of time. In contrast, in the last three decades such catalogues have existed for Ireland (O'Brien & O'Driscoll 2017; Hawkes 2018). Comparisons between these would be highly valuable to understanding this period of time, yet it seems increasingly likely that creating such gazetteers will become impossible to fund due to the length of time required for the process. This understood, it is only HERs that have the resources, longevity and institutional power to maintain such lists. These datasets do have issues highlighted in Chapter 3, but unlike almost any other gazetteer in Britain they also form a primary consistent record of ideally all heritage sites known to that region. As a result, they have the potential to provide gazetteers for almost any phenomenon. Despite this, these resources have recently been the focus of numerous cuts and their use seems to be primarily for commercially funded desktop reviews (Cooper & Green 2016 p.277). It is therefore vital to recognise and demonstrate their importance so that these datasets can effectively, systematically and routinely be utilised. It is hoped this thesis goes a small way to demonstrate the value of these records and the need to utilise and enhance them further.

8.5 Future work

The model presented above admits to being incomplete and requiring further investigation. Similarly, the nature of the dataset gathered is such that far more analyses can be conducted in future with little alteration to the core information and its structuring. The study has purposefully been concise in its analysis, primarily presenting the observable facts of the data that present the greatest value to understanding Bronze Age settlements. While further analyses may be made of the database in future, it is possible to make several recommendations from those results presented above that may prove particularly productive for further research.

8.5.1 8.5.1 Filling in the blanks

8.5.1.1 Study of all excavated Bronze Age structures

It has been recognised throughout the thesis that the data selected only represents those radiocarbon dated Bronze Age settlement sites. While this is for several strong reasons articulated in Chapter 3, it has meant that many of the analyses rely on simple observations of presence or absence. It is still not quite possible to state how many Bronze Age structures are known in Britain, although the number of sites has been estimated! As such future work combining all available information on those excavated Bronze Age structures would be of value not just in re-contextualising the results of this study but also in their integration with complementary datasets.

8.5.1.2 Study of all those understudied Bronze Age structures in regions such as Dartmoor/establishing the representative nature of the data

The thesis has been able to indicate the presence of bias in those sites chosen, whether intentionally or through selection bias for excavation, such as through developer led programs. It is very probable that sites typically in areas with a lower density of modern development activity, such as those in the uplands of Britain are underrepresented in any analysis. As such, further excavations and/or a considerable radiocarbon dating program of these regions that may indicate their temporal spread would be of considerable value.

8.5.2 Summed radiocarbon dates

It is notable that the diachronic model proposed by the radiocarbon dating associated with Bronze Age settlements is different when looking at settlements dated through material culture. Similarly, the model presented differs from Bevan et al.'s (2017) although it shows remarkable consistency with the research by Ginn (2012) and Stevens and Fuller (2012 – who are co-authors on Bevan et al. 2017). While I would suggest that the diachronic model reliant on radiocarbon dates is likely to be more accurate than the relative chronology-based model, it cannot confirm this. It has suggested that the discrepancy between Bevan et al. (2017) and this thesis' model may be in the differing subject matter radiocarbon dated. Short of radiocarbon dating every settlement to ever be studied, a new solution may need to be developed. One solution may be to key all available Bronze Age radiocarbon dates in relationship to their primary archaeological features, the quantities of which can be known, such as settlements, burials and specific forms of material culture. The relative ratios of these dates to the known material found could then be estimated with any cumulative frequency distributions altered to reflect what proportion of the total assemblage they date are represented. Doing so may be able to produce a more accurate temporal model for the relative intensities of Bronze Age phenomena.

8.5.2 Contextualising the data further - Using new datasets

8.5.2.1 Burials

This study has been able to provisionally identify interesting relationships between burials and settlements. One phenomenon decreases while the other increases; one phenomenon appears to locate itself near the existing sites of the other. The extent of these relationships, and so the extent of the relationships between the living and the dead in Bronze Age Britain are still unknown. While a comprehensive dataset of Middle Bronze Age burials exists for Britain (Caswell and Roberts 2018), further work synthesising those Early and Late Bronze Age burials is likely to provide further means to assess to what extent these phenomena interacted.

8.5.2.2 Sites – barrows, field systems, burnt mounds

The thesis has identified site specific local factors, possibly within only one hour's walk, may have provided some of the decisive factors for the location selection of Bronze Age settlements. Further research of these environs would therefore be of value in understanding the priorities of those choosing to live in permanent domestic structures. One such analysis, omitted from the study due to the processing time requirements, would be an assessment of how hidden Bronze Age settlements were in the landscape. A methodology now exists for such an analysis

(Gillings 2015a, 2015b, 2017), which could be applied to the entire dataset in order to assess whether these sites were defended in way other than structural fortification.

8.5.2.3 Metalwork

The provisional finding that up to one in tem settlements may have been used as sites for metalworking was surprising and warrants further investigation. A fuller investigation of each site's evidence for metalworking, the nature of this practice and the duration of that settlement would help inform on the validity of the model proposed above. Similarly, the comparison of the location of hoards has seen some investigation (Yates & Bradley 2010a, 2010b). If a full list of such sites could be complied the locations of these could be more thoroughly compared to the location of settlements and metalwork in watery deposits.

8.5.3 8.5.3 Macro study

This thesis has provided a national, rather than regional, overview. Within regional summaries are frequent mentions of the placing of settlement on the edge of landscape zones – whether wetlands (Huisman 2018), or uplands and lowlands (Pope 2015). An analysis of these data combining both the national and regional overviews is likely to further elucidate the choices made in settlement placement.

8.5.4 8.5.4 Dartmoor

Within the study's data collection phases an incredibly large number of stone-walled settlement have been identified. Similar numbers of stonewalled structures found on Dartmoor are also found in the uplands of Scotland and Wales. By necessity, the study of Dartmoor had to group those structures based on a crude proximity model. It would be of value to group these based on their immediate environs in order to better understand the distribution and dispersal of Bronze Age settlements sites. Although such work would admittedly require a large radiocarbon dating program to assess these sites temporal location.

8.5.5 8.5.5 Looking beyond Britain

This thesis has been able to conduct a limited review of those settlements seen in north western Europe. These have identified many similarities between Britain and north western Europe, with particularly close affinities to Ireland. A wider analysis combining the large number of surveys of settlement material from north western Europe and central Europe may help further elucidate the dynamic between these regions.

8.6 Conclusion

The thesis' primary aim was to evaluate the characteristics, tempo, location and roles of Bronze Age settlements in England, Scotland and Wales between c. 2400-800 cal BC . To do so it has provided a nationally consistent analysis of the variety of Bronze Age structures (Objective 2), the changes in its intensity (Objective 3), the locations they are found (Objective 4) and the activities that occurred within these (DT 1-3). At its outset this study set out with an ambitious goal. It aimed to understand Bronze Age settlement spaces and to do so by contextualising these sites within their immediate environs. The reality of the available heritage data required a pivot in this study to focus far more on the settlements themselves. Yet by doing so, the results of the study have produced a compelling, evidence-based and data driven national baseline of Bronze Age settlements. In order to accomplish this aim a bespoke database had to be designed and filled that recorded Bronze Age settlement sites in England, Scotland and Wales whose occupation has been radiocarbon dated (Objective 1). This work has been completed and comprises several datasets. These are: a gazetteer of 19523 possible Bronze Age settlement sites, reduced from over 22,000 records, known to almost all major heritage bodies in England, Scotland and Wales; a gazetteer of 6975 potential Bronze Age settlement sites within which 1488 sites have been identified as being excavated; and a final high resolution dataset of 1085 Bronze Age structures from 316 excavated Bronze Age settlement sites with at least one radiocarbon date. These datasets have allowed relatively simple – yet very much previously unanswered - research questions to be addressed.

This demonstrated that the dominant form of architecture is the roundhouse (RQ 1.1), although this takes many forms across the entirety of Britain. It also identified a boom in the appearance of permanent settlement structures at 1700 cal BC, followed by a sharp decrease in settlement numbers several hundred years later, followed then by a slight recovery. This chapter has suggested one potential for model for this change but recognises that further integration with this dataset and contemporary archaeological phenomenon is required within future research. It also found that the majority of Britain was inhabited during the Bronze Age, regardless of terrain or geology. It suggested that sites appear to have preferred locations closer to major rivers and the coast. It has discussed how settlements were often short-lived and that over half of these sites contained less than three structures. It has also been able to discuss the features, namely enclosures, evidence for metalworking and burials, associated with Bronze Age settlements and, by doing so, proposed that there are few signs of extensive social stratification.

In each of these instances, this chapter has discussed how these findings enhance our understanding of the Bronze Age. However, it has also consistently identified how further research is now possible using this dataset and discussed further avenues of research that the I believe would be valuable for our understanding of the Bronze Age.

Chapter 7 and 8 of this thesis in particular has emphasised the power of integrating the newly assembled baseline of Bronze Age settlements with other datasets, while this chapter has emphasised the value in such big data studies. I would like to conclude this study with the following observation. For the last three decades, the size of the archaeological record has increased exponentially and continues to expand year on year. It may be that these new data present complementary information to that already known, or it may reveal entirely hitherto unknown observations of the past. However, the scale of data now available does present a challenge, in that it requires a similarly large amount of time and effort to collect, organise, analyse and synthesise. Our ability to detect trends in this new archaeological data, both disruptive and benign, therefore becomes ever harder and more time consuming as the assemblage of archaeological grey literature continues to grow.

It is hoped that this thesis has demonstrated the value of such efforts both in its primary analysis and in combining its database with those of other projects. Similarly it has argued and attempted to demonstrate that this form of analysis is and will increasingly become more and more fundamental to the present and future of archaeological scholarship in Britain and beyond. Without such research, observations made decades ago about a small number of sites can be perpetuated with new sites simply being subject to pre-existing theories. Yet, as is recognised above, such analyses take time and will only take longer. It is my opinion then that, within Britain, the only solution to enabling such “big data” analyses and so forward our understanding of the past will to develop a coherent national strategy for the structure, management, maintenance and updating of heritage databases which is suitably supported both financially and by the research sector.

Appendices

9.1 Appendix 1 The database

Bibliography

Abercromby, J. (1912) *A study of the Bronze Age pottery of Great Britain & Ireland and its associated grave-goods.*

Adams, M. (2009) *An Archaeological Evaluation at St. Mary's Marina, Rufford, Lancashire. Final Report NGR SD 464153.* Unpublished report National Museums Liverpool.

Adams, S., Webley, L. and Brück, J. (2017) *The Social Context of Technology: non-ferrous metalworking in later prehistoric Britain and Ireland* [Online]. Available at: doi:10.5284/1046749 (Accessed: 28 February 2019).

Aitchison, K. (2015) Professional archaeology in the UK in 2015. *Cultural Trends* 24 (1), 11–14.

Alexander, D. (2000) Excavation of Neolithic pits, later prehistoric structures and a Roman temporary camp along the line of the A96 Kintore and Blackburn Bypass, Aberdeenshire. *Proceedings of the Society of Antiquaries of Scotland* 130, 11–75.

Algao (2019) *Regional Research Frameworks | ALGAO*. [Online]. 2019. Available at: https://www.algao.org.uk/england/research_frameworks (Accessed: 26 November 2019).

Allen, M., Brindle, T., Smith, A., Richards, J.D., Evans, T., Holbrook, N., Fulford, M., Blick, N. (2015) *The Rural Settlement of Roman Britain: an online resource* [Online]. Available at: doi:10.5284/1030449 (Accessed: 27 February 2019).

Allen, M.J., Gardiner, J., and Sheridan, A. (2012) *Is there a British Chalcolithic? people, place and polity in the later 3rd millennium*. Prehistoric Society research papers no. 4. Oxford, Oxbow.

Allen, T.G., Hayden, C., Lamdin-Whymark, H. and Ainslie, R. (2009) *From Bronze Age enclosure to Saxon settlement: archaeological excavations at Taplow Hillfort, Buckinghamshire, 1999-2005*. Thames Valley landscapes monograph no. 30. Oxford, Oxford Archaeology.

Amesbury, M.J., Charman, D.J., Fyfe, R.M., Langdon, P.G., and West, S. (2008) Bronze Age upland settlement decline in southwest England: testing the climate change hypothesis. *Journal of Archaeological Science* 35 (1), 87–98.

Anderson, D.E. (1998) A reconstruction of Holocene climatic changes from peat bogs in north-west Scotland. *Boreas* 27 (3), 208–224.

Andrews, P. (2006) A Middle to Late Bronze Age Settlement at Dunch Hill, Tidworth. *Wiltshire Archaeological and Natural History Magazine* 99, 51–78.

Anon (2019) *Council for British Archaeology | Cuts to archaeology services*. [Online]. 2019. Available at: http://new.archaeologyuk.org/cuts-to-archaeology-services (Accessed: 28 February 2019).

ApSimon, A.M., Greenfield, E., Biek, L., Boon, G.C., Hartley, B.R., Levy, J.F., and Wallis, F.S. (1972) The Excavation of Bronze Age and Iron Age Settlements at Trevisker, St. Eval, Cornwall. *Proceedings of the Prehistoric Society* 38, 302–381.

Arnoldussen, S. (2008) *A living landscape: Bronze Age settlement sites in the Dutch river area (c. 2000-800 BC)*. Leiden, Sidestone Press.

Arnoldussen, S. (2018) The Fields that Outlived the Celts: The Use-histories of Later Prehistoric Field Systems (Celtic Fields or Raatakkers) in the Netherlands. *Proceedings of the Prehistoric Society* 84, 303–327.

Arponen, V.P.J., Dörfler, W., Feeser, I., Grimm, S., Groß, D., Hinz, M., Knitter, D., Müller-Scheeßel, N., Ott, K., and Ribeiro, A. (2019) Environmental determinism and archaeology. Understanding and evaluating determinism in research design. *Archaeological Dialogues* 26 (1), 1–9.

Ashmore, P. (1999) Radiocarbon dating: Avoiding errors by avoiding mixed samples. *Antiquity* 73, 124–130.

Ashmore, P. and Historic Scotland (2016) *Scottish Radiocarbon Database* [Online]. Available at: https://canmore.org.uk/project/919374 (Accessed: 23 August 2016).

Aston, M. and Rowley, T. (1974) *Landscape archaeology: an introduction to fieldwork techniques on post-Roman landscapes*. Newton Abbot, David & Charles.

Avery, M. and Close-Brooks, J. (1970) Shearplace Hill, Sydling St Nicholas, Dorset, House A: a suggested re-interpretation. *Proceedings of the Prehistoric Society* 35, 345–351.

Bailey, D.W. (1999) What is a Tell? Settlement in fifth millenium Bulgaria. In: J Brück and M Goodman (eds.). *Making places in the prehistoric world. Themes in settlement archaeology, London*. Routledge. pp. 178–197.

Bakels, C.C. (2009) *The Western European loess belt: agrarian history, 5300 BC-AD 1000*. Dordrecht, Springer Science & Business Media.

Barber, K.E., Chambers, F.M. and Maddy, D. (2003) Holocene palaeoclimates from peat stratigraphy: macrofossil proxy climate records from three oceanic raised bogs in England and Ireland. *Quaternary Science Reviews* 22 (5), 521–539.

Barber, K.E. and Charman, D.J. (2003) Holocene palaeoclimate records from peatlands. In: A. W. Mackay, R. W. Battarbee, H. J. B. Birks, and F. Oldfield (eds.). *Global Change in the Holocene*. London, Arnold. pp. 210–226.

Barber, M. (2003) *Bronze and the Bronze Age: metalwork and society in Britain c.2500-800 BC*. Stroud, Tempus.

Barcham, R. (1978) A lost radiocarbon date for Shetland. *Proceedings of the Society of Antiquaries of Scotland* 110, 502–506.

Barclay, A., Glass, H. and Parry, C. (1995) Excavations of Neolithic and Bronze Age ring-ditches, Shorncote Quarry, Somerford Keynes, Gloucestershire. *Transactions of the Bristol and Gloucestershire Archaeological Society* 113, 21–60.

Barrett, J.C. (1980) The Pottery of the Later Bronze Age in Lowland England. *Proceedings of the Prehistoric Society* 462, 97–319.

Barrett, J.C. (1990) The monumentality of death: the character of Early Bronze Age mortuary mounds in southern Britain. *World archaeology* 22 (2), 179–189.

Barrett, J.C. (1994) *Fragments from antiquity: an archaeology of social life in Britain, 2900-1200 BC*. Social archaeology. Oxford, Blackwell.

Barrett, J.C. and Bradley, R. (1980) *Settlement and society in the British later bronze age*. Oxford, British Archaeological Reports British Series 83.

Barrett, J.C., Bradley, R., Bowden, M. and Mead, B. (1983) South Lodge after Pitt Rivers. *Antiquity* 57 (221), 193–204.

Barrett, J.C., Bradley, R. and Green, M. (1991) *Landscape, monuments and society: the prehistory of Cranborne Chase*. Cambridge, Cambridge University Press.

Barrett, J.C., Bradley, R., Green, M. and Lewis, B. (1981) The Earlier Prehistoric Settlement of Cranborne Chase-the First Results of Current Fieldwork. *The Antiquaries Journal* 61 (02), 203–237.

Barrowclough, D. (2008) *Prehistoric Lancashire*. UK ed. edition. Stroud, The History Press.

Bayliss, A., Bronk Ramsey, C., Cook, G., Ladle, L., Meadows, J., Plicht, J.V.D., Scaife, R., and Woodward, A. (2009) Chapter 6: Radiocarbon dating. In: L Ladle and A Woodward (eds.). *Excavations at Bestwall Quarry, Wareham 1992-2005. Volume 1, the prehistoric landscape*. Dorset Natural History and Archaeological Society monograph series. Dorchester, Dorset Natural History & Archaeological Society. pp. 126–153.

Bayliss, A., Bronk Ramsey, C., van der Plicht, J. and Whittle, A. (2007) Bradshaw and Bayes: Towards a Timetable for the Neolithic. *Cambridge Archaeological Journal*. 17 (S1), 1. 1-28,

Bell, M. (1990) *Brean Down excavations 1983-1987*. Archaeological report (English Heritage) no. 15. London, Historic Buildings and Monuments Commission for England.

Bell, M. (2013) *The Bronze Age in the Severn Estuary*. CBA research report 172. York, Council for British Archaeology.

Bender, B., Hamilton, S. and Tilley, C.Y. (2007) *Stone worlds: narrative and reflexivity in landscape archaeology*. Walnut Creek, California, Left Coast Press Inc.

Benson, D.G., Evans, J.G., Williams, G.H., Darvill, T., David, A., Brennan, D., Caseldine, A.E., Cole, R., Dresser, Q., Hyde, L.M., O'Connor, T., and Wilkinson, J.L. (1990) Excavations at Stackpole Warren, Dyfed. *Proceedings of the Prehistoric Society* 56, 179–245.

Bersu, G. (1940) Excavations at Little Woodbury, Wiltshire. *Proceedings of the Prehistoric Society* 6, 30–111.

Besse, M. and Desideri, J. (2005) Bell Beaker diversity: settlements, burials and ceramics-LA diversidad CampaniformeL Habitats, Sepulturas y ceramicas'. In: *El Campaniforme en la Península Ibérica y su contexto europeo/Bell Beakers in the Iberian Peninsula in their european context*. Arte y Arqueologia. Valladolid, Universidad de Valladolid. p. 61-106

Best, J. (2014) *Late Bronze Age pottery production: evidence from a 12thto 11th century BC settlement at Tinney's Lane, Sherborne, Dorset*. Dorset Natural History and Archaeological Society monograph series no. 21. Dorchester, Dorset Natural History & Archaeology Society.

Bevan, A., Colledge, S., Fuller, D., Fyfe, R., Shennan, S., and Stevens, C. (2017) Holocene fluctuations in human population demonstrate repeated links to food production and climate. *Proceedings of the National Academy of Sciences* 114 (49), E10524–E10531.

Bewley, R. and Bewley, R. (2003) *Prehistoric settlements*. Stroud, Tempus.

Bintliff, J.L. and Pearce, M. (2011) *The death of archaeological theory?* Oxford, Oxbow Books.

Bishop, R.R. (2015) Did Late Neolithic farming fail or flourish? A Scottish perspective on the evidence for Late Neolithic arable cultivation in the British Isles. *World Archaeology* 47 (5), 834–855.

Blaker, R. (1902) Ancient cultivations. *Sussex Archaeological Collections* 45, 198–203.

Bohannon, R.W. and Williams Andrews, A. (2011) Normal walking speed: a descriptive meta-analysis. *Physiotherapy* 97 (3), 182–189.

Bond, C.J. (2006) *Prehistoric settlement in Somerset: landscapes, material culture and communities 4300 to 700 cal. BC*. Unpublished Ph.D thesis. Southampton, University of Southampton.

Bond, D. (1988) *Excavation at the North Ring, Mucking, Esssex: a late bronze age enclosure*. East Anglian archaeology report. Chelmsford, Archaeology Section, Essex County Council.

Bourdieu, P. and Figuier, R. (2015) *Esquisse d'une théorie de la pratique : Précédé de Trois études d'ethnologie kabyle*. Points.

Bourgeois, J. and Talon, M. (2009) From Picardy to Flanders: Transmanche connections in the Bronze Age. In: P Clark (ed.). *Bronze Age Connections: Culture contact in prehistoric Europe,*. Oxford, Oxbow. pp. 38–59.

Bowden, M. and McOmish, D. (1989) Little boxes: more about hillforts. *Scottish Archaeological Review* 6, 12–16.

Boyer, P. (2007) *An Assessment of Archaeological Investigations at Western International Market, London Borough of Hounslow*. [Online]. Pre-Construct Archaeology Ltd (London). Available at: http://archaeologydataservice.ac.uk/archives/view/greylit/details.cfm?id=18318&det=y.

Bradbury, J., Davies, D., Jay, M., Phillip, G., Roberts, C., and Scarre, C. (2016) Making the Dead Visible: Problems and Solutions for "Big" Picture Approaches to the Past, and Dealing with Large "Mortuary" Datasets. *Journal of Archaeological Method and Theory*. 23 (02), 561–591.

Bradley, R. (1970) The Excavation of a Beaker Settlement at Belle Tout, East Sussex, England. *Proceedings of the Prehistoric Society* 36, 312–379.

Bradley, R. (1972) Prehistorians and pastoralists in Neolithic and Bronze Age England. *World Archaeology* 4 (2), 192–204.

Bradley, R. (1978a) Prehistoric Field Systems in Britain and North-West Europe - A Review of Some Recent Work. *World Archaeology* 9 (3), 265–280.

Bradley, R. (1978b) *The prehistoric settlement of Britain*. The Archaeology of Britain. London ; Boston, Routledge & K. Paul.

Bradley, R. (1981) 'Various Styles of Urn'---Cemeteries and Settlement in Southern England Circa 1400-1000 BC. In: Robert Chapman, Ian Kinnes, and Klavs Randsborg (eds.). *The Archaeology of death*. New directions in archaeology. Cambridge, Cambridge University Press. pp. 93–104.

Bradley, R. (1984) *The social foundations of prehistoric Britain: themes and variations in the archaeology of power*. Longman archaeology series. London, Longman.

Bradley, R. (2000) *An archaeology of natural places*. London, Routledge.

Bradley, R. (2007) *The prehistory of Britain and Ireland*. Cambridge world archaeology. Cambridge, Cambridge University Press.

Bradley, R. (2019) *The prehistory of Britain and Ireland*. Cambridge world archaeology. Second edition. Cambridge, Cambridge University Press.

Bradley, R. and Ellison, A. (1975) *Rams Hill: a Bronze Age defended enclosure and its landscape*. British archaeological reports 19. Oxford, British Archaeological Reports.

Bradley, R., Haselgrove, C., Vander Linden, M. and Webley, L. (2016) *The later prehistory of North-West Europe: the evidence of development-led fieldwork*. Oxford, Oxford University Press.

Bradley, R., Lobb, S., Richards, J. and Robinson, M. (1980) Two Late Bronze Age Settlements on the Kennet Gravels: Excavations at Aldermaston Wharf and Knight's Farm, Burghfield, Berkshire. *Proceedings of the Prehistoric Society* 46, 217–295.

Bradley, R. and Nimura, C. (2016) *The use and reuse of stone circles: fieldwork at five Scottish monuments and its implications*. Oxford, Oxbow Books.

Brandherm, D. (2019) Almost lost between the lines: The concept of the Atlantic Bronze Age. In: Dirk Brandherm (ed.). *Aspects of the Bronze Age in the Atlantic Archipelago and Beyond: Proceedings from the Belfast Bronze Age Forum, 9–10 November 2013*. Archæologia Atlantica. Hagen, Curach Bhán Publications. pp. 1–15.

Brennand, M., Chitty, G. and Newman, R. (2007) *Chapter 8: North West Archaeological Research Framework Research Strategy,* [Online]. Available at: http://www.liverpoolmuseums.org.uk/mol/archaeology/arf/vol2/research_agendas/chp8_research_strategy.pdf.

Bristow, P.H.W. (1998) *Attitudes to Disposal of the Dead in Southern Britain 3500BC - AD43*. Oxford, British Archaeological Reports British Series 274.

Bristow, P.H.W. (2001) Behaviour and belief in mortuary ritual: attitudes to the disposal of the dead in southern Britain 3500bc-AD43. *Internet Archaeology*. [Online] (11). Available at: doi:10.11141/ia.11.1 (Accessed: 17 August 2016).

Britnell, W., Darvill, T.C., Dresser, P.Q., Ehrenberg, M.R., Healey, E., Hillman, G., Keeley, H.C.M., Morgan, G.C., Northover, J.P., and Wilkinson, J.L. (1982) The Excavation of Two Round Barrows at Trelystan, Powys. *Proceedings of the Prehistoric Society* 48, 133–201.

Brossler, A. (2001) 12 Reading Business Park: the results of phases 1 and 2. In: J Brück (ed.). *Bronze Age landscapes: tradition and transformation*. Oxford, Oxbow. pp. 12–138.

Brossler, A. and Allen, L. (2013) *Prehistoric settlement in the lower Kennet Valley: excavations at Green Park (Reading Business Park) phase 3 and Moores Farm,* *Burghfield, Berkshire*. Thames Valley landscapes monograph. Oxford, Oxford Archaeology.

Brossler, A., Early, R., Allen, C.S.M. and Barclay, A. (2004) *Green Park (Reading Business Park): phase 2 excavations 1995: Neolithic and Bronze Age sites*. Thames Valley landscapes monograph no. 19. Oxford, Oxford Archaeology.

Brown, A.G., Davis, S.R., Hatton, J., O'Brien, C., Reilly, F., Taylor, K., Emer Dennehy, K., O'Donnell, L., Bermingham, N., Mighall, T., Timpany, S., Tetlow, E., Wheeler, J., and Wynne, S. (2016) The Environmental Context and Function of Burnt-Mounds: New Studies of Irish Fulachtaí Fiadh. *Proceedings of the Prehistoric Society* 82, 259–290.

Brown, N. (1988) A Late Bronze Age Enclosure at Lofts Farm, Essex. *Proceedings of the Prehistoric Society* 54, 249–302.

Brown, N. and Medlycott, M. (2013) *The Neolithic and Bronze Age Enclosures at Springfield Lyons, Essex: Excavations 1981–1991*. East Anglian Archaeology.

Brown, T. (2008) The Bronze Age climate and environment of Britain. *Bronze Age Review*. 17–22.

Brück, J. (1995) A place for the dead: the role of human remains in Late Bronze Age Britain. *Proceedings of the Prehistoric Society* 61, 245–277.

Brück, J. (1997) *The early-middle bronze age transition in Wessex, Sussex and the Thames Valley.* Unpublished Ph.D. thesis, Cambridge, University of Cambridge.

Brück, J. (1999a) Houses, Lifecycles and Deposition on Middle Bronze Age Settlements in Southern England. *Proceedings of the Prehistoric Society* 65, 145–166.

Brück, J. (1999b) What's in a settlement? Domestic practice and residential mobility in Early Bronze Age southern England. In: J Brück and M Goodman (eds.). *Making places in the prehistoric world. Themes in settlement archaeology,* London, Routledge. pp. 52–75.

Brück, J. (2000) Settlement, Landscape and Social Identity: The Early-Middle Bronze Age Transition in Wessex, Sussex and the Thames Valley. *Oxford Journal of Archaeology* 19 (3), 273–300.

Brück, J. (2001a) 14 Body metaphors and technologies of transformation in the English Middle and Late Bronze Age. In: J Brück (ed.). *Bronze Age landscapes: tradition and transformation*. Oxford, Oxbow. pp. 149–160.

Brück, J. (2001b) *Bronze age landscapes: tradition and transformation*. Oxford, Oxbow.

Brück, J. (2006) Fragmentation, Personhood and the Social Construction of Technology in Middle and Late Bronze Age Britain. *Cambridge Archaeological Journal* 16 (03), 297–315.

Brück, J. (2007) The character of Late Bronze Age settlement in southern Britain. In: C Haselgrove and R Pope (eds.). *The earlier Iron Age in Britain and the near continent*. Oxford, Oxbow. pp. 24–38.

Brück, J. (2012) What's in a settlement? Domestic practice and residential mobility in Early Bronze Age southern England. In: J Brück, and M Goodman (eds.). *Making Places in the Prehistoric World: Themes in Settlement Archaeology*. Routledge. pp. 52–75.

Brück, J. and Carlin, N. (2012) Searching for the Chalcolithic: continuity and change in the Irish Final Neolithic/Early Bronze. In: Michael J. Allen, Julie Gardiner, and Alison Sheridan (eds.). *Is there a British Chalcolithic? people, place and polity in the later 3rd millennium*. Prehistoric Society research papers. Oxford, Oxbow. pp. 193–210.

Brück, J. and Fokkens, H. (2013) Bronze Age settlements. In: A Harding and H Fokkens (eds.). *The Oxford Handbook of the European Bronze Age.* Oxford, Oxford University Press. pp. 82–101.

Brück, J. and Goodman, M. (1999) *Making places in the prehistoric world: themes in settlement archaeology*. London, UCL Press.

Brudenell, M.J. (2012) *Pots, practice and society : an investigation of pattern and variability in the post-deverel rimbury ceramic tradition of East Anglia*. Unpublished Ph.D thesis. York, University of York.

Brunning, R.A. (2007) *Structural wood in prehistoric England and Wales*. Unpublished Ph.D thesis. Exeter, University of Exeter.

Burgess, C. (1979) The background of early metalworking in Ireland and Britain. In: M Ryan (ed.). *The origins of metallurgy in Atlantic Europe: proceedings of the fifth Atlantic Colloquium, Dublin 1978*. Dublin, Stationery Office pp. 207–214.

Burgess, C. (1980) *The Age of Stonehenge*. History in the landscape series. 1st edition. London, Dent.

Burgess, C.B. (1985) Population, climate and upland settlement. In: D. Spratt and C. Burgess (eds.). *Upland settlement in Britain: The Second Millenium and After*. Oxford, British Archaeological Reports British 143. pp. 195–230.

Burgess, C. (2001) *The Age of Stonehenge*. History in the landscape series. London, Orion Publishing.

Burgess, C. and Gerloff, S. (1981) *The dirks and rapiers of Great Britain and Ireland*. Prähistorische Bronzefunde. Abt. 4 Bd. 7. München, Beck.

Burrow, S. and Williams, S. (2016) *The Wales and Borders radiocarbon database* [Online]. Available at: www.museumwales.ac.uk/en/radiocarbon (Accessed: 23 August 2016).

Burstow, G.P., Holleyman, G.A. and Helbaek, H. (1958) Late Bronze Age Settlement on Itford Hill, Sussex. *Proceedings of the Prehistoric Society* 23, 167–212.

Butcher, S.A. (1978) Excavations at Nornour, Isles of Scilly, 1969–73: the pre-Roman settlement. *Cornish Archaeology*. 17, 29–112.

Butterworth, C.A. (1999) 5. Hayne Lane. In: A.P. Fitzpatrick., C.A. Butterworth. And J. Grove (eds.) *Prehistoric and Roman Sites in East Devon: The A30 Honiton to Exeter Improvement DBFO, 1996-9*. Salisbury, Trust for Wessex Archaeology. pp. 91–129.

Buttimer, A. (1980) Home, Reach, And The Sense of Place. In: Anne Buttimer and David Seamon (eds.). *The human experience of space and place*. London, Croom Helm. pp. 166–187.

Butzer, K.W. (1964) *Environment and archaeology: an introduction to pleistocene geography.* Chicago, Aldine.

Calder, C. (1949) Report on the Excavation of a Neolithic Temple at Stanydale in the Parish of Sandsting, Shetland. *Proceedings of the Society of Antiquaries of Scotland* 84, 185–205.

Calder, C. (1955) Report on the discovery of numerous Stone Age house-sites in Shetland. *Proceedings of the Society of Antiquaries of Scotland* 89, 340–397.

Calkin, J.B. (1962) The Bournemouth area in the Middle and Late Bronze Age, with the 'Deverel-Rimbury'problem reconsidered. *Archaeological journal* 119 (1), 1–91.

Cambridge Archaeological Unit (2006) *Bradley Fen Excavations 2001-2004, Whittlesey, Cambridgeshire. An Archaeological Assessment Report* [Online]. Available at: doi:10.5284/1023607 (Accessed: 2 December 2019)..

Carey, C., Jones, A.M., Allen, M.J. and Juleff, G. (2019) The social organisation of metalworking in southern England during the Beaker period and Bronze Age: absence of evidence or evidence of absence? *Internet Archaeology*. [Online] (52). Available at: doi:10/ggdtr4 (Accessed: 2 December 2019).

Carsten, J. (1997) *The heat of the hearth: the process of kinship in a Malay fishing community*. Oxford studies in social and cultural anthropology. Oxford, Clarendon Press.

Carsten, J. and Hugh-Jones, S. eds. (1995) *About the house: Lévi-Strauss and beyond*. Cambridge, Cambridge University Press.

Carter, S. (1993) Tulloch Wood, Forres, Moray: the survey and dating of a fragment of prehistoric landscape. *Proceedings of the Society of Antiquaries of Scotland* 123, 215–233.

Caseldine, C.J. (1999) Archaeological and environmental change on prehistoric Dartmoor—current understanding and future directions. *Journal of Quaternary Science* 14 (6), 575–583.

Caswell, E.J. (2016) *Expense vs. Effect: an analysis of selected variables that affect the production of cost surfaces*. Poster presented at 22nd Annual Meeting of the EAA.

Caswell, E. and Roberts, B.W. (2018) Reassessing Community Cemeteries: Cremation Burials in Britain during the Middle Bronze Age (c. 1600–1150 cal bc). *Proceedings of the Prehistoric Society* 84. 329-357.

Cavers, G. (2006) Late Bronze and Iron Age Lake Settlement in Scotland and Ireland: The Development of the 'Crannog' in the North and West. *Oxford Journal of Archaeology*25 (4), 389–412.

Chambers, F.M., Barber, K.E., Maddy, D. and Brew, J. (1997) A 5500-year proxy-climate and vegetation record from blanket mire at Talla Moss, Borders, Scotland. *The Holocene* 7 (4), 391–399.

Champion, T. (2009) The Later Bronze Age. In: John Hunter and Ian Ralston (eds.). *The Archaeology of Britain*. 2 edition. London ; New York, Routledge. p.95-112.

Chapman, H. (1996) The Ancient Dwellings of Grimspound and Hound Tor. *Chudleigh: Orchard Publications*. 3–21.

Charman, D.J., Blundell, A., Chiverrell, R.C., Hendon, D., Langdon, P.G. (2006) Compilation of non-annually resolved Holocene proxy climate records: stacked Holocene peatland palaeo-water table reconstructions from northern Britain. *Quaternary Science Reviews* 25 (3), 336–350.

Childe, V.G. (1931) Skara Brae: a 'Stone Age' Village in Orkney. *Antiquity* 5 (17), 47–59.

Childe, V.G. (1940) *Prehistoric communities of the British Isles*. London, Chambers.

Childe, V.G., Bryce, T.H. and Watson, D.M.S. (1931) *Skara Brae: A Pictish Village in Orkney*. Kegan Paul, Trench, Trubner & Company, Limited.

Chowne, P. (1980) The Evidence for Later Bronze Age settlement and Burial in Norfolk. In: J Barrett and R Bradley (eds.). *Settlement and society in the British later bronze age Volume 2*. Oxford, British Archaeological Reports British Series 83(ii). pp. 271–294.

Chowne, P., Healy, F., Bradley, R., Cleal, R. and Kinnes, I. (1993) *Excavations at Redgate Hill, Hunstanton, Norfolk; and at Tattershall Thorpe, Lincolnshire*. Dereham, East Anglian Archaeology.

Christison, D. (1901) Excavations undertaken by the Society of Antiquaries of Scotland of earthworks adjoining the" Roman Road" between Ardoch and Dupplin Perthshire'. *Proceedings of the Society of Antiquaries of Scotland* 35, 16–43.

Clarke, D.L. (1972) *Models in archaeology*. London, Methuen.

Clark, J.G.D. (1937) Current prehistory. In: *Proceedings of the Prehistoric Society* 3 (1-2), 166–85.

Clark, P. (2004) *The Dover Bronze Age boat in context: society and water transport in prehistoric Europe*. Oxford, Oxbow.

Coffey, G. (1913) *The Bronze Age in Ireland*. Dublin, Hodges, Figgis, & co. Ltd.

Coggins, D. and Fairless, K.J. (1984) The Bronze Age settlement site of Bracken Rigg, Upper Teesdale, Co. Durham. *Durham Archaeological Journal* 1, 15–21.

Coles, J.M. and Harding, A.F. (1979) *The Bronze Age in Europe: an introduction to the prehistory of Europe, c.2000-700 BC*. London, Methuen.

Collard, M., Darvill, T., Watts, M., Bayliss, A., Brett, M., Ramsey, C.B., Meadows, J., Morris, E.L., Plicht, H.V.D. and Young, T. (2006) Ironworking in the Bronze Age? Evidence from a 10th Century BC Settlement at Hartshill Copse, Upper Bucklebury, West Berkshire. *Proceedings of the Prehistoric Society* 72, 367–421.

Colquhoun, I. and Burgess, C. (1988) *The swords of Britain*. Prähistorische Bronzefunde. Abt. 4 Bd. 5. München, C. H. Beck'sche verlagsbuchhandlung.

Cook, M. (2006) Excavations of a Bronze Age roundhouse and associated palisaded enclosure at Aird Quarry, Castle Kennedy, Dumfries and Galloway. *Transactions of the Dumfriesshire & Galloway Natural History & Antiquarian Society* 8, 09–28.

Cook, M. and Dunbar, L. (2008) *Rituals, roundhouses and Romans: excavations at Kintore, Aberdeenshire, 2000-2006*. Monograph / Scottish Trust for Archaeological Research 8. Edinburgh, Scottish Trust for Archaeological Research.

Coombs, D.G. and Thompson, F.H. (1979) Excavation of the hill fort of Mam Tor, Derbyshire 1965-69. *Derbyshire Archaeological Journal* 9, 97–51.

Cooper, A. (2012) Pursuing 'the Pressure of the Past': British Prehistoric Research, 1980–2010. *Proceedings of the Prehistoric Society* 78, 315–339.

Cooper, A. and Edmonds, M.R. (2007) *Past and present: excavations at Broom, Bedfordshire 1996-2005*. Cambridge, Cambridge Archaeological Unit.

Cooper, A. and Green, C. (2016) Embracing the Complexities of 'Big Data' in Archaeology: the Case of the English Landscape and Identities Project. *Journal of Archaeological Method and Theory* 23 (1), 271–304.

Copper, C. (2017) *The Bronze Age funerary cups of Southern England*. Unpublished MPhil thesis. University of Bradford.

Cormack, K. (2018) *What Happened to the Unburnt Dead in Middle Bronze Age Britain?* Unpublished BA dissertation. Durham, Durham University.

Council For British Archaeology (2012) *Archaeological Site Index to Radiocarbon Dates from Great Britain and Ireland* [Online]. Available at: doi:10.5284/1017767 (Accessed: 28 February 2019).

Craig, O.E., Shillito, L.-M., Albarella, U., Viner-Daniels, S., Chan, B., Cleal, R., Ixer, R., Jay, M., Marshall, P., Simmons, E., Wright, E. and Pearson, M.P. (2015) Feeding Stonehenge: cuisine and consumption at the Late Neolithic site of Durrington Walls. *Antiquity* 89 (347), 1096–1109.

Crawford, O.G.S. (1912) The Distribution of Early Bronze Age Settlements in Britain. *The Geographical Journal* 40 (2), 184–197.

Crawford, O.G.S. (1922) A Prehistoric Invasion of England. *The Antiquaries Journal* 2 (1), 27–35.

Crellin, R.J. (2014) *Changing times : the emergence of a Bronze Age on the Isle of Man*. Unpublished Ph.D. thesis. Newcastle-upon-Tyne, University of Newcastle Upon Tyne.

Crema, E.R., Bevan, A. and Lake, M.W. (2010) A probabilistic framework for assessing spatio-temporal point patterns in the archaeological record. *Journal of Archaeological Science* (5), 1118–1130.

Crema, E.R., Bevan, A. and Shennan, S. (2017) Spatio-temporal approaches to archaeological radiocarbon dates. *Journal of Archaeological Science* 87, 1–9.

Crema, E.R., Habu, J., Kobayashi, K. and Madella, M. (2016) Summed Probability Distribution of 14C Dates Suggests Regional Divergences in the Population Dynamics of the Jomon Period in Eastern Japan. *PLOS ONE* 11 (4), e0154809.

Cummings, L. (Forthcoming) *Rethinking the henge monuments of the British Isles*. Unpublished Ph.D. thesis. Newcastle-upon-Tyne, Newcastle University.

Cunliffe, B. (1970) A Bronze Age Settlement at Chalton, Hants (Site 78). *The Antiquaries Journal* 50 (1), 1–13.

Cunliffe, B. (2013) *Britain begins*. Oxford, Oxford University Press.

Cunliffe, B. and Phillipson, D.W. (1969) Excavations at Eldon's Seat, Encombe, Dorset. *Proceedings of the Prehistoric Society* 34, 191–237.

Curle, A. (1920) The Broch of Dun Troddan, Gleann Beag, Glenelg, Inverness-shire. *Proceedings of the Society of Antiquaries of Scotland*. 55, 83–94.

Curwen, E. and Curwen, E.C. (1922) Sussex lynchets and their associated field-ways. *Sussex Archaeological Collections* 6, 41–65.

Curwen, E.C. (1929) Excavations in the Trundle, Goodwood 1928. *Sussex Archaeological Collections* 70, 33–85.

Curwen, E.C. (1930) Wolstonbury. *Sussex Archaeological Collections* 71, 237–245.

Curwen, E.C. (1934a) A late Bronze Age farm and a Neolithic pit-dwelling on New Barn Down, Clapham, near Worthing. *Sussex Archaeological Collections* 75, 136–170.

Curwen, E.C. (1934b) A prehistoric site in Kingley Vale, near Chichester. *Sussex Archaeological Collections* 75, 209–216.

Curwen, E.C. (1937) *The archaeology of Sussex*. London, Methuen.

Curwen, E.C. (1954) *The archaeology of Sussex*. 2nd edition. London, Methuen.

Dark, P. (2006) Climate deterioration and land-use change in the first millennium BC: perspectives from the British palynological record. *Journal of Archaeological Science* 33 (10), 1381–1395.

Darvill, T. (1996) *Prehistoric Britain*. London, Routledge.

Darvill, T. (2008) Pathways to a Panoramic Past: A Brief History of Landscap Archaeology in Europe. In: B David and J Thomas (eds.). *Handbook of landscape archaeology*. World Archaeological Congress research handbooks in archaeology. Walnut Creek, CA, Left Coast Press. pp. 60–76.

Darvill, T. (2010) *Prehistoric Britain*. Routledge world archaeology. 2nd ed. London, Routledge.

Darvill, T. and Russell, B. (2002) *Archaeology after PPG16: archaeological investigations in England 1990-1999*. Research report (Bournemouth University. School of Conservation Sciences) 10. Bournemouth, Bournemouth University School of Conservation Sciences in association with English Heritage.

Davies, A. (2016) *Social Organisation in the Upper and Middle Thames Valley from the Late Bronze Age to the Middle Iron Age*. Unpublished Ph.D thesis. Cardiff, Cardiff University.

Davis, R. (2006) *Basal-Looped Spearheads: Typology, chronology, context and use*. Oxford, British Archaeological Reports Oxford Ltd.

Davis, R. (2012) *The Early and Middle Bronze Age spearheads of Britain*. Prähistorische Bronzefunde. Abteilung V Bd. 5. Stuttgart, F. Steiner.

Davis, R. (2015) *The Late Bronze Age spearheads of Britain*. Prähistorische Bronzefunde. Abteilung V Band 7. Stuttgart, Franz Steiner Verlag.

Díaz-Andreu García, M., Giles, K., Hicks, D., Hingley, R., Meskell, L. (2009) *TAG 2009 Plenary session*. In: John Chapman (ed.). 2009 Durham.

Dolfini, A., Horn, C. and Uckelmann, M. (2018) *Prehistoric Warfare and Violence: Quantitative and Qualitative Approaches*. Quantitative Methods in the Humanities and Social Sciences. R J. Crellin (ed.). Cham, Springer International Publishing.

Donnelly, V. (2016) *A study in grey: grey literature and archaeological investigation in England 1990 to 2010*. Unpublished Ph.D. thesis, Oxford, University of Oxford.

Doody, M., G. (2000) Bronze Age houses in Ireland. In: D, A., Johnson, G., McCarthy, M., Sheehan, J., and E., Shee-Twohig. (eds.). *New agendas in Irish prehistory*. Bray, Wordwell. pp. 135–160.

Downes, J. (n.d.) *ScARF Summary Bronze Age Panel Report, Scottish Archaeological Research Framework*. [Online]. Society of Antiquaries of Scotland. Available at: http://tinyurl.com/d86dgfq.

Downes, J. and Richards, C. (2005) Spatial organization of houses. In: C Richards (ed.). *Dwelling among the monuments: an examination of the Neolithic village of Barnhouse, Maeshowe passage grave andsurrounding monuments at Stenness, Orkney*. McDonald Institute monographs. Cambridge, McDonald Institute for Archaeological Research. pp. 57–127.

Drewett, P. (1979) New Evidence for the Structure and Function of Middle Bronze Age Round Houses in Sussex. *Archaeological Journal* 136 (1), 3–11.

Drewett, P. (1980) Black Patch and the later Bronze Age in Sussex. In: J Barrett and R Bradley (eds.) *Settlement and Society in the British late Bronze Age.* Oxford, British Archaeological Reports British Series 83(ii), 377–398.

Drewett, P., Ellison, A.B., Cartwright, C.R., Hinton, P., Connor, T.P.O. (1982) Later Bronze Age Downland Economy and Excavations at Black Patch, East Sussex. *Proceedings of the Prehistoric Society* 48, 321–400.

Dudley, D. (1941) A Late Bronze Age Settlement on Trewey Downs, Zennor, Cornwall. *Archaeological Journal* 98 (1), 105–130.

Dunkin, D.J. (2012) Water, landscape and Bronze Age society in S. England : a contextual study : with special reference to “burnt mounds” Unpublished Ph.D. thesis. Reading, University of Reading.

Dunning, G. (1932) Notes on the excavation of two round barrows at Niton and a Bronze Age hut site on Gore Down. *Proceedings of the Isle of Wight Natural History & Archaeological Society*. 2, 196–210.

Dutton, A., Fasham, P.J., Jenkins, D.A., Caseldine, A.E. and Hamilton-Dyer, S. (1994) Prehistoric Copper Mining on the Great Orme, Llandudno, Gwynedd. *Proceedings of the Prehistoric Society* 60 (1), 245–286.

Edmonds, M.R. (1999) *Ancestral geographies of the Neolithic: landscapes, monuments and memory*. London, Routledge.

Ehrenberg, M.R. (1983) *Connections between Britain and Ireland in the middle and late Bronze Age as evidenced by the metalwork*. Unpublished Ph.D. thesis, Cardiff, University of Wales Institute of Science and Technology.

Ellison, A. (1975) *Pottery and Settlements of the Later Bronze Age in Southern England.* Unpublished Ph.D. thesis, Cambridge, University of Cambridge.

Ellison, A. (1978) The Bronze Age of Sussex. In: P Drewett (ed.). *Archaeology in Sussex to AD 1500: essays for Eric Holden*. CBA research report. London, Council for British Archaeology. pp. 30–37.

Ellison, A. (1980a) Deverel-Rimbury urn cemeteries: the evidence for social organisation. In: J Barrett and R Bradley (eds.). *Settlement and society in the British later bronze age.* Oxford, British Archaeological Reports British 83 series (i). pp. 115–26.

Ellison, A. (1980b) Settlements and regional exchange a case study. In: J. C. Barrett and Richard Bradley (eds.). *Settlement and society in the British later bronze age Volume 1*. Oxford, British Archaeological Reports British Series 83(i). BAR. pp. 127–141.

Ellison, A. (1981) Towards a socioeconomic model for the Middle Bronze Age in southern England. In: Ian Hodder, G Issac, and N Hammond (eds.). *Pattern of the Past: studies in honour of David Clarke*. Cambridge, Cambridge University Press. pp. 413–436.

Ellison, A., Rahtz, P., Ensom, P.C., Otlet, R.L., Williams, D.F., Wilthew, P. (1987) Excavations at Hog Cliff Hill, Maiden Newton, Dorset. *Proceedings of the Prehistoric Society* 53, 223–269.

English Heritage (2002) *Historic Environment Records: benchmarks for good practice*. Association of Local Government Archaeological Officers.

Erskine, J.G.P. (1995) Excavation of a Bronze Age settlement at Savages Wood, Bradley Stoke. *Bristol and Avon Archaeology* 12, 18–23.

Evans, C. (1989) Archaeology and modern times: Bersu's Woodbury 1938 & 1939. *Antiquity* 63 (240), 436–450.

Evans, C., Tabor, J. and Vander Linden, M. (2016) *Twice-crossed river: prehistoric and palaeoenvironmentalinvestigations at Barleycroft Farm/Over, Cambridgeshire*. Cambridge Archaeological Unit Landscape Archives series : the Archaeology of the

Lower Ouse Valley volume III. Cambridge, UK, MacDonald Institute for Archaeological Research.

Evans, J. (1881) *The ancient bronze implements, weapons, and ornaments of Great Britain and Ireland*. London, Longmans, Green & Co.

Evans, T.N.L. 2015 A Reassessment of Archaeological Grey Literature: semantics and paradoxes, Internet Archaeology 40. https://doi.org/10.11141/ia.40.6

Eve, S. (2014) *Dead men's eyes: embodied GIS, mixed reality and landscape archaeology*. Oxford, British Archaeological Reports British Series 600. Oxford, Archaeopress.

Eve, S.J. and Crema, E.R. (2014) A house with a view? Multi-model inference, visibility fields, and point process analysis of a Bronze Age settlement on Leskernick Hill (Cornwall, UK). *Journal of Archaeological Science* 43 (Supplement C), 267–277.

Fairburn, N., Carruthers, W.J., Fairburn, N., Matthews, K.J., Ward, M., Morris, E., and Gale, G.R. (2002) II: Brook House Farm, Bruen Stapleford: excavation of a first millennium BC settlement. *Journal of the Chester Archaeological Society* 7, 79–57.

Fasham, P.J., Farwell, D.E. and Whinney, R.J.B. (1989) *The Archaeological Site at Easton Lane, Winchester*. Hampshire Field Club and Archaeological Society.

Feachem, R. (1958) Glenachan Rig Homestead, Cardon, Peeblesshire. *Proceedings of the Society of Antiquaries of Scotland* 92, 15–24.

Feachem, R., W. (1960) Unenclosed platform settlements. *Proceedings of the Society of Antiquaries of Scotland* 94, 79–85.

Feachem, R., W. (1962) The Palisaded Settlements At Harehope, Peeblesshire. Excavations, 1960. *Proceedings of the Society of Antiquaries of Scotland* 93 (1959–60), 174–191.

Feachem, R., W. (1965) *The North Britons: the prehistory of a border people*. London, Hutchinson.

Feachem, R.W. (1973) Ancient Agriculture in the Highland of Britain. *Proceedings of the Prehistoric Society* 39, 332–353.

Fewster, K.J. (1999) The uses of ethnoarchaeology in settlement studies: the case of the Bamangwato and Basara of Serowe, Botswana. In: J Brück and M Goodman (eds.). *Making places in the prehistoric world. Themes in settlement archaeology,* London. Routledge. pp. 178–197.

Finn, N. and Bayliss, A. (2011) *Bronze age ceremonial enclosures and cremation cemetery at Eye Kettleby, Leicestershire: the development of a prehistoric landscape*. Leicester archaeology monograph 20. Leicester, University of Leicester Archaeological Services.

Finsinger, W. and Tinner, W. (2006) Holocene vegetation and land-use changes in response to climatic changes in the forelands of the southwestern Alps, Italy. *Journal of Quaternary Science* 21 (3), 243–258.

Fitzjohn, M. (2007) Viewing Places: GIS Applications for Examining the Perception of Space in the Mountains of Sicily. *World Archaeology* 39 (1), 36–50.

Fitzpatrick, A.P., Barnes, I. and Cleal, R.M.J. (1995) An Early Iron Age settlement at Dunston Park, Thatcham. In: I Barnes., W, Boismier., R, Cleal., A, Fitzpatrick. And M, Roberts, M *(eds.) Early Settlement in Berkshire*. Salisbury, Wessex Archaeology/Oxford Archaeological Unit. pp. 65–92.

Flatrés, P. (1971) Hamlet and village. In: R. H. Buchanan, E Jones, and D McCourt (eds.). *Man and his Environment: essays presented to Emyr Estyn Evans*. London, Routledge & Keegan Paul. pp. 165–185.

Fleming, A. (1973) Models for the development of the Wessex Culture. In: C Renfrew (ed.). *The explanation of culture change: models in prehistory: proceedings of a meeting of the Research Seminar in Archaeology and Related Subjects held at the University of Sheffield*. London, Duckworth. pp. 571–588.

Fleming, A. (1988) *The Dartmoor reaves: investigating prehistoric land divisions*. London, Batsford.

Fleming, A. (2007) *The Dartmoor Reaves: Investigating Prehistoric Land Divisions*. 2 Rev Ed edition. Oxford, Windgather Press.

Ford, H.S. (1987) Chronological and Functional Aspects of Flint Assemblages. In: A. G. Brown and M. R. Edmonds (eds.). *Lithic analysis and later British prehistory: some problems and approaches*. Oxford, British Archaeological Reports British Series 162. pp. 67–83.

Forde-Johnston, J. (1960) The excavation of a round barrow at Gallowsclough Hill, Delamere Forest, Cheshire. *Transactions of the Lancashire and Cheshire Antiquarian Society* 70, 74–83.

Fowler, C. and Wilkin, N. (2016) Early Bronze Age mortuary practices in North-East England and South-East Scotland: Using relational typologies to trace social networks. In: R Crellin, C Fowler, and R Tipping (eds.). *Prehistory without borders: the prehistoric archaeology of the Tyne-Forth region*. Oxford, Oxbow. pp. 112–135.

Fox, C. (1932) *The personality of Britain: its influence on inhabitant and invader in prehistoric and early historic times*. 1st edition. Cardiff, National Museum of Wales.

Fox, L.A.M.H. (1957) Excavations on Dean Moor, in the Avon Valley: 1954-1956: the Late Bronze Age Settlement. *Transactions of the Devonshire Association* (89), 18–77.

Freundschuh, S.M. and Egenhofer, M.J. (1997) Human conceptions of spaces: Implications for GIS. *Transactions in GIS* 2 (4), 361–375.

Furholt, M. (2019) Re-integrating Archaeology: A Contribution to aDNA Studies and the Migration Discourse on the 3rd Millennium BC in Europe. *Proceedings of the Prehistoric Society* 85, 1–15.

Gardner, W., Savory, H.N. and Williams, I. (1964) *Dinorben; a hill-fort occupied in early iron age and Roman times*. Cardiff, National Museum of Wales.

Garner, D.J., Allen, C.S.M., Wenban-Smith, F.F. and Bevins, R.E. (2007) *The Neolithic and Bronze Age settlement at Oversley Farm, Styal, Cheshire: excavations in advance of Manchester airport's second runway, 1997-8*. British Archaeological Reports British Series 435.

Garwood, P. (2007) Before The Hills In Order Stood. In: J. Last (ed.). *Beyond the Grave: New Perspectives on Barrows*. Oxford, Oxbow. pp. 30-52.

Gent, H. (1983) Centralized Storage in Later Prehistoric Britain. *Proceedings of the Prehistoric Society* 49, 243–267.

Gerloff, S. (1975) *The Early Bronze Age daggers in Great Britain and a reconsideration of the Wessex culture*. Prähistorische Bronzefunde. München, Beck.

Gerloff, S. and Northover, J.P. (2010) *Atlantic cauldrons and buckets of the Late Bronze and Early Iron Ages in Western Europe: with a review of comparable vessels from Central Europe and Italy*. Prähistorische Bronzefunde. Abteilung II Bd. 18. Stuttgart, Franz Steiner Verlag.

Gerloff, S. and O'Connor, B. (2019) A scheme for the British Bronze Age by C F C Hawkes. In: D Brandherm (ed.). *Aspects of the Bronze Age in the Atlantic Archipelago and Beyond: Proceedings from the Belfast Bronze Age Forum, 9–10 November 2013*. Archæologia Atlantica. [Online]. Hagen, Curach Bhán Publications. pp. 16-30.

Gero, J.M. and Conkey, M.W. (1991) *Engendering archaeology: women and prehistory*. Social archaeology. Oxford, Basil Blackwell.

Gerritsen, F. (2007) Familiar landscapes with unfamiliar pasts? Bronze Age barrows and Iron Age communities in the southern Netherlands. In: C Haselgrove and R Pope (eds.). *The Earlier Iron Age in Britain and the Near Continent*. Oxford, Oxbow. pp. 338–353.

Ghey, E., Edwards, N., Johnston, R. and Pope, R. (2007) Characterising the Welsh Roundhouse: chronology, inhabitation and landscape. *Internet Archaeology*. [Online] (23). Available at: doi:10.11141/ia.23.1 (Accessed: 28 July 2016).

Gibson, A.M. (1982) *Beaker domestic sites*. Oxford, British Archaeological Reports British Series 107(1).

Gibson, A.M. (1996) The later Neolithic structures at Trelystan, Powys, Wales: ten years on. *Neolithic houses in northwest Europe and beyond*. 133–41.

Gibson, A.M. (2019) Beaker domestic architecture in Britain and Ireland. In: A M. Gibson (ed.). *Bell Beaker Settlement of Europe: The Bell Beaker Phenomenon from a Domestic Perspective*. Oxbow Books. pp. 309–328.

Gibson, C., O'Brien, L. and Baxter, I. (2004) *Lines in the sand: middle to late Bronze age settlement at Game Farm, Brandon*. Hertford, Archaeological Solutions.

Gillings, M. (2015a) Fugitive Monuments and Animal Pathways: Explaining the Stone Settings of Exmoor. *Proceedings of the Prehistoric Society* 81, 87–106.

Gillings, M. (2015b) Mapping invisibility: GIS approaches to the analysis of hiding and seclusion. *Journal of Archaeological Science* 62, 1–14.

Gillings, M. (2017) Mapping liminality: Critical frameworks for the GIS-based modelling of visibility. *Journal of Archaeological Science* 84, 121–128.

Gillings, M. and Pollard, J. (2016) Making Megaliths: Shifting and Unstable Stones in the Neolithic of the Avebury Landscape. *Cambridge Archaeological Journal*. 26 (04), 537–559.

Gills, B.K. and Frank, A.G. (1992) World System Cycles, Crises, and Hegemonial Shifts, 1700 BC to 1700 AD. *Review (Fernand Braudel Center)* 15 (4), 621–687.

Gilman, A., Adams, R.McC., Sestieri, A.M.B., Cazzella, A., Claessen, H.J.M., Cowgill, G.L., Crumley, C.L., Earle, T., Gallay, A., Harding, A.F., Harrison, R.J., Hicks, R., Kohl, P.L., Lewthwaite, J., Schwartz, C.A., Shennan, S.J., Sherratt, A., Tosi, M. and Wells, P.S. (1981) The Development of Social Stratification in Bronze Age Europe [and Comments and Reply]. *Current Anthropology* 22 (1), 1–23.

Gingell, C. and Cleal, R. (1992) *The Marlborough Downs: a later Bronze Age landscape and its origins*. Monograph (Wiltshire Archaeological and Natural History Society) 1. Devizes, Wiltshire Archaeological and Natural History Society.

Ginn, V. (2012) *Settlement Structure in Middle-Late Bronze Age Ireland*. Unpublished Ph.D. Thesis. Belfast, Queen's University Belfast.

Ginn, V. (2016) *Mapping society: settlement structure in later Bronze Age Ireland*. Oxford, Archaeopress Archaeology.

Ginn, V., Rathbone, S. and Akeret, Ö. (2012) *Corrstown: a coastal community: excavations of a bronzeage village in Northern Ireland*. Oxford, Oxbow Books.

Glasbergen, W. (1954) Barrow Excavations in the Eight Beatitudes. The Bronze Age Cemetery between Toterfout & Halve Mijl, North Brabant. I: the excavations. *Palaeohistoria* 2, 1–134.

Goody, J. (1958) *The developmental cycle in domestic groups*. Cambridge papers in social anthropology no. 1. Cambridge, Published for the Dept. of Archaeology and Anthropology at the University Press.

Gossip, J. and Jones, A. (2008) A Bronze Age roundhouse at Carnon Gate, Feock. *Cornish Archaeology* 47, 101–115.

Gossip, J. and Jones, A.M. (2009) Excavations at Tremough, Penryn, Cornwall, 2000–6. *Cornish Archaeology* 48–49, 1–66.

Gray, H. and Suddaby, I. (2010) An early Neolithic pit, a Middle Bronze Age roundhouse and other features at Hatton Farm, Elliot, Angus. *Tayside & Fife Archaeological Journal* 16, 8–29.

Green, C. (2012) The AIP: maximising the picture *English Landscape and Identities*. [Online]. Available at: https://englaid.wordpress.com/2012/03/07/aip1/.

Green, C., Gosden, C., Cooper, A., Franconi, T., ten Harkel, L., Kamash, Z. and Lowerre, A. (2017) Understanding the Spatial Patterning of English Archaeology: Modelling Mass Data, 1500 BC to AD 1086. *Archaeological Journal* 174 (1), 244–280.

Greenwood, P. (1986) A Late Bronze Age-Early Iron Age field system and settlement at Whitehall Wood, Upminster. *London Archaeologist* 5 (7), 171–175.

de Gruchy, M., Caswell, E. and Edwards, J. (2017) Velocity-Based Terrain Coefficients for Time-Based Models of Human Movement. *Internet Archaeology*. [Online] (45). Available at: doi:10.11141/ia.45.4 (Accessed: 27 February 2019).

de Gruchy, M., Deckers, K. and Riehl, S. (2016) A diachronic reconstruction of the Northern Mesopotamian landscape (4th to 2nd millennia BCE) from three separate sources of evidence. *Journal of Archaeological Science: Reports* 8, 250–267.

Guilbert, G. (1981) Double-ring Roundhouses, Probable and Possible, in Prehistoric Britain. *Proceedings of the Prehistoric Society* 47, 299–317.

Guilbert, G. (1982a) A 'Sussex style'of post-ring layout in Bronze Age roundhouses. *Sussex Archaeological Collections* 120, 209–13.

Guilbert, G. (1982b) Post-ring symmetry in roundhouses at Moel y Gaer and some other sites in prehistoric Britain. In: P. J. Drury (ed.). *Structural reconstruction: approaches to the interpretation of the excavated remains of buildings*. Oxford, British Archaeological Reports British Series 110. pp. 67–86.

Gulliver, P. (1965) The Jie of Uganda. In: J.L. Gibbs (ed.). *Peoples of Africa*. New York, Holt, Rhinehart and Winston. pp. 157–196.

Guttmann, E.B.A., Last, J., Gale, R., Harrison, E., McDonald, T., Macphail, R.I., Scaife, R. and Waldron, T. (2000) A Late Bronze Age Landscape at South Hornchurch, Essex. *Proceedings of the Prehistoric Society* 66, 319–359.

Hacıgüzeller, P. (2012) GIS, critique, representation and beyond. *Journal of Social Archaeology* 12 (2), 245–263.

Hall, G.R. (1880a) An Account of Researches in Ancient Circular Dwellings near Birtley, Northumberland. *Archaeologia* 45 (2), 355–374.

Hall, G.R. (1880b) An account of the Gunnar Peak Camp, North Tynedale, and of excavations in the ancient circular and other dwellings. *Archaeologia Aeliana* 10, 12–37.

Hallam, D.L. (2015) *The Bronze Age Funerary Cups of Northern England*. Unpublished Mphil thesis, Bradford, University of Bradford.

Halliday, S., P. (2007) Unenclosed round-houses in Scotland: occupation, abandonment, and the character of settlement. In: C Bugess, P Topping, and F Lynch (eds.). *Beyond Stonehenge: essays on the bronze age in honour of Colin Burgess*. Oxford, Oxbow Books. pp. 49–56.

Hamilton, S. (2002) The Downsview pottery with specific reference to the Bronze Age assemblage: its form, dating and regional implications. In: D Rudling (ed.). *Downland settlement and land-use: the archaeology of the Brighton bypass*. UCL Field Archaeology Unit monograph. London, Archetype in association with English Heritage. pp. 170–182.

Hamilton, S. and Manley, J. (1997) Points of view: prominent enclosures in first millennium BC Sussex. *Sussex Archaeological Collections* 135 93–112.

Hamilton, S. and Manley, J. (2001) Hillforts, monumentality and place: a chronological and topographic review of first millennium BC hillforts of south-east England. *European Journal of Archaeology* 4 (1), 7–42.

Harding, A.F. (2000) *European societies in the Bronze Age*. Cambridge, Cambridge University Press.

Harding, D.W. (2004) *The Iron Age in northern Britain: Britons and Romans, natives and settlers*. Second edition. Abingdon, Routledge.

Harding, D.W. (2009) *The Iron Age Round-House: Later Prehistoric Building in Britain and Beyond*. Oxford. Oxford University Press.

Harding, J.M. (1964) Interim report on the excavation of a Late Bronze Age homestead in Weston Wood, Albury, Surrey. *Surrey Archaeological Collections* 61, 10–17.

Haustein, M., Gillis, C. and Pernicka, E. (2010) Tin Isotopy—a New Method for Solving Old Questions. *Archaeometry* 52 (5), 816–832.

Hawkes, A. (2018) *The Archaeology of Prehistoric Burnt Mounds in Ireland*. Archaeopress Archaeology.

Hawkes, J. and Hawkes, C.F.C. (1953) *Prehistoric Britain*. Boston, Harvard University Press.

Hearne, C., M. and Adams, N. (1999) Excavation of an Extensive Late Bronze-Age Settlement at Shorncote Quarry, near Cirencester, 1995–6. *Transactions of the Bristol and Gloucestershire Archaeological Society* 117, 35–73.

Hedges, J.W. (1986) Bronze Age Structures at Tougs, Burra Isle, Shetland. *Glasgow Archaeological Journal* 13 (13), 1–43.

Hedges, R.E.M., Mook, W.D. and Margaritz, H. (1987) Radiocarbon Dating by Accelerator Mass Spectrometry: Some Recent Results and Applications [and Discussion]. *Philosophical Transactions of the Royal Society of London. Series A, Mathematical and Physical Sciences* 323 (1569), 57–73.

Heise, M.E. (2016) *Heads North or East? : a re-examination of Beaker burials in Britain*. Unpublished Ph.D. thesis, Edinburgh, University of Edinburgh.

Hermsen, I.C.G. and Van der Wal, M. (2016) *Archeologisch onderzoek naar de nederzettingsresten uit de late prehistorie en de Romeinse tijd bij boerderij De Olthof in Epse-Noord (gemeente Deventer)*. Deventer, Gemeente Deventer.

Herzog, I. (2014) Least-cost Paths – Some Methodological Issues. *Internet Archaeology*. [Online] (36). Available at: doi:10/gd6csd (Accessed: 4 December 2019).

Hey, G., Bell, C., Dennis, C. and Robinson, M. (2016) *Yarnton: Neolithic and Bronze Age settlement and landscape: results of excavations 1990-98*. Thames Valley landscapes monograph 39. Oxford, Oxford University School of Archaeology.

Hill, J.D. (1995) *Ritual and rubbish in the Iron Age of Wessex: a study on the formation of a specific archaeological record*. Oxford, British Archaeological Reports British Series 242.

Hill, P.H. (1984) A sense of proportion: a contribution to the study of double-ring roundhouses. *Scottish Archaeological Review*. 3 (2), 80–86.

Historic England (n.d.) *Research Frameworks | Historic England*. [Online]. Available at: https://historicengland.org.uk/research/support-and-collaboration/research-frameworks-typologies/research-frameworks/ (Accessed: 27 February 2019).

Historic England (2019) *Research Frameworks | Historic England*. [Online]. 2019. Available at: http://historicengland.org.uk/research/support-and-collaboration/research-frameworks-typologies/research-frameworks/ (Accessed: 26 November 2019).

Hodges, H.W.M. (1957) Braves, Breakers and Battle-Axes. *Antiquity* 31 (123), 142–146.

Hodgson, J. and Brennand, M. (2006) The Prehistoric period: resource assessment. In: M Brennand (ed.). *The Archaeology of North West England: An archaeological research framework for North West England: Resource assessment*. Manchester, Archaeology Northwest. pp. 23–58.

Hodgson, J. and Brennand, M. (2007) The Prehistoric period research agenda. In: M Brennand (ed.). *The Archaeology of North West England: An archaeological research framework for North West England: Resource assessment*. Manchester, Archaeology Northwest. pp. 31–54.

Holden, E.W. (1972) A Bronze Age cemetery-barrow on Itford Hill, Beddingham. *Sussex Archaeological Collections* 110, 70–117.

Holleyman, G.A. and Curwen, E.C. (1935) Late Bronze Age Lynchet-Settlements on Plumpton Plain, Sussex. *Proceedings of the Prehistoric Society* 11, 6–38.

Holst, M.K., Rasmussen, M., Kristiansen, K. and Bech, J. H. (2013) Bronze Age ‘Herostrats’: Ritual, Political, and Domestic Economies in Early Bronze Age Denmark. *Proceedings of the Prehistoric Society* 79, 265–296.

Horn, C. (2017) *Warfare in Bronze Age Society*. New York, Cambridge University Press.

Hughes, P.D.M., Mauquoy, D., Barber, K.E. and Langdon, P.G. (2000) Mire-development pathways and palaeoclimatic records from a full Holocene peat archive at Walton Moss, Cumbria, England: *The Holocene* 10 (4), 465–479.

Hunter, J. and Ralston, I. (2009) *The Archaeology of Britain*. 2 edition. London, Routledge.

Hunter, J. and Woodward, A. (2014) *Ritual in Early Bronze Age Grave Goods*. Oxford, Oxbow Books.

Ialongo, N. and Rahmstorf, L. (2019) The identification of balance weights in pre-literate Bronze Age Europe: Typology, chronology, distribution and metrology. In: L Rahmstorf (ed.). *Weights and Marketplaces from the Bronze Age to the Early Modern Period: Proceedings of Two Workshops Funded by the European Research Council*. 1st edition. Wachholtz Verlag GmbH. pp. 105–126.

IFA Wales/Cymru (n.d.) *Research Framework for the Archaeology of Wales - Fframwaith Ymchwil i Archaeoleg Cymru*. [Online]. Available at: https://www.archaeoleg.org.uk/neo.html (Accessed: 27 February 2019).

Jackson, J.E. (1983) *The fish people: linguistic exogamy and Tukanoan identity in northwest Amazonia*. Cambridge studies in social anthropology 39. Cambridge, Cambridge University Press.

Jackson, R., Bayliss, A., Templeton, L., Hunt, C., Rigby, S. (2015) *Huntsman's Quarry, Kemerton: a late Bronze Age settlement and landscape in Worcestershire*. Oxford, Oxbow Books.

Jobey, G. (1978) Green Knowe unenclosed platform settlement and Harehope cairn, Peeblesshire. *Proceedings of the Society of Antiquaries of Scotland* 110, 72–113.

Jobey, G. (1980) Unenclosed platforms and settlements of the later second millennium BC in northern Britain. In: L. M. Thoms (ed.). *Settlements in Scotland, 1000 BC - AD 1000: Scottish Archaeological Forum 10*. Edinburgh, Edinburgh University Press. pp. 12–26.

Jobey, G. (1983) Excavation of an unenclosed settlement on Standrop Rigg, Northumberland, and some problems related to similar settlements between Tyne and Forth. *Archaeologia Aeliana* 5 (11), 1–21.

Jobey, G. and Tait, J. (1966) Excavations on palisaded settlements and cairnfields at Alnham, Northumberland. *Archaeologia Aeliana* 4, 45–48.

Johnson, B., Waddington, C., Baker, P., Ramsey, C.B., Clogg, P., Cook, G., Cotton, J., Hamilton, D., Marshall, P., Stern, B. (2008) Prehistoric and Dark Age Settlement Remains from Cheviot Quarry, Milfield Basin, Northumberland. *Archaeological Journal* 165 (1), 107–264.

Johnson, M. (2010) *Archaeological theory: an introduction*. Second edition. Chichester, Wiley-Blackwell.

Johnson, N. (1980) Later Bronze Age settlement in the South-West. In: J Barrett and R Bradley (eds.). *Settlement and society in the British later bronze age Volume 1*. Oxford, British Archaeological Reports British Series 83(i). pp. 141–180.

Johnston, R. (2005) Pattern Without A Plan Rethinking The Bronze Age Coaxial Field Systems On Dartmoor, South-West England. *Oxford Journal of Archaeology* 24 (1), 1–21.

Jones, A.M. (1998) The excavation of a Later Bronze Age structure at Callestick. *Cornish Archaeology* 37, 85–55.

Jones, A.M. (2008) Houses for the Dead and Cairns for the Living; a Reconsideration of the Early to Middle Bronze Age Transition in South-West England. *Oxford Journal of Archaeology* 27 (2), 153–174.

Jones, A.M. (2013a) Memory, myth, place and landscape inhabitation: a perspective from the south west peninsula. In: A.M., Chadwick and C.D. Gibson (eds.). Memory, Myth, Place and Long-Term Landscape Inhabitation. Oxford, Oxbow Books, pp. 55–75.

Jones, A.M. (2013b) Archaeological excavation at Bosiliack, Madron, Cornwall. *Cornish Archaeology* 52, 135–169.

Jones, A.M. (2015) Ritual, Rubbish or Everyday Life? Evidence from a Middle Bronze Age Settlement in Mid-Cornwall. *Archaeological Journal* 172 (1), 30–51.

Jones, A.M., Gossip, J. and Quinnell, H. (2015) *Settlement and metalworking in the Middle Bronze Age and beyond: New evidence from Tremough, Cornwall*. Leiden, Sidestone Press.

Jones, A.M. and Quinnell, H. (2011) The Neolithic and Bronze Age Periods in Cornwall, c. 4000 cal BC to c. 1000 cal BC: An Overview of Recent Developments. *Cornish Archaeology* 50, 197–230.

Jones, A.M. and Taylor, S. (2004) *What Lies Beneath… St Newlyn East & Mitchell.* Truro, Historic Environment Service Cornwall County Council.

Jones, A.M., Taylor, S.R. and Butcher, S. (2010) *Scarcewater, Pennance, Cornwall: archaeological excavation of a Bronze Age and Roman landscape*. Oxford, British Archaeological Reports British Series 516.

Jones, A.M., Taylor, S. and Sturgess, J. (2012) A Beaker structure and other discoveries along the Sennen to Porthcurno South West Water pipeline. *Cornish Archaeology* 51, 1–67.

Jones, E., Sheridan, J.A. and Franklin, J. (2018) Neolithic and Bronze Age occupation at Meadowend Farm, Clackmannanshire: Pots, pits and roundhouses. *Scottish Archaeological Internet Reports*. 77.

Jones, M.U. and Bond, D. (1980) Later Bronze Age settlement at Mucking, Essex. In: J Barrett and R Bradley (eds.). *Settlement and society in the British later bronze age Volume 2*. Oxford, British Archaeological Reports British Series 83(ii). pp. 471–482.

Kelly, R.S., Conway, J.S., Williams, D. and Yassi, N.H. (1988) Two Late Prehistoric Circular Enclosures near Harlech, Gwynedd. *Proceedings of the Prehistoric Society* 54, 101–151.

Kendrick, J., Barclay, G.J., Cowie, T.G., Saville, A., Townshend, A. and Braby, A. (1995). Excavation of a Neolithic enclosure and an Iron Age settlement at Douglasmuir, Angus. *Proceedings of the Society of Antiquaries of Scotland* 125, 29–67.

Kendrick, T.D. and Hawkes, C.F.C. (1932) *Archaeology in England and Wales, 1914-1931*. London, Methuen & Co., ltd.

Kleine, J.P. (1999) *Approaching High-Flux Interaction: Pottery, identity and overseas contacts in the later Early and Middle Bronze Age (2000-1000 cal BC) of North West Europe.* Unpublished MA dissertation. Leiden, Leiden University.

Kleijne, J.P. and Drenth, E. (2019) An overview of Bell Beaker house plans in the Netherlands. In: A.M. Gibson (ed.). *The Bell Beaker settlement of Europe: the Bell Beaker phenomenon from a domestic perspective*. Prehistoric society research papers. Oxford, Oxbow Books. pp. 295–308.

Knight, M. (2019) Doubtful associations? Assessing Bronze Age 'multi-period' hoards from northern England, Scotland and Wales. In: M Knight, Dot Boughton, and R Wilkinson (eds.). *Objects of the Past in the Past: The Significance of Earlier Artefacts in Later Contexts*. Oxford, Archaeopress Archaeology. pp. 19–41.

Knight, M. (1999) *Prehistoric Excavations at King's Dyke West, Whittlesey, Cambridgeshire. A Terminal Bronze Age Settlement near Moreton's Leam*. Cambridge Archaeological Unit.

Knight, M., Ballantyne, R., Zeki, I.R. and Gibson, D. (2019) The Must Farm pile-dwelling settlement. *Antiquity* 93 (369), 645–663.

Koch, J.T. and Cunliffe, B.W. (2016) *Celtic from the West 3: Atlantic Europe in the Metal Ages: questions of shared language*. Oxford, Oxbow Books.

Kristiansen, K. and Larsson, T.B. (2005) *The rise of Bronze Age society: travels, transmissions and transformations*. Cambridge, Cambridge University Press.

Kristiansen, K., Lindkvist, T. and Myrdal, J. (2018) The rise of Bronze Age peripheries and the expansion of international trade 1950– 1100 bc. In: K Kristiansen., T Lindkvist. and J Myrdal (eds.). *Trade and Civilisation: Economic Networks and Cultural Ties, from Prehistory to the Early Modern Era*. Cambridge, UK ; New York, NY, Cambridge University Press. pp. 87–112.

Kristiansen, K. and Suchowska-Ducke, P. (2015) Connected Histories: the Dynamics of Bronze Age Interaction and Trade 1500–1100 bc. *Proceedings of the Prehistoric Society* 81, 361–392.

Ladle, L., Woodward, A., Attoe, K. (2009) *Excavations at Bestwall Quarry, Wareham 1992-2005. Volume 1: the prehistoric landscape*, Dorset Natural History and Archaeological Society monograph series. Dorchester, Dorset Natural History & Archaeological Society.

Lambrick, G. (2009) Hearth and Home: Buildings and Domestic Culture. In: Lambrick, G., Robinson, M., Allen, T.G., Wachnik, M. and Lorimer, P. (eds.). *The Thames through time: the archaeology of the gravel terraces of the Upper and Middle Thames: the Thames Valley in late prehistory, 1500 BC-AD 50*. Thames Valley landscapes monograph. Oxford, Published for Oxford Archaeology by Oxford University School of Archaeology. pp. 133–178.

Lambrick, G., Robinson, M., Allen, T.G., Wachnik, M., and Lorimer, P. (2009) *The Thames through time: the archaeology of the gravel terraces of the Upper and Middle Thames: the Thames Valley in late prehistory, 1500 BC-AD 50*. Thames Valley landscapes monograph no. 29. Oxford, Published for Oxford Archaeology by Oxford University School of Archaeology.

LaMotta, V.M. and Schiffer, M.B. (1999) Formation processes of house floor assemblages. In: P M Allison (ed.) *The Archaeology of Household Activities*. London, Routledge. pp. 19–29.

LandIS (2019) *Soilscapes Viewer*. [Online]. 27 February 2019. Available at: http://www.landis.org.uk/services/soilscapes.cfm.

Langdon, P.G. and Barber, K.E. (2005) The climate of Scotland over the last 5000 years inferred from multiproxy peatland records: inter-site correlations and regional variability. *Journal of Quaternary Science* 20 (6), 549–566.

Law, R. (2009) *The development and perpetuation of a ceramic tradition: the significance of Collared Urns in Early Bronze Age social life*. Unpublished Ph.D Thesis. Cambridge, University of Cambridge.

Lawrence, D. (2012) *Early urbanism in the northern fertile crescent : a comparison of regional settlement trajectories and millennial landscape change*. Unpublished Ph.D Thesis, Durham, Durham University.

Lawson, A.J. (2000) *Potterne 1982-5: animal husbandry in later prehistoric Wiltshire*. Wessex archaeology report 17. Salisbury, Trust for Wessex Archaeology.

Lehoërff, A. and Talon, M. (2017) *Movement, exchange and identity in Europe in the 2nd and 1st millennia BC: beyond frontiers*. Oxford, United Kingdom ; Philadelphia, Oxbow Books.

Lévi-Strauss, C. (1982) *The way of the masks*. Seattle, University of Washington Press.

Lewis, E.R. and Walker, G. (1976) A Middle Bronze Age settlement site at Westbury, West Meon, Hampshire. *Proceedings of the Hampshire Field Club and Archaeological Society* 33, 33–44.

Llobera, M. (1996) Exploring the topography of mind: GIS, social space and archaeology. *Antiquity* 70 (269), 612–622.

Louwe Koojimans, L.P. (2000) Living in the Neolithic: Habitation and Landscape. In: A Ritchie (ed.). *Neolithic Orkney in its European context*. Cambridge, McDonald Institute for Archaeological Research, University of Cambridge. pp. 323–331.

Lucas, G. (2001) *Critical approaches to fieldwork: contemporary and historical archaeological practice*. London, Routledge.

Luke, M. (2008) *Life in the loop: investigation of a prehistoric and romano-british landscape at Biddenham Loop, Bedfordshire*. Albion Archaeology.

Maclagan, C. (1862) *Chips from Old Stones*. Edinburgh, George Waterston & Sons.

Magny, M. (2004) Holocene climate variability as reflected by mid-European lake-level fluctuations and its probable impact on prehistoric human settlements. *Quaternary International* 113 (1), 65–79.

Mamwell, C.J. (2018) *'It rained a lot and nothing much happened' Settlement and Society in Bronze Age Orkney*. Unpublished Ph.D thesis. Edinburgh, University of Edinburgh.

Manby, T. (1978) Thwing Excavation 1978. *Prehistory Research Section Bulletin (Yorkshire Archaeological Society)*. 162–4.

Manby, T. (1983) Thwing Excavation 1982. *Prehistory Research Section Bulletin (Yorkshire Archaeological Society)*. 204–6.

Manby, T. (2007) Continuity of Monumental Traditions into the Late Bronze Age? Henges to Ring-forts, and Shrines. *Beyond Stonehenge. Essays on the Bronze Age in Honour of Colin Burgess*. Oxford, Oxbow. pp.403–24.

Manley, J. (1984) Craig Fechan. *Archaeology in Wales*. 2477–78.

Mare, E. (2006) *Malleville-sur-le-Bec A28 NOrd. Buisson du Roui*. 200354–55.

Martin, J. (2000) *Site and settlement: land and settlement structures in rural Northumberland*. Unpublished Ph.D thesis. Newcastle-upon-Tyne, University of Newcastle.

McCullagh, R.P.J. and Tipping, R. (1998) *The Lairg project 1988–1996: the evolution of an archaeological landscape in northern Scotland*. Edinburgh, Scottish Trust for Archaeological Research.

McGrail, S. (1997) *Studies in maritime archaeology*. Oxford, British Archaeological Reports British Series 256.

McLaren, A. (2008) Flintworking in the British Later Bronze and Iron Ages: A Critical Review and Statement of Research Potential. *Lithic Technology* 33 (2), 141–159.

McLaughlin, T.R., Whitehouse, N.J., Schulting, R.J., McClatchie, M., Barratt, P., Bogaard, A. (2016) The Changing Face of Neolithic and Bronze Age Ireland: A Big Data Approach to the Settlement and Burial Records. *Journal of World Prehistory* 29 (2), 117–153.

McOmish, D. and Field, D. (2010) The Bronze Age and Early Iron Age Midden Site at East Chisenbury, Wiltshire. *The Wiltshire Archaeological and Natural History Magazine* 103, 35–101.

Megaw, J.V.S. and Simpson, D.D.A. (1979) *Introduction to British prehistory from the arrival of homo sapiens to the Claudian invasion*. Leicester, Leicester University Press.

Mizoguchi, K. (1993) Time in the reproduction of mortuary practices. *World Archaeology* 25 (2), 223–235.

Montelius, O. (1908) III. The Chronology of the British Bronze Age. *Archaeologia* 61 (1), 97–162.

Moore, H.L. (1986) *Space, text and gender: an anthropological study of the Marakwet of Kenya*. Cambridge, Cambridge University Press.

Moore, J. and Jennings, D. (1992) *Reading Business Park: a Bronze Age landscape*. Thames Valley landscapes v. 1. Oxford, Oxford University Committee for Archaeology for the Oxford Archaeological Unit.

Morigi, T., Schreve, D., White, M. and Hey, G. (2011) *The Thames Through Time: The Archaeology of the Gravel Terraces of the Upper and Middle Thames: Early Prehistory to 1500 BC*. Oxford, Lancaster.

Mörtz, T., Horn, C. and Kristiansen, K. (2017) Violence and ritual in Late Bronze Age Britain: Weapon depositions and their interpretation. In: C Horn (ed.). *Warfare in Bronze Age Society*. New York, Cambridge University Press. pp. 168–188.

Mullin, D. (2012) The River Has Never Divided Us: Bronze Age Metalwork Deposition In Western Britain. *Oxford Journal of Archaeology* 31 (1), 47–57.

Musson, C. (1970) House-plans and prehistory. *Current Archaeology* 2 (10), 267–75.

Must Farm (2019) *Platform Home | Must Farm* [Online]. Available at: http://www.mustfarm.com/bronze-age-settlement/ (Accessed: 28 February 2019).

Natural England (2014) *National Character Area Profile: 150. Dartmoor*. [Online]. Available at: http://publications.naturalengland.org.uk/publication/5098832853467136 (Accessed: 27 November 2019).

Natural England (2019) *Natural England Access to Evidence - National Character Areas*. [Online]. 2019. Available at: http://publications.naturalengland.org.uk/category/587130 (Accessed: 27 February 2019).

Natural Resources Wales (2019) *Natural Resources Wales / National Landscape Character Areas (NLCA)*. [Online]. 2019. Available at: https://naturalresources.wales/evidence-and-data/maps/nlca/?lang=en (Accessed: 27 February 2019).

Nayling, N. and Caseldine, A. (1997) *Excavations at Caldicot, Gwent: Bronze Age palaeochannels in the lower Nedern Valley*. CBA research report 108. York, Council for British Archaeology.

Needham, S. (1983) *The Early Bronze Age axeheads of central and southern England*. Unpublished Ph.D. thesis, Cardiff, Cardiff University.

Needham, S. (1996) Chronology and periodisation in the British Bronze Age. *Acta Archaeologica* 67, 121–140.

Needham, S. (2000a) The Development of Embossed Goldwork in Bronze Age Europe. *The Antiquaries Journal* 80 (1), 27–65.

Needham, S. (2000b) Power Pulses Across a Cultural Divide: Cosmologically Driven Acquisition Between Armorica and Wessex. *Proceedings of the Prehistoric Society* 66, 151–207.

Needham, S. (2005) Transforming Beaker Culture in North-West Europe; Processes of Fusion and Fission. *Proceedings of the Prehistoric Society* 71, 171–217.

Needham, S. (2007) The Great Divide. In: C Haselgrove and R Pope (eds.). *The earlier Iron Age in Britain and the near continent*. Oxford, Oxbow Books. pp. 39–63.

Needham, S. (2009) Encompassing the sea: 'Maritories' and Bronze Age maritime interactions. In: P Clark (ed.). *Bronze Age Connections: Culture contact in prehistoric Europe*. Oxford, Oxbow. pp. 12–37.

Needham, S. (2012) Putting capes into context: Mold at the heart of a domain. In: F. Lynch, W. J. Britnell, and R. J. Silvester (eds.). *Reflections on the past: essays in honour of Frances Lynch*. Welshpool, Cambrian Archaeological Association. pp. 210–236.

Needham, S. (2013) *Claimed by the sea: Salcombe, Langdon Bay, and other marine finds of the bronze age*. CBA research report 173. York, Council for British Archaeology.

Needham, S. and Bowman, S. (2005) Flesh-Hooks, Technological Complexity and the Atlantic Bronze Age Feasting Complex. *European Journal of Archaeology* 8 (2), 93–136.

Needham, S., Davis, M., Gwilt, A., Lodwick, M., Parkes, P. and Reavill, P. (2015) A Hafted Halberd Excavated at Trecastell, Powys from Undercurrent to Uptake – the Emergence and Contextualisation of Halberds in Wales and North-west Europe. *Proceedings of the Prehistoric Society*, 81, 1–41.

Needham, S. and Longley, D. (1980) Runnymede Bridge, Egham: a Late Bronze Age riverside settlement. In: J Barrett and R Bradley (eds.). *Settlement and society in the British later bronze age Volume 2*. Oxford, British Archaeological Reports British Series 83(ii). pp. 397–436.

Needham, S., Ramsey, C.B., Coombs, D., Cartwright, C., Pettitt, P. (1997) An Independent Chronology for British Bronze Age Metalwork: The Results of the Oxford Radiocarbon Accelerator Programme. *Archaeological Journal* 154 (1), 55–107.

Nicolas, C., Favrel, Q., Rousseau, L., Ard, V., Blanchet, S., Donnart, K., Fromont, N., Manceau, L., Marcigny, C., Marticorena, P., Nicolas, T., Pailler, Y. and Ripoche, J. (2019) 18. The introduction of the Bell Beaker culture in Atlantic France: an overview of Settlements. In: A.M. Gibson (ed.). *The Bell Beaker settlement of*

Europe: the Bell Beaker phenomenon from a domestic perspective. Prehistoric society research papers. Oxford, Oxbow Books. pp. 329–352.

Norberg-Schulz, C. (1980) *Genius loci: towards a phenomenology of architecture*. London, Academy Editions.

Nørgaard, H.W., Pernicka, E. and Vandkilde, H. (2019) On the trail of Scandinavia's early metallurgy: Provenance, transfer and mixing. *PLOS ONE* 14 (7), e0219574.

Nowakowski, J.A. (1991) Trethellan Farm, Newquay: excavations of a lowland Bronze Age settlement and Iron Age cemetery. *Cornish Archaeology* 30, 5–242.

Nowakowski, J.A. (2001) Leaving home in the Cornish Bronze Age: insights into planned abandonment processes. In: J Brück (ed.). *Bronze Age landscapes: tradition and transformation*. pp. 139–48.

Nowakowski, J.A. (2012) Trevisker pottery: some recent studies. In: F. Lynch, W. J. Britnell, and R. J. Silvester (eds.). *Reflections on the past: essays in honour of Frances Lynch*. Welshpool, Cambrian Archaeological Association. pp. 146–71.

O'Brien, W. (2012) The Chalcolithic in Ireland: a chronological and cultural framework. In: M J. Allen, J Gardiner, and A Sheridan (eds.). *Is there a British Chalcolithic? people, place and polity in the later 3rd millennium*. Prehistoric Society research papers. Oxford, Oxbow. pp. 27–39.

O'Brien, W. and O'Driscoll, J. (2017) *Hillforts, warfare and society in Bronze Age Ireland*. Archaeopress archaeology. Oxford, Archaeopress Publishing LTD.

O'Connor, B. (1980) *Cross-channel relations in the later Bronze Age: relations between Britain, North-Eastern France, and the low countries during the later Bronze Age and the early Iron Age, with particular reference to the metalwork*. Oxford, British Archaeological Reports International Series 91.

O'Connor, B., Cowie, T. and O'Neil, M. (1995) Middle Bronze Age dirks and rapiers from Scotland: some finds old and new. *Proceedings of the Society of Antiquaries of Scotland* 125, 345–367.

O'Connor, B., Roberts, B. and Wilkin, N. (2017) The Ornament Horizon revisited: New and old finds of Middle Bronze Age ornaments in southern England. In: T Lachenal, C Mordant, T Nicolas, and C Véber (eds.). *Le Bronze moyen et l'origine du Bronze final en Europe occidentale, de la Méditerranée aux pays nordiques (xviie-xiiie siècle avant notre ère), Colloque APRAB "Bronze 2014", Strasbourg 17 au 20 juin 2014, Strasbourg*. pp. 267–279.

Olalde, I., Brace, S., Allentoft, M.E., Armit, I., Kristiansen, K., Booth, T., Rohland, N., Mallick, S., Szécsényi-Nagy, A., Mittnik, A., Altena, E., Lipson, M., Lazaridis, I., Harper, T.K., Patterson, N., Broomandkhoshbacht, N., Diekmann, Y., Faltyskova, Z., Fernandes, D., Ferry, M., Harney, E., de Knijff, P., Michel, M., Oppenheimer, J., Stewardson, K., Barclay, A., Alt, K.W., Liesau, C., Ríos, P., Blasco, C., Miguel, J.V., García, R.M., Fernández, A.A., Bánffy, E., Bernabò-Brea, M., Billoin, D., Bonsall, C., Bonsall, L., Allen, T., Büster, L., Carver, S., Navarro, L.C., Craig, O.E., Cook, G.T., Cunliffe, B., Denaire, A., Dinwiddy, K.E., Dodwell, N., Ernée, M., Evans, C., Kuchařík, M., Farré, J.F., Fowler, C., Gazenbeek, M., Pena, R.G., Haber-Uriarte, M., Haduch, E., Hey, G., Jowett, N., Knowles, T., Massy, K., Pfrengle, S., Lefranc, P., Lemercier, O., Lefebvre, A., Martínez, C.H., Olmo, V.G., Ramírez, A.B., Maurandi, J.L., Majó, T., McKinley, J.I., McSweeney, K., Mende, B.G., Mod, A., Kulcsár, G., Kiss, V., Czene, A., Patay, R., Endrődi, A., Köhler, K., Hajdu, T., Szeniczey, T., Dani, J., Bernert, Z., Hoole, M., Cheronet, O., Keating, D., Velemínský, P., Dobeš, M., Candilio, F., Brown, F., Fernández, R.F., Herrero-Corral, A.-M., Tusa, S., Carnieri, E., Lentini, L., Valenti, A., Zanini, A., Waddington, C., Delibes, G., Guerra-Doce, E., Neil, B., Brittain, M., Luke, M., Mortimer, R., Desideri, J., Besse, M., Brücken, G., Furmanek, M., Hałuszko, A., Mackiewicz, M., Rapiński, A., Leach, S., Soriano, I., Lillios, K.T., Cardoso, J.L., Pearson, M.P., Włodarczak, P., Price, T.D., Prieto, P., Rey, P.-J., Risch, R., Rojo Guerra, M.A., Schmitt, A., Serralongue, J., Silva, A.M., Smrčka, V., Vergnaud, L., Zilhão, J., Caramelli, D., Higham, T., Thomas, M.G., Kennett, D.J., Fokkens, H., Heyd, V., Sheridan, A., Sjögren, K.-G., Stockhammer, P.W., Krause, J., Pinhasi, R., Haak, W., Barnes, I., Lalueza-Fox, C., and Reich, D. (2018) The Beaker phenomenon and the genomic transformation of northwest Europe. *Nature* 555 (7695), 190-6.

Oliver, A. (1996) *Frameworks for our Past: A Review of Research Frameworks, Strategies and Perceptions.* London, English Heritage.

O'Neil, B.S.J. (1937) Excavations at Breiddin Hill Camp. *Archaeologia Cambrensis* 92, 86–128.

Ordnance Survey (2019) *Strategi*. [Online]. 2019. Available at: https://www.ordnancesurvey.co.uk/business-and-government/products/strategi.html.

Oswald, A. (1949) A re-excavation of the Roman villa at Mansfield Woodhouse, Nottinghamshire, 1936-39. *Transactions of the Thoroton Society* 53, 1–14.

Oswald, A. (1991) *A Doorway on the Past: Round-house Entrance Orientation and its Significance in Iron Age Britain*. Unpublished BA dissertation. Cambridge, University of Cambridge.

Oswald, A. (1997) A doorway on the past: practical and mystic concerns in the orientation of roundhouse doorways. In: C Gwilt and C Haselgrove (eds.). *Reconstructing Iron Age societies*. Oxford, Oxbow Books. pp. 87–95.

Page, N. (2001) A477 Sageston-Redberth Bypass. *Archaeology in Wales* 41, 124.

Palmisano, A., Bevan, A. and Shennan, S. (2017) Comparing archaeological proxies for long-term population patterns: An example from central Italy. *Journal of Archaeological Science* 87, 59–72.

Parker Pearson, M. (1990) The production and distribution of Bronze Age pottery in south-west Britain. *Cornish Archaeology* 29, 5–32.

Parker Pearson, M. (1996) Food, fertility and front doors in the first millennium BC. In: T. C. Champion and John Collis (eds.). *The Iron age in Britain and Ireland: recent trends*. Sheffield, J.R. Collis Publications. pp. 117–132.

Parker Pearson, M. (1999) Food, Sex and Death: Cosmologies in the British Iron Age with Particular Reference to East Yorkshire. *Cambridge Archaeological Journal* 9 (1), 43-69.

Parker Pearson, M. (2009) The Earlier Bronze Age. In: John Hunter and Ian Ralston (eds.). *The Archaeology of Britain*. 2 edition. London ; New York, Routledge. pp.77-94.

Parker Pearson, M. (2012) *Stonehenge: exploring the greatest Stone Age mystery*. London, Simon & Schuster.

Parker Pearson, M., Chamberlain, A., Craig, O., Marshall, P., Mulville, J., Smith, H., Chenery, C., Collins, M., Cook, G. and Craig, G. (2005) Evidence for mummification in Bronze Age Britain. *Antiquity* 79 (305), 529–546.

Parker Pearson, M., Chamberlain, A., Jay, M., Richards, M., Sheridan, A., Curtis, N., Evans, J., Gibson, A., Hutchison, M., Mahoney, P., Marshall, P., Montgomery, J., Needham, S., O'Mahoney, S., Pellegrini, M., Wilkin, N. (2016) Beaker people in Britain: migration, mobility and diet. *Antiquity* 90 (351), 620–637.

Parker Pearson, M. and Richards, C. (1994) Ordering the world: perceptions of architecture, space, and time. In: M P Pearson and C Richards (eds.). *Architecture and order: approaches to social space*. London, Routledge. pp. 1–33.

Parker Pearson, M., Sheridan, A., Jay, M., Chamberlain, A., Richards, M., Evans, J. (2018) *The Beaker People: Isotopes, Mobility and Diet in Prehistoric Britain*. Philadelphia, PA, Oxbow Books.

Parker Pearson, M. and Zvelebil, M. (2014) *Excavations at Cill Donnain: a Bronze Age settlement andIron Age wheelhouse in South Uist*. Sheffield Environmental and Archaeological Research Campaign in the Hebrides volume 9. Hardcover edition. Oxford, Oxbow Books.

Parsons, J. (1961) Broomwood Bronze Age Settlement, St. Paul's Cray. *Archaeologia Cantiana*. 76, 134–142.

Parsons, W.J. and Curwen, E.C. (1933) An agricultural settlement on Charleston Brow, near Firle Beacon. *Sussex Archaeological Collections* 74, 164–80.

Patterson, P. and Fletcher, M. (1996) Grimspound, one hundred years on. *Devon Archaeological Society Proceedings* 5, 21–20.

Petts, D., Gerrard, C. and Cranstone, D. (2006) *Shared visions: the North-East regional research framework for the historic environment*. Durham, Durham County Council.

Philpott, R. and Adams, M.H. (2010) *Irby, Wirral: excavations on a late prehistoric Roman-British and medieval site, 1987-96*. Liverpool, National Museums Liverpool.

Pickstone, A. and Mortimer, R. (2011) *The Archaeology of Brigg's Farm, Prior's Fen, Thorney, Peterborough. The Archaeology of Brigg's Farm.* Available at: https://library.thehumanjourney.net/2928/ (Accessed: 27 February 2019).

Piggott, S. (1949) *British prehistory*. London, Oxford University Press.

Pitt-Rivers, A.H.L.-F. (1898) *Excavations in Cranborne Chase, near Rushmore, on the borders of Dorset and Wiltshire 1893-1896.* London [Harrison and sons, printers] Printed privately.

Plunkett, G., McDermott, C., Swindles, G.T. and Brown, D.M. (2013) Environmental indifference? A critique of environmentally deterministic theories of peatland archaeological site construction in Ireland. *Quaternary Science Reviews* 61, 17–31.

Pope, R. (2003) *Prehistoric dwelling: circular structures in north and central Britain c 2500 BC-AD 500*. Unpublished Ph.D. thesis, Durham, University of Durham.

Pope, R. (2007) Ritual and the roundhouse: a critique of recent ideas on domestic space in later British prehistory. In: Colin Haselgrove and Rachel Pope (eds.). *The Earlier Iron Age in Britain and the Near Continent*. Oxford, Oxbow. pp. 204–228.

Pope, R. (2015) Bronze Age architectural traditions: dates and landscapes. In: F Hunter and I Ralston (eds.). *Scotland in later prehistoric Europe*. Edinburgh, Society of Antiquaries of Scotland. pp. 159–184.

Powell, K., Smith, A. and Laws, G. (2010) *Evolution of a farming community in the upper Thames Valley: excavation of prehistoric, Roman and post-Roman landscape at Cotswold Community, Gloucestershire and Wiltshire. Vol. 1: site narrative and overview*. Thames Valley landscapes monograph no. 31. Oxford, Oxford Archaeology.

Powell, T.G.E. (1954) The Gold Ornament from Mold, Flintshire North Wales. *Proceedings of the Prehistoric Society* 19 (2), 161–179.

Powlesland, D., Haughton, C. and Hanson, J. (1986) Excavations at Heslerton, North Yorkshire 1978–82. *Archaeological Journal* 143 (1), 53–173.

Poyer, A. (2015) *The Topographic Setting of Bronze Age Metalwork Deposits in North East England*. Unpublished Ph.D. Thesis. Sheffield, University of Sheffield.

Preston-Jones, A. (2007) *Kynance Gate, Cornwall: scrub clearance and interpretation*. Truro, Cornwall County Council.

Pryor, F. (1974) *Excavation at Fengate, Peterborough, England: the first report*. Royal Ontario Museum.

Pryor, F. (1978) *Excavation at Fengate, Petersborough, England: the Second Report*. Royal Toronto Museum.

Pryor, F. (1980) *excavation at fengate, peterborough, england, the third report*. Leicester Leicestershire : Toronto, Northamptonshire Archaeology Society Monographs 1/ Royal Ontario Museum Monograph 6.

Pryor, F. (1984) *Excavation at Fengate, Peterborough, England: The Fourth Report*. Microfiches Included edition. Toronto, Royal Ontario Museum.

Pryor, F. (2001a) *Seahenge: a quest for life and death in Bronze Age Britain*. London, HarperCollins.

Pryor, F. (2001b) *The Flag Fen Basin: archaeology and environment of a Fenland landscape*. Archaeological report (English Heritage). Swindon, English Heritage.

QGIS-feature-tracker (2018) *[FEATURE][processing] New dbscan spatial clustering algorithm #2789*. [Online]. 2018. Available at: https://github.com/qgis/QGIS-Documentation/issues/2789. (Accessed: 27 February 2019).

Quinnell, H., Nowakowski, J., Lawson-Jones, A., Sturgess, J., Thorpe, C. and Thomas, C. (2008) *Gwithian, Cornwall: Excavations 1949-1969 [data-set]. York: Archaeology Data Service [distributor] https://doi.org/10.5284/1000200.* (Accessed: 27 February 2019).

Radford, C.A.R. (1953) Prehistoric Settlements on Dartmoor and the Cornish Moors. *Proceedings of the Prehistoric Society* 18 (1), 55–84.

Radivojević, M., Roberts, B.W., Pernicka, E., Stos-Gale, Z., Martinón-Torres, M., Rehren, T., Bray, P., Brandherm, D., Ling, J., Mei, J., Vandkilde, H., Kristiansen, K., Shennan, S.J. and Broodbank, C. (2019) The Provenance, Use, and Circulation of Metals in the European Bronze Age: The State of Debate. *Journal of Archaeological Research* 27 (2), 131–185.

Rahmstorf, L. (2019) Scales, weights and weight-regulated artefacts in Middle and Late Bronze Age Britain. *Antiquity* 93 (371), 1197–1210.

Rahtz, P. and ApSimon, A.M. (1962) Excavations at Shearplace Hill, Sydling St. Nicholas Dorset, England. *Proceedings of the Prehistoric Society* 28, 289–328.

Ralston, I. and Sabine, K.A. (2000) *Excavations of Second and First Millennia BC Remains on the Sands of Forvie, Slains, Aberdeenshire*. Aberdeen, Department of Geography & Environment, University of Aberdeen.

Ramsey, C.B. (1995) Radiocarbon calibration and analysis of stratigraphy: the OxCal program. *Radiocarbon*. 37 (2), 425–430.

Ramsey, C.B. (1997) Probability and dating. *Radiocarbon* 40 (1), 461–474.

Ramsey, C.B. (2009) Bayesian Analysis of Radiocarbon Dates. *Radiocarbon* 51 (1), 337–360.

Rasmussen, M. and Adamsen, C. (1993) Settlement. In: S Hvass and B Storgaard (eds.). *Digging into the past: 25 years of archaeology in Denmark*. Copenhagen : Hojbjerg, Royal Society of Northern Antiquaries ; Jutland Archaeological Society. pp. 137–144.

Rathbone, S. (2013) A Consideration of Villages in Neolithic and Bronze Age Britain and Ireland. *Proceedings of the Prehistoric Society* 79, 39–60.

Renfrew, C. (1973a) *Before civilization: the radiocarbon revolution and prehistoric Europe*. London, Cape.

Renfrew, C. (1973b) Monuments, mobilization and social organization in neolithic Wessex. In: C Renfrew (ed.). *The explanation of culture change: models in prehistory: proceedings of a meeting of the Research Seminar in Archaeology and Related Subjects held at the University ofSheffield*. London, Duckworth. pp. 539–558.

Renfrew, C. (1974) *British prehistory: a new outline*. London, Duckworth.

Reynolds, D.M. (1982) Aspects of later prehistoric timber construction in south-east Scotland. In: D W Harding (ed.) Later Prehistoric Settlement in South-East Scotland. Edinburgh, University of Edinburgh Occasional Papers 8.

Reynolds, P.J. (1979) *Iron-age farm: the Butser experiment*. Colonnade books. London, British Museum Publications.

Robbins, K.J. (2013) Balancing the Scales: Exploring the Variable Effects of Collection Bias on Data Collected by the Portable Antiquities Scheme. *Landscapes* 14 (1), 54–72.

Roberts, B. (2007) Adorning the Living but Not the Dead: Understanding Ornaments in Britain c. 1400–1100 cal BC. *Proceedings of the Prehistoric Society* 73, 135–167.

Roberts, B. (2013) Farmers in the Landscape or Heroes on the High Seas: Britain and Ireland in the Bronze Age. In: A. F. Harding and H Fokkens (eds.). *The Oxford handbook of the European Bronze Age*. Oxford handbooks in archaeology. Oxford, Oxford University Press. pp. 531–549.

Roberts, B. (2008) The Bronze Age. In: R Adkins, L Adkins, and V Leitch (eds.). *The Handbook of British Archaeology*. London, Constable & Robinson. pp.63-93

Roberts, B. and Frieman, C.J. (2012) Drawing boundaries and building models: investigating the concept of the ‘Chalcolithic frontier’ in Northwest Europe. In: M J. Allen, J Gardiner, and A Sheridan (eds.). *Is there a British Chalcolithic? people, place and polity in the later 3rd millennium*. Prehistoric Society research papers. Oxford, Oxbow. pp. 27–39.

Roberts, B., Uckelmann, M. and Brandherm (2013) Old father time: the Bronze Age chronology of Western Europe. In: A. F. Harding and H Fokkens (eds.). *The Oxford handbook of the European Bronze Age*. Oxford handbooks in archaeology. Oxford, Oxford University Press. pp. 17–46.

Roberts, B.K. (1996) *Landscapes of settlement: prehistory to the present*. London, Routledge.

Roberts, B.K. and Wrathmell, S. (2000) *An atlas of rural settlement in England*. London, English Heritage.

Robinson, G. (2013) Re-building memory, identity and place: the long-term re-use of prehistoric settlements on the Isles of Scilly. In: A.M., Chadwick and C.D. Gibson (eds.). *Memory, Myth, Place and Long-Term Landscape Inhabitation*. Oxford, Oxbow Books, pp. 146–164.

Ronan, D. and Higgins, J. (2005) Bronze Age settlement at Ross Bay, Kirkcudbright. *Transactions of the Dumfriesshire and Galloway Natural History and Antiquarian Society* 79, 47–70.

Rowlands, M. (1976) *The production and distribution of metalwork in the Middle Bronze Age in Southern Britain*. Oxford, British Archaeological Reports British Series 31.

Rowlands, M. (1980) Kinship, exchange and regional economies of the later Bronze Age. In: J Barrett and R Bradley (eds.). *Settlement and society in the British later bronze age*. Oxford, British Archaeological Reports British Series 83(i). pp. 15–55.

Rowley-Conwy, P. (2007) *From genesis to prehistory: the archaeological three age system and its contested reception in Denmark, Britain, and Ireland*. Oxford, Oxford University Press.

Rudling, D. (2002) Excavations adjacent to Coldean Lane. In: *Downland Settlement and Land-use. The Archaeology of the Brighton Bypass. London: Archetype publications for English Heritage*. pp. 141–201.

ScARF (2012) *3.4 Relative sea level changes during the last 15,000 years | ScARF*. [Online]. 2012. Available at: https://www.scottishheritagehub.com/content/34-relative-sea-level-changes-during-last-15000-years (Accessed: 27 February 2019).

Schmidt, P.K. and Burgess, C. (1981) *The axes of Scotland and northern England*. Prähistorische Bronzefunde. München, C.H. Beck'sche Verlagsbuchhandlung.

Schofield, J., Carman, J. and Belford, P. (2011) A History of Archaeology in Great Britain. In: *Archaeological practice in Great Britain: a heritage handbook*. World Archaeological Congress cultural heritage manual series. New York, Springer. pp. 25–40.

Schulting, R.J., Murphy, E., Jones, C. and Warren, G. (2012) New dates from the north and a proposed chronology for Irish court tombs. *Proceedings of the Royal*

Irish Academy. Section C: Archaeology, Celtic Studies, History, Linguistics, Literature. 112C1–60.

Scotland's environment (2019) *Scotland's Soils*. [Online]. 27 February 2019. Available at: https://soils.environment.gov.scot/maps/.

Scottish Natural Heritage (2019) *Landscape Character Assessment | Scottish Natural Heritage*. [Online]. 2019. Available at: https://www.nature.scot/professional-advice/landscape/landscape-character-assessment (Accessed: 27 February 2019).

Sharples, N.M. (2010) *Social relations in later prehistory: Wessex in the first millennium BC*. Oxford, Oxford University Press.

Sharples, N.M. and Parker Pearson, M. (1999) *Between land and sea: excavations at Dun Vulan, South Uist*. Sheffield Environmental and Archaeological Research Campaign in the Hebrides 3. Sheffield, Sheffield Academic Press.

Sheridan, J.A. (2003) New Dates For Scottish Bronze Age Cinerary Urns: Results From The National Museums Of Scotland Dating Cremated Bones Project. In: A.M. Gibson (ed.). *Prehistoric pottery: people, pattern and purpose*. Oxford, BAR international series 1156. pp. 201–226.

Sheridan, J.A. (2007) Dating the Scottish bronze age: 'There is clearly much that the material can still tell us'. In: C Bugess, P Topping, and F Lynch (eds.). *Beyond Stonehenge: essays on the bronze age in honour of Colin Burgess*. Oxford, Oxbow Books. pp. 162–185.

Sheridan, J.A., Larsson, M. and Parker Pearson, M. (2007) Scottish beaker dates: the good, the bad and the ugly. In: *From Stonehenge to the Baltic: Living with cultural diversity in the Third Millennium BC*. British Archaeological Reports International Series 1692. pp. 91–123.

Sheridan, J.A. and Shortland, A. (2003) Supernatural power dressing. *British Archaeology*. 18–23.

Sherratt, A. (1996) Why Wessex? The Avon route and river transport in later British prehistory. *Oxford Journal of Archaeology* 15 (2), 211–234.

Simmons, I.G. and Proudfoot, V.B. (1970) Environment and Early Man on Dartmoor, Devon, England. *Proceedings of the Prehistoric Society* 35, 203–219.

Simpson, D.D.A. (1971) Beaker houses and settlements in Britain. In: *Economy and settlement in Neolithic and early Bronze Age Britain and Europe*. pp. 131–52.

Simpson, D.D.A. (1976) The later Neolithic and Beaker settlement at Northton, Isle of Harris. In: D.D.A Simpson (ed.) *Settlement and Economy in the third and second millennia BC*. pp. 221–6. Leicester : Leicester University Press

Simpson, D.D.A., Murphy, E.M. and Gregory, R.A. (2006) *Excavations at Northton, Isle of Harris*. Oxford, British Archaeological Reports British Series 408.

Sites, R. (2015) *Collapse, continuity, or growth? : investigating agricultural change through architectural proxies at the end of the Bronze Age in southern Britain and Denmark*. Unpublished Ph.D. thesis, Sheffield, University of Sheffield.

Smith, K., Coppen, J., Wainwright, G.J., Beckett, S., Balaam, N., Berridge, G., Browse, R., Keeley, H., Macphail, R. and Wilkinson, T. (1981) The Shaugh Moor Project: Third Report—Settlement and Environmental Investigations. *Proceedings of the Prehistoric Society* 47, 205–273.

Smith, M.A. (1959) Some Somerset hoards and their place in the Bronze Age of Southern Britain. *Proceedings of the Prehistoric Society* 25, 144–187.

Smith, N. (2013) *Settlement and field patterns in the South Pennines : a critique of morphological approaches to landscape history in upland environments*. Unpublished Ph.D. thesis. Lancaster, Lancaster University.

Spillane, B. (2017) *A reassessment of Irish Middle and Late Bronze Age cremations: 1600 - 600 BC*. Unpublished Ma Thesis. Durham, Durham University.

Stanford, S.C. (1970) Credenhill Camp, Herefordshire: An Iron Age Hill-Fort Capital. *Archaeological Journal* 127 (1), 82–129.

Stevens, C.J. and Fuller, D.Q. (2012) Did Neolithic farming fail? The case for a Bronze Age agricultural revolution in the British Isles. *Antiquity* 86 (333), 707–722.

Stone, J.F.S. (1937) *A Late Bronze Age habitation site on Thorny Down, Winterbourne Gunner, S. Wilts*. Wiltshire Archaeological and Natural History Society.

Stone, J.F.S. (1941) The Deverel-Rimbury Settlement on Thorny Down, Winterbourne Gunner, S. Wilts. *Proceedings of the Prehistoric Society* 7, 114–133.

Tapper, R.Q. (2012) *Middle and Late Bronze Age settlement on the South Downs: the case study of Black Patch*. Unpublished Ph.D. thesis, Brighton, University of Sussex.

Tate, G. (1861) The Old Celtic Town of Greaves Ash, Near Linhope, Northumberland: With an Account of Diggings Recently Made Into this and Other Ancient Remains, in the Valley of the Breamish. *History of the Berwickshire Naturalists Club* 4, 293–316.

Tate, G. (1862) The Antiquities of Yevering Bell and Three Stone Burn, Among the Cheviots in Northumberland: With an Account of Excavations Made Into Celtic Forts, Hut Dwellings, Barrows and Stone Circle. *History of the Berwickshire Naturalists Club* 4, 431–453.

Taylor, J.A. (1975) The role of climatic factors in environmental and cultural changes in prehistoric times. In: J.G. Evans, S Limbrey, and H Cleere (eds.). *The effect of man on the landscape: the Highland Zone*. CBA research report. Nottingham. pp. 6–19.

Taylor, R.J. (1988) *Hoards : The interpretation and analysis of hoards of the Bronze Age in Southern Britain*. Unpublished Ph.D. thesis, Reading, University of Reading.

Terry, J. (1995) Excavation at Lintshie Gutter unenclosed platform settlement, Crawford, Lanarkshire, 1991. *Proceedings of the Society of Antiquaries of Scotland* 125, 369–427.

Thomas, J. (1991) *Rethinking the Neolithic*. New studies in archaeology. Cambridge, Cambridge University Press.

Tilley, C.Y. (1994) *A phenomenology of landscape: places, paths, and monuments*. Explorations in anthropology. Oxford, R.I, Berg.

Tilley, C.Y. (2010) *Interpreting landscapes: geologies, topographies, identities*. Explorations in landscape phenomenology 3. Walnut Creek, Calif, Left Coast Press.

Tinner, W., Lotter, A.F., Ammann, B., Conedera, M., Hubschmid, P., van Leeuwen, J.F.N. and Wehrli, M. (2003) Climatic change and contemporaneous land-use phases north and south of the Alps 2300 BC to 800 AD. *Quaternary Science Reviews* 22 (14), 1447–1460.

Tipping, R. (2002) Climatic Variability and 'Marginal' Settlement in Upland British Landscapes: A Re-Evaluation. *Landscapes* 3 (2), 10–29.

Tipping, R. (2016) Catastrophism, Climate Change, Colin Burgess and The Cheviot. In: R Crellin, C Fowler, and R. M. Tipping (eds.). *Prehistory without borders: the prehistoric archaeology of the Tyne-Forth region*. Oxford, Oxbow Books. pp. 191–199.

Tobler, W. (1993) Non-isotropic geographic modeling. *Technical Report*. [Online] 93–1. Available at: http://www.geodyssey.com/papers/tobler93.html (Accessed: 1 January 2019).

Toolis, R. (2005) Bronze Age pastoral practices in the Clyde Valley: excavations at West Acres, Newton Mearns. *Proceedings of the Society of Antiquaries of Scotland*. 135, 471–504.

Torfing, T. (2015) Neolithic population and summed probability distribution of 14C-dates. *Journal of Archaeological Science* 63, 193–198.

Treherne, P. (1995) The Warrior's Beauty The Masculine Body And Self Identity In Bronze-Age Europe. *Journal of European archaeology* 3 (1), 105–144.

Tringham, R. (1991) Households with faces The challenge of Gender in Prehistoric Architectural Remains. In: J. M Gero and M.W. Conkey (eds.). *Engendering archaeology: women and prehistory*. Oxford, Basil Blackwell. pp. 93–131.

Turnbull, J. (1862) On Edin's Hall. *History of the Berwickshire Naturalists Club*. 981–99.

Turney, C.S.M., Jones, R.T., Thomas, Z.A., Palmer, J.G., Brown, D. (2016) Extreme wet conditions coincident with Bronze Age abandonment of upland areas in Britain. *Anthropocene*. 13, 69–79.

Uckelmann, M. (2012) *Die Schilde der Bronzezeit in Nord-, West- und Zentraleuropa*. Prähistorische Bronzefunde. Abt. 3 Bd. 4. Stuttgart, F. Steiner.

Vander Linden, M. (2006) *Le phénomène campaniforme dans l'Europe du 3ème millénaire avant notre ère: Synthèse et nouvelles perspectives.* Oxford, British Archaeological Reports International Series 1470.

Waddington, C. (2009) A note of Neolithic, Bronze Age, Iron Age and Anglo-Saxon remains at Lanton Quarry near Milfield, Northumberland. *Iron Age and Anglo-Saxon remains at Lanton Quarry near Milfield, Northumberland.* Archaeologia Aeliana 5 (38), 23–29.

Waddington, C. and Passmore, D. (2016) Bronze Age Settlement: Some Considerations in the Light of Recent Results. In: R Crellin, C Fowler, and R. M. Tipping (eds.). *Prehistory without borders: the prehistoric archaeology of the Tyne-Forth region*. Oxford, Oxbow Books. pp. 179–190.

Waddington, K. (2013) *Settlements of Northwest Wales: from the late Bronze Age to the early medieval period*. Cardiff, University of Wales Press.

Waddington, K., Bayliss, A., Higham, T., Madgwick, R., Sharples, N. (2018) Histories of deposition: creating chronologies for the Late Bronze Age–Early Iron Age transition in Southern Britain. *Archaeological Journal* 176 (1), 84-133.

Wainwright, G.J., Fleming, A. and Smith, K. (1979) The Shaugh Moor Project: First Report. *Proceedings of the Prehistoric Society* 45, 1–33.

Wainwright, G.J., Smith, K., Balaam, N., Beckett, S., Fordham, S., Jenkins, C.A., Keeley, H., Keepax, C., Macphail, R., Otlet, R.L., Vincent, A., Walker, E.J. and Williams, D.F. (1980) The Shaugh Moor Project: Second Report—The Enclosure. *Proceedings of the Prehistoric Society* 46, 65–122.

Wake, T. (1939) Excavations at Witchy Neuk, Hepple. *Archaeologia Aeliana* 4 (16), 129–139.

Walsh, S. (2013) *Identity as process : an archaeological and osteological study of Early Bronze Age burials in northern England*. Unpublished Ph.D. thesis. Preston, University of Central Lancashire.

Warden, K., Caswell, Edward.J. and Roberts, B. (2016) Funerary fragments between the rivers: analysing the evidence for the dead in the Tyne–Forth region during the Late Bronze Age (c. 1150–800 BC). In: R Crellin, C Fowler, and R Tipping (eds.). *Prehistory without Borders - The Prehistoric Archaeology of the Tyne-Forth Region*. Oxford, Oxbow Books. pp. 156-167.

Warren, S.H. (1932) Prehistoric Timber Structures associated with a Briquetage Site in Lincolnshire. *The Antiquaries Journal* 12 (3), 254–256.

Waterbolk, H.T. (1971) Working with Radiocarbon Dates. *Proceedings of the Prehistoric Society* 37 (2), 15–33.

Waterson, R. (1990) *The living house: an anthropology of architecture in South-East Asia*. Singapore, OUP.

Webley, L. (2007) Using and Abandoning Roundhouses: A Reinterpretation of the Evidence from Late Bronze Age–Early Iron Age Southern England. *Oxford Journal of Archaeology* 26 (2), 127–144.

Webster, C.J. (2007) *The Archaeology of South West England South West Archaeological Research Framework Resource Assessment and Research Agenda*. Taunton, Somerset County Council.

Wendt, K. and Päffgen, B. (2003) Erstmals im Rheinland: ein Hofplatz der älter- bis mittelbronze-zeitlichen Hilversum-Gruppe bei Altdorf J Kunow (ed.). *Archäologie im Rheinland*. 58–59.

White, D.A. and Surface-Evans, S.L. (2012a) An Introduction to the Least Cost Analysis of Social Landscape. In: D White and S L. Surface-Evans (eds.). *Least cost analysis of social landscapes: archaeologicalcase studies*. Salt Lake City, University of Utah Press. pp. 1–10.

White, D.A. and Surface-Evans, S.L. (2012b) *Least cost analysis of social landscapes: archaeologicalcase studies*. Salt Lake City, University of Utah Press.

Whitefield, A. (2017) Neolithic 'Celtic' Fields? A Reinterpretation of the Chronological Evidence from Céide Fields in North-western Ireland. *European Journal of Archaeology* 20 (02), 257–279.

Whittle, A. (1985) Scord of Brouster and early settlement in Shetland, in B Smith (ed.) *Shetland archaeology: new work in Shetland in the 1970s*. Lerwick, Shetland Times. Pp. 1-26

Wilkin, N. (2013) *Food vessel pottery from Early Bronze Age funerary contexts in northern England: a typological and contextual study*. Unpublished Ph.D. Thesis. Birmingham, University of Birmingham.

Wilkin, N. (2017) Combination, composition and context: Readdressing British Middle Bronze Age ornament hoards (c. 1400–1100 cal. BC). In M, T. and R Weetch.

(eds.) *Dress and Society: Contributions from archaeology*. Oxford, Oxbow Books pp 14–47.

Wilkin, N. and Vander Linden, M. (2015) What was and what would never be: changing patterns of interaction and archaeological visibility across north-west Europe from 2500 to 1500 cal BC. In: H Anderson-Whymark, D Garrow, and F Sturt (eds.). *Continental Connections: Exploring cross-channel relationships from the Mesolithic to the Iron Age*. Oxford, Oxbow. pp. 99–121.

Williams, A.N. (2012) The use of summed radiocarbon probability distributions in archaeology: a review of methods. *Journal of Archaeological Science* 39 (3), 578–589.

Williams, R.A. and de Veslud, C.L.C. (2019) Boom and bust in Bronze Age Britain: major copper production from the Great Orme mine and European trade, c. 1600–1400 BC. *Antiquity* 93 (371), 1178–1196.

Wiseman, R. (2014) Social Distance in Hunter-Gather Settlement Sites: A Conceptual Metaphor in Material Culture. *Metaphor and Symbol* 29 (2), 129–143.

Wiseman, R. (2016) Social Distance in Settled Communities the Conceptual Metaphor, Social Distance is Physical Distance, in Action. *Journal of Archaeological Method and Theory* 23 (4), 1023–1052.

Wiseman, R. (2018) Random accumulation and breaking: The formation of Bronze Age scrap hoards in England and Wales. *Journal of Archaeological Science* 90, 39–49

Wolseley, G.R., Smith, R.A. and Hawley, W. (1927) Prehistoric and Roman Settlements on Park Brow. *Archaeologia* 76, 1–40.

Woodward, A. (2009) Chapter 8: the pottery. In: L Ladle and A Woodward (eds.). *Excavations at Bestwall Quarry, Wareham 1992-2005. Volume 1, the prehistoric landscape*. Dorset Natural History and Archaeological Society monograph series. Dorchester, Dorset Natural History & Archaeological Society. pp. 200–271.

Woodward, P.J. (1991) Chapter 4: The Excavations at Winterbourne Steepleton. In: *The South Dorset Ridgeway: survey and excavations, 1977-84*. Dorset Natural History and Archaeological Society monograph series. Dorchester, Dorset Natural History and Archaeological Society. pp. 39–55.

Wymer, J. and Brown, N. (1995) *North Shoebury: Settlement and Economy in South-East Essex 1500BC–AD1500*. Chelmsford, East Anglian Archaeology.

Yates, D.T. (2007) *Land, power and prestige: Bronze Age field systems in Southern England*. Oxford, Oxbow.

Yates, D., and Bradley, R. (2010a) Still water, hidden depths: the deposition of Bronze Age metalwork in the English Fenland. *Antiquity* 84, 405–415.

Yates, D., and Bradley, R. (2010b) The Siting of Metalwork Hoards in the Bronze Age of South-East England. *The Antiquaries Journal* 90, 41–72.

Young, R. and Hancocks, A. (2006) Early Bronze Age ring ditches and Romano-British agriculture at Showell Farm, Chippenham. Excavations in 1999. *Wiltshire Archaeological and Natural History Magazine* 99, 10–50.

Young, R. and Simmonds, T. (1995) Marginality and the nature of later prehistoric upland settlement in the north of England. *Landscape History* 17 (1), 5–16.