Chapter 1: Introduction

Forensic archaeology is a relatively new sub-discipline of archaeology that emerged out of the potential to apply systematic archaeological excavation and recording to the investigation and research of crime scenes and the recovery of human remains deposited through clandestine activities (Hunter *et al*., 1994: 758). In its developed form it can be defined as a sub-disciple of archaeology that involves the application of archaeological techniques and theories to assist in the process of a forensic investigation by providing evidence for use in legal proceedings (Darvill 2008: 162). Over the past decade this sub-discipline has gained credibility internationally, through the realisation that the utilisation of archaeologists in forensic investigations resulted in an improved rate of evidence recovery and documentation (Morse *et al.*, 1976; Sigler-Eisenberg 1985; Crist 2001; Sonderman 2001; Davenport and Harrison 2011). Consequently, forensic archaeologists are increasingly requested to participate in crime scene investigations both nationally and internationally, the majority of which revolve around the recovery of human remains from earth-cut graves.

Existing forensic archaeological literature is dominated by papers and reports that have been written by practitioners both in the academic and commercial sectors of the discipline. These have discussed the sub-field's development and the application of forensic archaeological techniques to various types and stages of forensic investigation, in particular, the excavation and recording of single and mass burials (Vanezis 1999; Haglund 2001; Haglund *et al*., 2001; Owsley 2001; Ferllini 2003; Blau 2004; Blau 2005; Blau and Skinner 2005; Hunter and Cox 2005; Oakley 2005; Connor 2007; Schultz and Dupras 2008; Blau and Ubelaker 2009). Whilst such publications are mostly of the same opinion regarding the value of forensic archaeology in domestic and international contexts, the question of forensic excavation and recording methodology is more divided, with scholars advocating different approaches to the examination of similar types of feature such as pits, ditches, and graves.

The greatest divergence relates to the excavation of single or mass graves. Some practitioners advocate various forms of the Arbitrary Excavation method (Bass and Birkby 1978; Morse *et al*., 1983; Brooks and Brooks 1984; Ubelaker 1989; Spennemann and Franke 1995; Pickering and Bachman 1997; Haglund *et al*., 2001; Stover and Ryan 2001; Oakley 2005; Burns 2006; Ruwanpura *et al*., 2006 and Connor

2007). Other practitioners suggest that a form of Block Excavation be used (Larson *et al*., 2011). In contrast, some scholars state that graves should be excavated using a form of sectioning, suggesting that either the Demirant or Quadrant Excavation methods be used (Hunter and Cox 2005; Dupras *et al*., 2006; Congram 2008; Hunter 2009 and Ruffell *et al*., 2009; Hunter *et al*., 2013). Alternatively, Wolfe Steadman *et al*., (2009) advocate a Vertical Slice Excavation method. Many other academics recommend that graves should be excavated using the Stratigraphic Excavation method (Powell *et al*., 1997; Connor and Scott 2001; Hunter *et al*., 2001; Hochrein 2002; Skinner *et al*., 2003; Hanson 2004; Blau 2005; Blau and Skinner 2005; Jessee and Skinner 2005; Skinner and Sterenberg 2005; Schultz and Dupras 2008; Cheetham and Hanson 2009, and Nuzzolese and Borrini 2010).

These divergences emphasise the lack of standardisation in forensic archaeological practice, a problem that can be attributed to the fact that forensic archaeological practitioners have uncritically adopted techniques, principles, and practices from the wider and long-established sub-discipline of field archaeology (Hunter *et al*., 1996; Drewett 1999).

In the field of archaeology, approaches to archaeological excavation and recording vary greatly from country to country, and have evolved to their current state according to the practices advocated by practitioners and professional bodies in their country of origin, and the inherited traditions present in each. Consequently, different excavation methods and recording systems are used by different archaeological practitioners in accordance with their individual preferences. These preferences, however, are largely determined by the site types from which an archaeological practitioner has gained their academic training and experience (Carver 2009; Carver 2011: 107). Thus, if an archaeologist had gained their academic qualifications and field experience in North America, working primarily on prehistoric burial sites lacking stratigraphy, they would be more likely to advocate an Arbitrary method of excavation and a Unit Level method of recording (Wheeler 1954; Pallis 1956; Willey and Sabloff 1980; Joukowsky 1980; Brooks and Brooks 1984; Ubelaker 1989; Hester 1997; Hochrein 1997; Pickering and Bachman 1997; Powell *et al*., 1997; Drewett 2000a-e). Whereas, if an archaeologist had gained their academic qualifications and field experience in the United Kingdom since 1980, working primarily on urban cemetery sites with complex stratigraphy, they would be

more likely to advocate a Stratigraphic method of excavation and a Single Context method of recording (Wheeler 1954; Pallis 1956; Praetzellis 1993; Harris 1979; Barker 1993; Hester 1997; Roskams 2001; Hanson 2004; Balme and Paterson 2006).

However, the adoption of a variety of different methodological approaches to the excavation and recording of single or mass graves from field archaeology into forensic archaeological practice poses a problem. The primary aim of forensic archaeological investigations is the provision of evidence to legal proceedings. Therefore, when archaeological investigations are conducted within a forensic context the methods utilised, and the evidence retrieved as a consequence of the investigation are held accountable to the admissibility regulations and the legal processes upheld by the courts in the country in which the investigation is being conducted and/or tried.

In general, the legal processes and admissibility regulations state that any techniques used during the course of a forensic investigation must have been subjected to empirical testing, peer review, have known error rates, have standards controlling their operation, and be widely accepted amongst the academic community from which they originate (Pepper 2005; Glancy and Bradford 2007; Hanzlick 2007; Edwards 2009; Klinker 2009; NAS Report 2009; The Law Commission 2009, 2011; Robertson 2009; Edmond 2010; Robertson 2010; Selby 2010). Therefore, if an archaeologist is to be accepted as an expert witness by legal practitioners, and the evidence retrieved as a consequence of an archaeological investigation is to be accepted by a court, the archaeologist must be able to demonstrate that the methods utilised during the course of the forensic archaeological investigation adhered to a widely accepted and tested archaeological investigatory process (Hunter and Knupfer 1996: 37). However, to date, no such forensic archaeological investigatory process has been established. Furthermore, no substantial empirical testing has been undertaken regarding archaeological excavation methods or recording systems, a point which was highlighted in a recent report published by the 'Committee on Identifying the Needs of the Forensic Sciences Community, National Research Council' (NAS Report 2009). As a consequence, much of the work undertaken through excavation by forensic archaeologists does not currently meet the admissibility regulations and legal requirements of the international court systems.

It follows that for the sub-field of forensic archaeology to continue to maintain credibility as a forensic discipline, it is necessary for the various archaeological

excavation methods and recording systems advocated by practitioners within the archaeological literature to be empirically tested, error rates to be established, and a peer reviewed protocol to be formulated. This will ensure that evidence gathered as a consequence of a forensic archaeologist's participation within a forensic investigation will not be dismissed from future court proceedings as inadmissible.

1.1 Research question

Against this background, the central question at the heart of this research is: do recognised archaeological excavation methods and recording systems used to recover evidence in forensic cases satisfy the legal tests of admissibility currently applied in the international courts?

1.2 Aim of the Research Project

The aim of this Project is to determine which, if any, of the various excavation methods and recording systems currently used in the United Kingdom, Ireland, Australasia and North America fulfil criteria for legal acceptance and best meet the needs of forensic archaeology. Burials and the recovery of human remains are the focus of attention in this research as these represent the majority of work in this sub-field, although the research has wider implications.

1.3 Objectives of the Research Project

Experimental studies conducted by Chilcott and Deetz (1964), Tuller and Đurić (2006), Pelling (2008), Evis (2009), Roberts (2009), and Scherr (2009) compared archaeological excavation methods to determine the impact that different methodological approaches had upon the retrieval of artefacts and the formulation of interpretations regarding an archaeological feature's formation process. In order to expand upon these experimental studies, and to establish the most effective archaeological excavation methods and recording systems to use during forensic archaeological investigations the following objectives were pursued:

1. To review, analyse and compare published academic literature and published/unpublished archaeological manuals/guidelines.

2. To identify the origins, development and current use of archaeological excavation methods and recording systems in the United Kingdom, Ireland, Australasia and North America.

3. To conduct interviews with field and academic archaeologists in order to evaluate how they excavate, and why and when they choose to use particular excavation methods and recording systems.

4. To create a controlled experiment through which differing archaeological excavation methods, recording systems and the affect of archaeological experience can be directly compared, contrasted and measured.

5. To examine the affect that factors such as archaeological excavation method, archaeological recording system, and archaeological experience have on archaeological investigations, including: the quality and quantity of evidence recovered, and the consistency of interpretation(s) regarding the site's formation process.

1.4 Structure of the thesis

The thesis is divided into two volumes, the second of which contains the results of the thesis. This unusual structure has been selected as the results chapters are particularly large, and by placing the results in a separate volume, the reader will be able to view the results with ease as they read the discussion chapters.

In Volume I Chapter 2, there is a literature review, in which four different subjects are explored. The first subject is the development of archaeological excavation methods and recording systems. The second subject is how archaeological excavation and recording methods have been adapted and applied to forensic investigations. The third subject is how the legal requirements of the international courts impact forensic archaeological investigations, and the fourth subject is how forensic archaeological practitioners have attempted to standardise forensic archaeological practice.

In Volume I Chapter 3, the methodological approaches used during the research in order to achieve the five objectives outlined above are discussed.

Volume II Chapter 7.1, contains the results from the archaeological manual/guideline analysis. These results are then explored in Volume I Chapter 4.1, in which the development, origins and current use of archaeological excavation methods and recording systems in the United Kingdom, Ireland, Australasia, and North America are discussed.

Volume II Chapter 7.2, contains the results of the interviews conducted with archaeological practitioners. These interview results are then used, in Volume I Chapter 4.2, to answer how archaeological practitioners excavate, and explain why and when archaeologists choose to use particular excavation methods and recording systems.

Volume II Chapter 8 and Volume II Chapter 8.1, contains the results of the grave excavation experiments. These results are first explored in Volume I Chapter 4.3, in which each of the excavation methods and recording systems tested are comparatively assessed, in order to determine how the different methodological approaches impacted the quality and quantity of evidence recovered during the grave excavation experiments.

The results presented in Volume II Chapter 8, are also used to examine, in Volume I Chapter 4.4, how the different methodological approaches tested impacted the construction of interpretation-based narratives of the formation sequence of the grave simulation.

The results presented in Volume II Chapter 8, are then used to explore, in Volume I Chapter 4.5, the impact that the length of time that archaeologists spent conducting the excavation experiment had on the quality and quantity of evidence recovered.

The results presented in Volume II Chapter 8, are finally used, in Volume I Chapter 4.6, to discuss the impact that archaeological experience had on the quality and quantity of evidence recovered during the grave excavation experiments.

In Volume I Chapter 4.7, the reasons why error rates are unable to be established for archaeological excavation methods and recording systems are discussed.

In Volume I Chapter 5, the conclusions of the research are presented. These state which of the excavation methods and recording systems tested best meets the needs of forensic

archaeology, and satisfies the legal and admissibility requirements of the international courts.

Volume I Chapter 6, contains recommendations for future research in this subject area, and highlights the methodological approaches that ought to be used by forensic archaeologists when conducting forensic archaeological investigations.

Chapter 2: Background

2.1 The development and use of archaeological excavation methods and recording systems

In order to examine the separate development and use of different archaeological excavation methods and recording systems, it is necessary to discuss the underlying theoretical principles, the practical application and the origins of the Stratigraphic Excavation method, the Quadrant Excavation method, the Demirant Excavation method and the Arbitrary Excavation method and their associated recording systems.

Archaeological excavation and recording

The processes of archaeological excavation and recording provide archaeologists with the methodological tools by which they are able to retrieve and record archaeological data that have been buried as a result of natural and/or man made processes (Clarke 1978; Barker 1993; Pavel 2010). This procedure is often referred to as a process of controlled destruction, which provides archaeologists with a singular opportunity to extract, define and record artefacts, features and stratigraphic units present within an archaeological site (Barker 1993; Roskams 2001; Harris 2006; Carver 2009). Once completed, this process allows archaeologists to formulate interpretations regarding the human activities that occurred at the site during a particular period in the past and changes in those activities through time (Harris 1989; Roskams 2001; Saul and Saul 2002).

Although the processes of archaeological excavation and recording are central to the recovery and documentation of archaeological data in the field of archaeology, methodological approaches vary internationally, with numerous archaeologists advocating differing methodologies for the excavation and recording of the same type of archaeological feature (Phillips *et al*., 1951; Wheeler 1954; Pallis 1956; Kjolbye-Biddle 1975; Harris 1979; Joukowsky 1980; Barker 1993; Roskams 2001; Carver 2009; Pavel 2010). This variation in methodological approaches is primarily due to the differential development of archaeological practice internationally.

The development of Stratigraphic Excavation

The principle of stratigraphy was first conceptualised in the field of geology during the eighteenth century by individuals such as Nicolaus Steno, William Smith and Sir Charles Lyell (Steno 1669; Smith 1815; Smith 1816; Lyell 1830; Lyell 1832; Lyell 1833; Gardner 1997; Dirkmaat and Adovasio 1997; Hochrein 2002). These geologists first recognised the concept of stratification; the process whereby geological layers of strata are continually laid down over time in a series of sequential layers one on top of the other (Renfrew 1973; Harris 1989; Barker 1993). Geological stratigraphy is the overall study and validation of geological stratification with a view to arranging geological strata into a chronological sequence (Renfrew 1973; Harris 1989; Barker 1993).

In archaeology, the process of stratification and the concept of stratigraphy is the same, however, archaeological stratification differs in that strata present within an archaeological site can be the result of both man made and/or natural processes (Harris 1989; Barker 1993). There are two types of archaeological stratigraphic unit. One is referred to as a layer/deposit/fill and the other is known as an interface.

Layers/deposits/fills have a mass, a physical presence within the site, and have been deposited within the site by either natural processes such as a flood, or anthropogenic processes such as the construction of a floor or the infilling of a pit (Barker 1993; Harris 1989; 2002).

Interfaces are surfaces created as a result of the deposition of a layer/deposit/fill or by the removal of an existing layer/deposit/fill. There are two types of interface – a vertical interface and a horizontal interface (Harris 1989; 2002). Every layer/deposit/fill has two interfaces, one above and one below (Barker 1993: 171). Unlike layers/deposits/fills, such interfaces are not able to be excavated and removed from a site, and must be recorded where they are found (Harris 1989; 2002; Dupras *et al*., 2006). Although the deposition of a layer/deposit/fill and the creation of an interface can be seen as being contemporaneous they are regarded and recorded as separate stratigraphic units, as there are occasions when the formation of an interface and the deposition of a layer/deposit/fill are not synchronous. A cut into existing layers/deposits/fills is an example of such an occasion where, for example, a ditch has been cut into existing

layers of strata and has been left open and at a later point in time been filled in; thus the creation of the ditch and the subsequent infilling are not contemporaneous and are therefore recorded as separate stratigraphic units (Harris 1989; 2002; Roskams 2001).

The process by which archaeological stratification occurs is governed by the following principles:

Principle Of Superposition: in a series of layers, as originally created, the upper units of stratification are younger and the lower older, as each must have been deposited on, or created as a result of the removal of, a pre-existing mass of archaeological stratification (Harris 1989: 30).

Principle Of Original Horizontality: any layer deposited in an unconsolidated form will tend towards a horizontal position; strata found with tilted surfaces were originally deposited that way, or lie in conformity with the contours of a pre-existing basin of deposition (Harris 1989: 31).

Principle Of Original Continuity: an archaeological layer as originally laid down, will be bounded by a basin of deposition or will thin down to a feather edge. If any edge of the layer is exposed in vertical view, part of its original context must have been removed by excavation or erosion and its continuity must be sought or absence explained (Harris 1989: 32).

Principle Of Stratigraphical Succession: any unit of archaeological stratification takes its place in the stratigraphic sequence of a site from its position between the lowest of all units which lie above it and the uppermost of all those units which lie below it and with which it has physical contact (Harris and Reece 1979: 113; Harris 1989: 34).

Principle Of Intercutting: if a feature or a layer/deposit/fill is found to cut into, or across, another layer/deposit/fill it must be more recent (Darvill 2008: 438).

Principle Of Incorporation: all artefactual and ecofactual material found to be contained within a layer/deposit/fill must be the same age or older than the formation of that layer (Darvill 2008: 438).

Principle Of Correlation: relationships can be inferred between layers/deposits/fills that exhibit the same characteristics, contain the same range of artefactual and ecofactual material, and occupy comparable stratigraphic positions within related stratigraphic sequences (Darvill 2008: 438).

It is by adherence to these principles that Stratigraphic Excavation is conducted, during which individual stratigraphic units, are excavated in their entirety, in the reverse order in which they were deposited from the latest to the earliest, see Figure 2.1 (Harris 1989; 2002; Barker 1993; Darvill 2000; Turnbaugh *et al*., 2002). In addition, any finds or samples retrieved during the excavation of a stratigraphic unit are recorded as originating from the stratigraphic unit from which they were obtained (Darvill 2000: 32). When using this excavation technique, an archaeological recording system known as Single Context Recording is used. When using this system of recording, each stratigraphic unit that is identified during the excavation is planned and recorded in three dimensions, as are any artefacts that were found or samples that were taken (Darvill 2000: 32). Consequently, this process allows archaeologists to recover and record the exact physical dimensions of each stratigraphic unit, and the relative chronology of deposition of the individual stratigraphic units present within the archaeological site (Harris 1989; 2002; Darvill 2000; Carver 2009). That, in turn, enables archaeologists to determine the stratigraphic sequence of the archaeological site (Harris 1989; 2002; Darvill 2000; Carver 2009). If the artefacts recovered during the archaeological excavation can be allocated a specific date of manufacture, then it is possible to allocate a *terminus post quem* or *terminus ante quem* for the relative deposition of the stratigraphic units and the creation of archaeological features present at the archaeological site (Harris 1989; 2002; Barker 1993).

The concept of Stratigraphic Excavation has long been recognised by archaeologists. As early as the nineteenth century archaeologists such as J.J.A Worsaae excavating Prehistoric sites in Denmark and Giuseppe Fiorelli excavating in Pompeii applied stratigraphic approaches to their excavations (Gamble 2001: 61), realising as Droop (1915:7-8) so eloquently phrased it – "if objects be taken out in a higgledy piggldey manner no subsequent knowledge of the history of accumulations will be of much avail". However, widespread utilisation of the Stratigraphic method of excavation did not occur until practitioners such as Geoffrey Wainwright excavated rural

archaeological sites at Tollard Royal and Gussage All Saints in Dorset, and Philip Barker excavated urban archaeological sites at Wroxeter and Shropshire (Wainwright 1968; 1979; Barker *et al.*, 1997; Darvill 2000: 32). Ever since, the Stratigraphic method of excavation has been continually advocated by numerous scholars including Barker (1997), Harris (1979; 1989; 2002), Roskams (2001), Hanson (2004) and Carver (2009) to name but a few, and has now become somewhat standardised practice for archaeological investigations conducted in the United Kingdom and Ireland.

The development of Quadrant and Demirant Excavation

The Quadrant Excavation method also adheres to the aforementioned principles of archaeological stratigraphy, and is an excavation method that tends to be used to excavate circular or negative archaeological features (Darvill 2000: 31; Carver 2009). This excavation approach is applied by dividing the archaeological feature that is to be excavated into four quarters (Atkinson 1946; Darvill 2000; Carver 2009). Subsequently, each quarter is excavated individually, with two opposing quarters being excavated first, as shown in Figure 2.2 (Atkinson 1946; Darvill 2000; Carver 2009). Occasionally, when utilising this excavation method, archaeologists leave either a cross-shaped or key-shaped baulk across the midline of the feature (Atkinson 1946; Darvill 2000; Carver 2009). However, the manner in which this excavation approach is applied is determined by the preferences of the archaeologist responsible for excavating the archaeological feature.

When using the Quadrant Excavation method, the recording of the stratigraphic units present relies not on plans, but on recording the long section and half section profiles that are exposed during the excavation process (Atkinson 1946; Darvill 2000; Carver 2009). This enables the sequence of deposition across the entire archaeological feature to be documented and reconstructed after the excavation has been completed.

Similarly, the Demirant Excavation method also adheres to the aforementioned principles of archaeological stratigraphy, and is primarily used to excavate circular or negative archaeological features that are too small in size for the Quadrant Excavation method to be used. This excavation method is applied by first dividing the archaeological feature that is to be excavated into two halves. Subsequently, each half is excavated separately, as shown in Figure 2.3 (Carver 2009; Darvill 2008).

When using the Demirant Excavation system, the recording of stratigraphic units relies on recording the half section face that is exposed once the first half of the archaeological feature has been excavated (Carver 2009; Darvill 2008). This enables the archaeologist to document the sequence of deposition of the stratigraphic units present, at the particular point at which the half section was set up.

The use of sectioning as a method to excavate, record and interpret archaeological features can be dated to the early 1920s and the work of Cyril Fox, who applied this approach to his excavation of Bronze Age round barrows in Wales (Darvill 2000: 31). Subsequently, these methodological approaches have continued to be used regularly in field archaeology to deal with both circular and cut features in the United Kingdom, Ireland and Continental Europe (Darvill 2000; Darvill 2008; Hunter and Cox 2005; Dupras *et al*., 2006; Ruffell *et al*., 2009; Litherland *et al*., 2011).

The development of Arbitrary Excavation

The excavation method known as Arbitrary Excavation is also referred to by other names including – the Unit Level method, the Planum technique and Metrical Stratigraphy (Hester *et al.,* 1997; Darvill 2000; Lucas 2001; Hanson 2004; Darvill 2008; Carver 2009).

It is an excavation method whereby an archaeological site is divided into individual excavation units, which are usually 1m x 1m in area (Darvill 2000: 31). The area within these excavation units is then excavated in a succession of separate arbitrary levels, each of which is completed before the next is excavated; such levels are usually 5cm, 10cm or 20cm in depth, see Figure 2.4 (Hester 1997:88; Darvill 2000). Each arbitrary level is regarded as a separate unit of stratification and artefacts retrieved from each arbitrary level are placed into a depositional sequence in relation to the arbitrary level from which they were recovered, in accordance with the principle of superposition (Hanson 2004; Darvill 2000). When using the Arbitrary Excavation method a recording system known as Unit Level Recording is used. When using this system of recording, archaeologists complete plans of each of the arbitrary levels that were excavated in

which any relevant soil colours, structures and deposits present are defined and drawn (Hester 1997; Darvill 2000: 31).

The process of Arbitrary Excavation originated in the Americas in the early twentieth century, as a result of the increased formalisation of American field archaeology and the rejection of the formally dominant concept of evolutionism; the belief that non-European peoples lacked any form of identifiable history (Lucas 2001). As a result, increased emphasis was placed upon the retrieval of artefactual evidence from archaeological sites, and the establishment of chronological sequences of material culture assemblages associated with non-European cultures that had existed prior to the European migration to the Americas in the fifteenth century (Willey and Sabloff 1980; Browman and Givens 1996; Lyman and O'Brien 1999; Lucas 2001).

As chronological sequencing of material culture assemblages found at archaeological sites came to dominate the concerns of American archaeologists, existing excavation techniques were adapted in what has come to be referred to as the 'stratigraphic revolution' in which the geological principles of stratification and stratigraphy became widely utilised to interpret archaeological sites, and provided a method by which archaeologists could contrast, compare and prove cross-site material culture sequences (Willey and Sabloff 1980; Lucas 2001). However, unlike in the United Kingdom, Ireland and continental Europe the methodological approaches used in order to understand stratigraphic sequences differed, in that Stratigraphic Excavation usually meant the recognition of evident stratification *post-facto* or via vertical section as the excavation proceeded in arbitrary levels, rather than excavation by recognition and adherence to identifiable stratigraphic units (Browman and Givens 1996; Lucas 2001).

The adoption of the Arbitrary 'Stratigraphic' Excavation approach has been attributed to the American archaeologists - Nels C Nelson (1916) excavating in South Western America and Manual Gamio (1930) excavating in Mexico. It is widely believed that Nelson adopted this excavation approach after excavating for a season at Castillo in Spain in 1913, during which he witnessed the process of Stratigraphic Excavation (Browman and Givens 1996; Lucas 2001). Subsequently, when he returned to North America it is thought that he was unsure of how to apply the Stratigraphic Excavation method he had utilised in Castillo to his excavations at San Cristóbal (Browman and Givens 1996; Lucas 2001). This resulted in Nelson setting up excavation units within

which he excavated using arbitrary one-foot levels and interpreted the stratigraphic sequence via vertical section (Browman and Givens 1996; Lucas 2001).

This Arbitrary Excavation method, pioneered by Nelson, was subsequently adopted by both North American and Latin American archaeologists as a standard excavation method and continues to be advocated by archaeologists within American excavation guidance literature (Brooks and Brooks 1984; Ubelaker 1989; Spennemann and Franke 1995; Browman and Givens 1996; Hester 1997).

Despite the widespread adoption of the Arbitrary Excavation methodology throughout North and Latin America, not all practitioners utilised this method of excavation. Archaeologists such as George Pepper, Alfred Kidder and Max Uhle preferred to excavate using natural stratigraphy, excavating in accordance to the identifiable stratigraphic boundaries present at archaeological sites (Browman and Givens 1996; Lucas 2001), believing that excavating arbitrarily "would have resulted in the splitting or cross-cutting of strata" (Kidder and Kidder 1917: 340). Although these archaeologists were contemporaries of both Nelson and Gamio, it appears that this excavation method was largely disregarded (Browman and Givens 1996; Lucas 2001). Archaeologists of the period appeared to prefer the Arbitrary method of excavation as it was simpler to employ and because the visible layers of stratification evident in North and Latin America tended to be the result of natural geological processes rather than anthropogenic processes (Browman and Givens 1996).

Nevertheless, in more recent American archaeological excavation guidance literature, excavation via natural stratigraphy is increasingly advised whenever possible (Hester *et al*., 1997). Although, as Lucas (2001) points out, despite the use of natural stratigraphy "the layer is still regarded as the primary element of a site; thus features such as pits are often described as disturbances to the stratigraphy rather than stratigraphy in their own right (Lucas 2001: 60; Joukowsky 1980: 150-7), which again differentiates the Natural Stratigraphic Excavation method from the Stratigraphic Excavation method used in the United Kingdom, Ireland and Continental Europe.

Having discussed the development of archaeological excavation methods and recording systems in field archaeology, it will be necessary to examine, in the following chapter,

how archaeological excavation methods and recording systems have been adapted and applied to forensic archaeological casework.

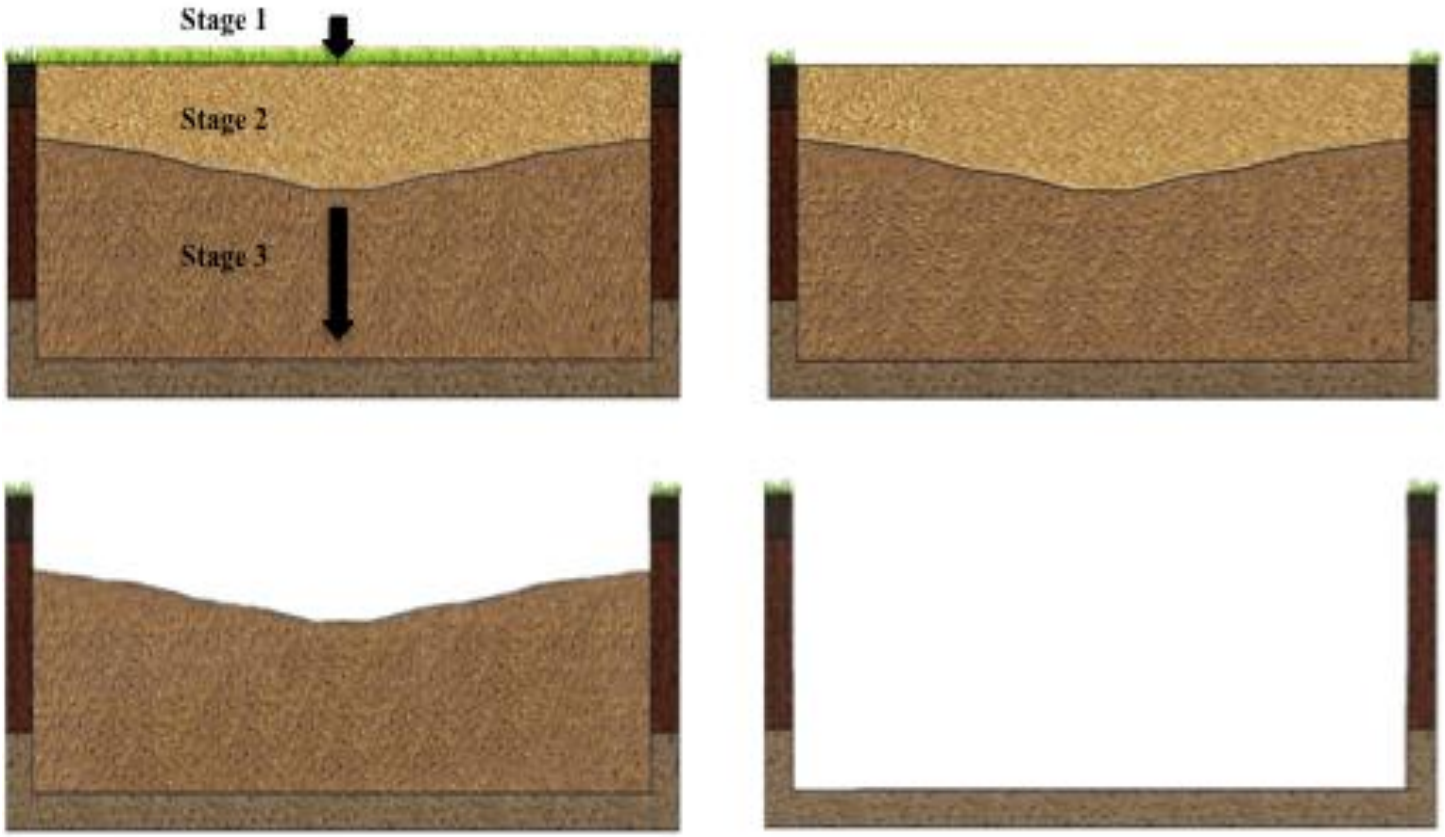


Figure 2.1: Illustrates the process of Stratigraphic Excavation.

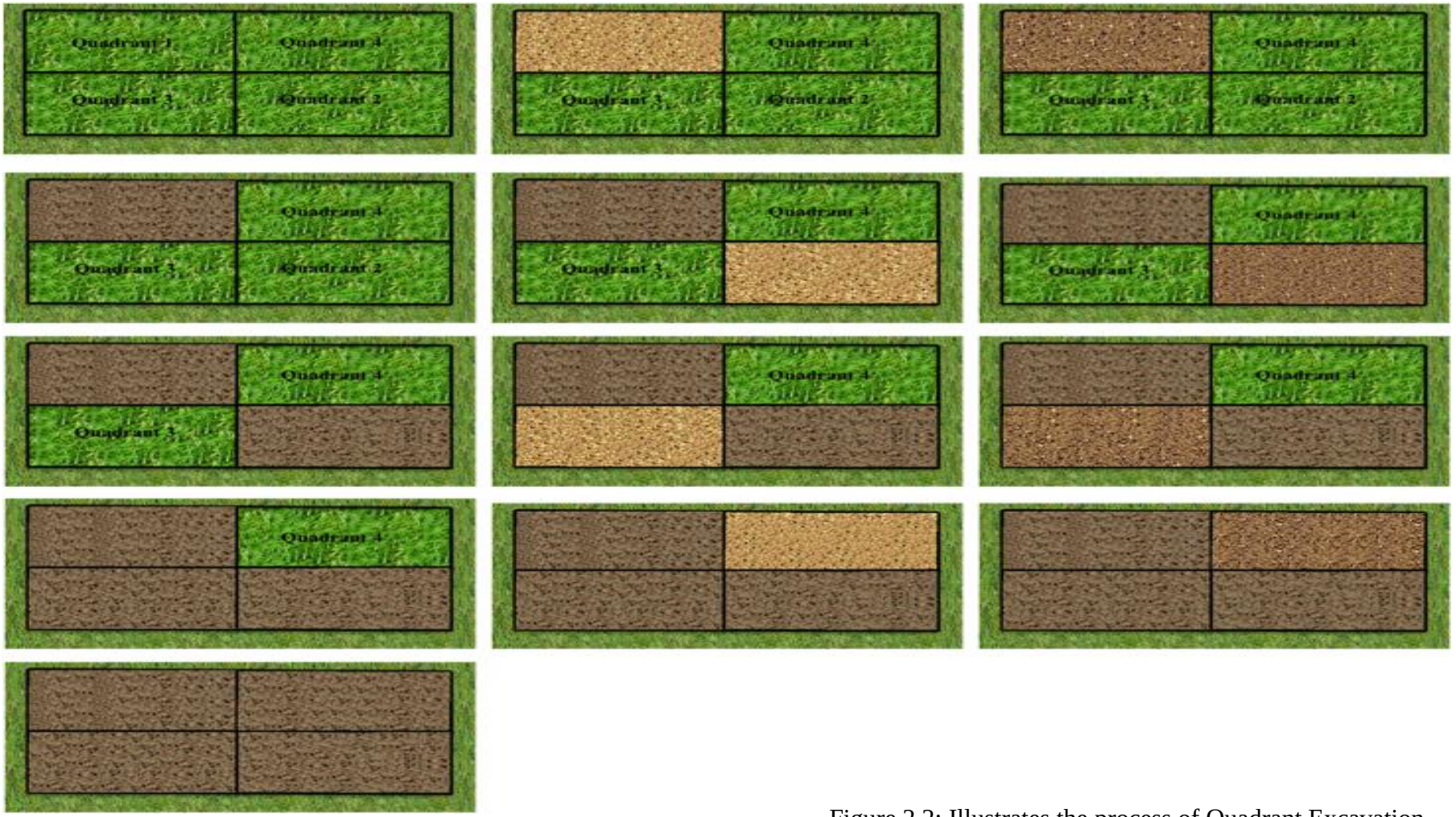
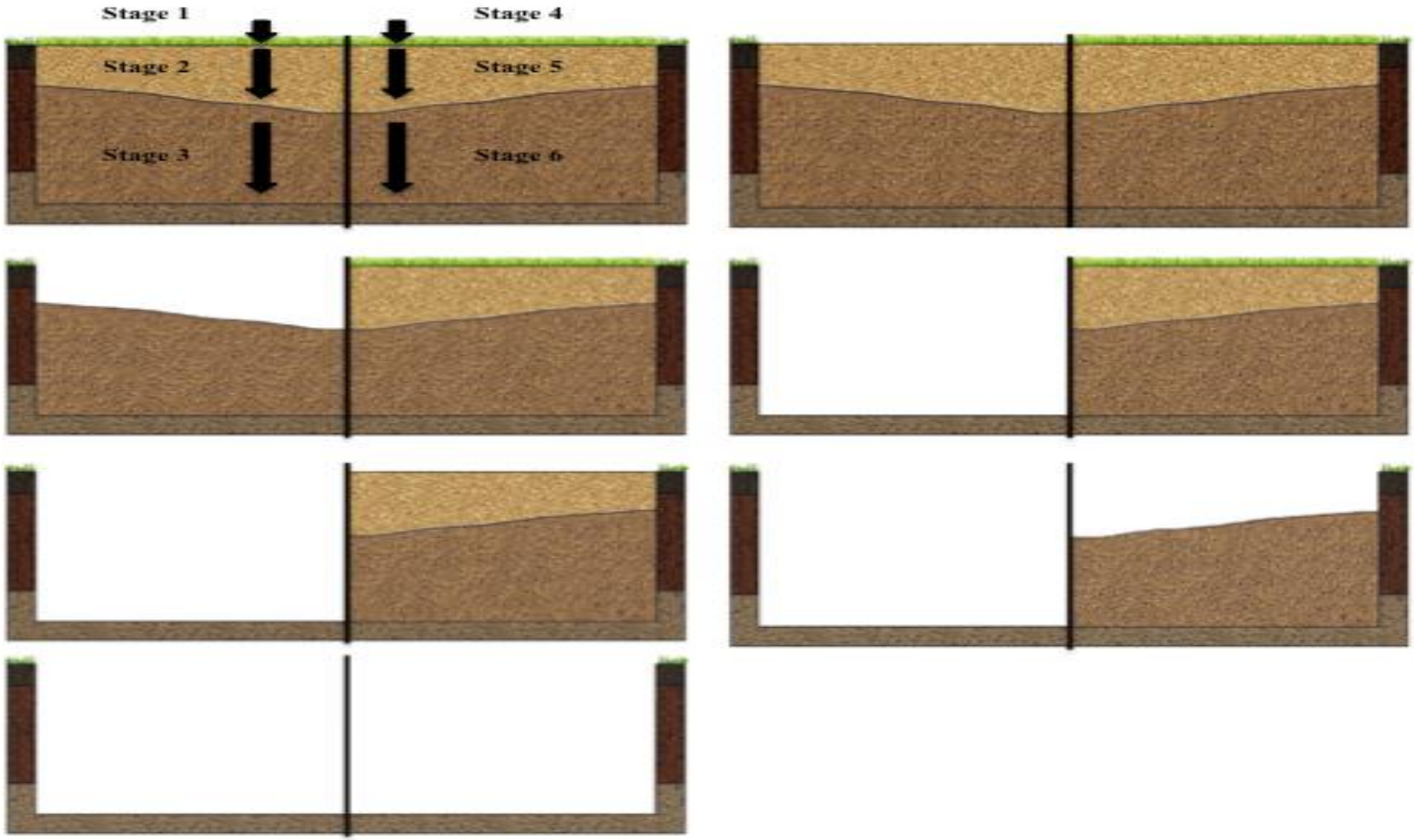


Figure 2.2: Illustrates the process of Quadrant Excavation.

Figure 2.3: Illustrates the process of Demirant Excavation.



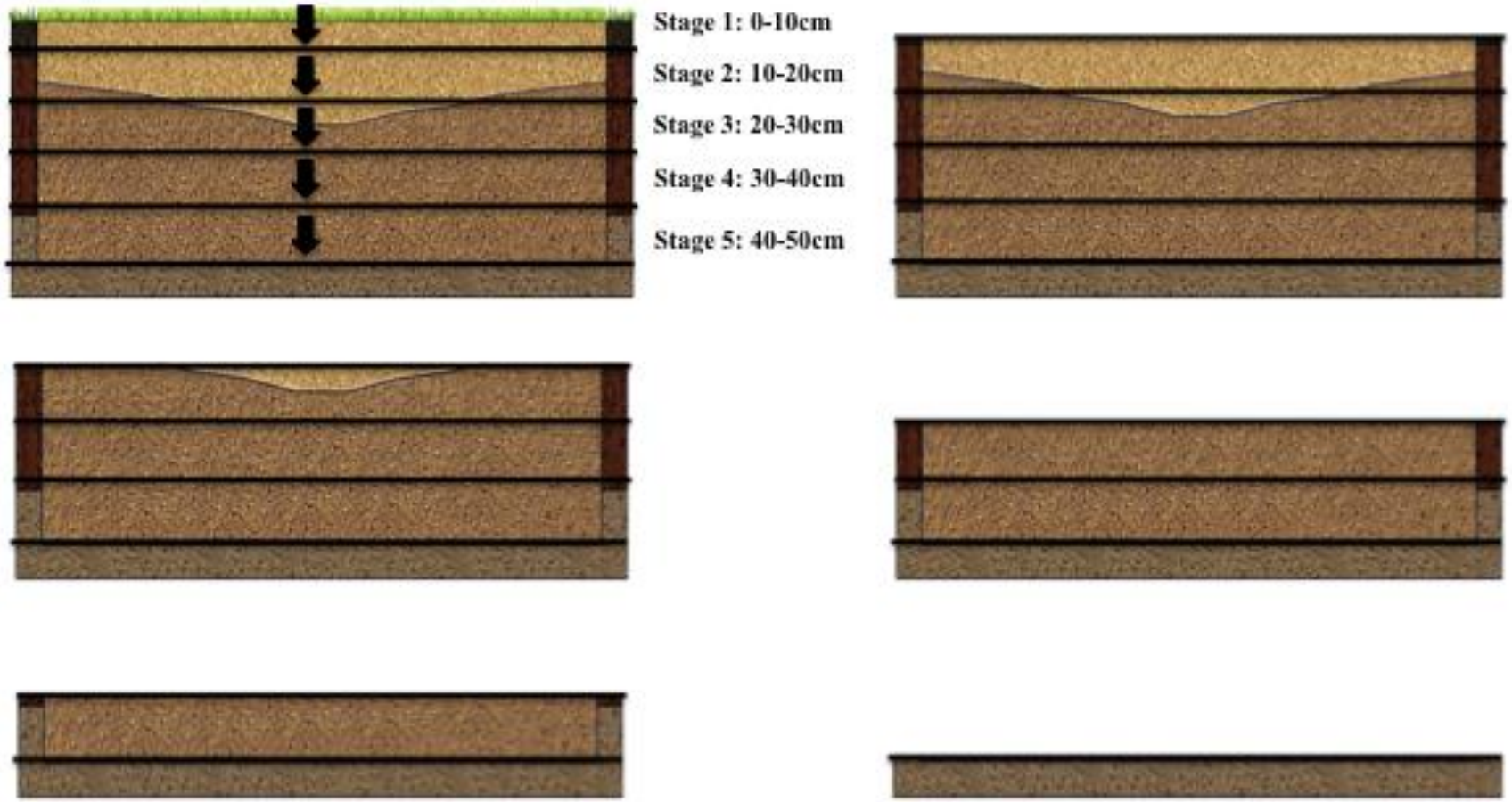


Figure 2.4: Illustrates the process of Arbitrary Excavation.

2.2 The adaptation and application of archaeological methods to forensic investigations

In order to effectively discuss the background to the application of forensic archaeology to the investigation of burials and mass graves numerous factors must be considered. Firstly, one must discuss the various roles and responsibilities that may be allocated to a forensic archaeologist during the process of a forensic investigation. One must also evaluate how the differential development of the discipline in the United Kingdom, Ireland, Australasia and North America has resulted in discrepancies in how the discipline's practitioners have come to define the discipline, and the impact that this has had upon the archaeological excavation methods that they have chosen to adopt. Finally, one must consider what qualifications and what level of experience a forensic archaeologist is expected to have gained in order to be qualified to participate in a forensic investigation.

Crime scene to court

The acceptance and utilisation of forensic archaeologists in criminal investigations of burials and mass graves has been a relatively recent development (Hunter *et al*., 1994: 758). Occasions during which forensic archaeologists are requested to participate in a forensic investigation in the United Kingdom, Ireland and Australasia are relatively rare, compared with their North American counterparts (Hunter and Cox 2005). This is largely due to the fact that these regions have lower homicide rates (Blau 2004; Donlon 2009; Skinner and Bowie 2009).

In recent years forensic archaeologists have been increasingly integrated into crime scene operations. This is due to greater public awareness of the discipline, and the fact that if a forensic archaeologist is not used, a defence barrister may call upon a forensic archaeologist to testify that the methodologies utilised were unsuitable, with the aim of having the evidence that was collected by unspecialised investigators dismissed from the court proceedings (Hunter and Dockrill 1996: 43).

However, the decision on whether or not to employ a forensic archaeologist in a crime scene investigation is left to the discretion of the case's Senior Investigator (Hunter and

Cox 2005; Menez 2005). Nonetheless, if a forensic archaeologist is brought in to assist with a forensic investigation, there are several requirements that the archaeologist must fulfil.

Firstly, upon arrival at the crime scene the forensic archaeologist must make sure that their entrance is recorded in the crime scene log (Pepper 2005: 109). Furthermore, due to the forensic nature of the investigation, the archaeologist must ensure that they are wearing a disposable crime scene suit and have either brought, or been provided with, sterile or new equipment in order to prevent contamination (Hunter and Knupfer 1996: 31; Pepper 2005: 177). It is advisable that the forensic archaeologist also has their sterile equipment photographed prior to starting any investigative work, to satisfy the court that no cross contamination may have occurred. It is then that the forensic archaeologist will be briefed by the Senior Investigator. Such briefings usually outline the background of the case and involve a discussion of what evidence the investigators believe may be present at the crime scene (Pepper 2005).

If the investigators require the archaeologist to identify the location of a clandestine grave, the archaeologist will then establish a grid, and then proceed to inspect the site in order to identify and record the presence of surface indicators associated with the creation of a grave (Rodriguez and Bass 1985; Killam 2004; Dupras *et al*., 2006: 38).

There are four types of surface indicators that may be present at an interment site. The first indicator is changes to vegetation (Hunter and Martin 1996; Killam 2004; Hunter and Cox 2005: 30). These changes are induced by the process of digging the grave and placing human remains within it. Depending on the species of plants present at the gravesite, the increase in nutrients, provided by the decomposition of the body, will either promote plant growth or retard plant growth on top of and around the grave (Morse *et al*., 1983; Killam 2004; Hunter and Cox 2005).

The second indicator is the presence of disturbed soil. Soil disturbances occur due to the fact that "one can never dig in the ground and put the dirt back exactly as nature had put it there originally" (Bass and Birkby 1978:6). Such disturbances take the form of colour or textural differences between the disturbed soil contained within the grave and the undisturbed soil surrounding it (Morse *et al*., 1984; Killam 2004; Hunter and Cox 2005: 32; Dupras *et al*., 2006). Additionally, due to the fact that space is taken up within the

grave by the placement of human remains, perpetrators are often left with an excess of soil after backfilling. Consequently, this soil is often piled on top of the grave resulting in the creation of a soil mound (Killam 2004; Hunter and Cox 2005: 31).

The third indicator is the presence of depressions on the ground surface. Primary depressions are triggered by the settlement of soil contained within the grave over the course of time (Killam 2004; Dupras *et al*., 2006). This results in the grave's surface sinking beneath that of the surrounding undisturbed ground. Secondary depressions are caused by the collapse of the victim's abdominal cavity during decomposition (Morse *et al*., 1983). When this occurs, the soil that had been resting on top of this cavity falls into it, resulting in the creation of a small secondary depression on the grave's surface, over the area where the victim's abdomen once was (Killam 2004: 35).

The fourth indicator is the presence of animal activity (Rodriguez and Bass 1985; Dupras *et al*., 2006). When human remains are contained within a grave it often attracts scavengers. These scavengers attempt to gain access to the remains by burrowing into the grave, resulting in signs of digging around the area in which the grave is located (Killam 2004: 36; Dupras *et al*., 2006).

In addition to surface indicators, the forensic archaeologist may also employ geophysical surveying techniques such as: earth resistivity, magnetometry, electromagnetic systems, or ground penetrating radar (Bevan 1991; Davenport 2001a; Davenport 2001b; Killam 2004; Cheetham 2005; Dupras *et al*., 2006). These techniques allow the archaeologist to measure and map the properties of the investigative area's sub-surface. Such properties include its "acoustic, electrical, magnetic and electromagnetic" characteristics (Cheetham 2005: 65). It is by identifying regions within the survey area that have measurably different properties from those surrounding it that the archaeologist is able to detect possible grave locations. These regions are commonly referred to as 'anomalies' or 'hot-spots' (Cheetham 2005: 65).

If any surface indicators or sub-surface anomalies are identified during the search phase of the investigation they are drawn, photographed and/or videoed, and digitally recorded using a Total Station, or its technological equivalent (Hunter and Dockrill 1996: 52; Menez 2005). Moreover, if potential evidentiary artefacts are located they are also recorded using the same techniques. Once recorded, these artefacts are then signed over

to the investigator who is in charge of exhibits, so that they can be packaged and labelled in the appropriate manner. This ensures that the chain of custody is maintained, and that the artefactual evidence is admissible in court (Hunter and Cox 2005).

Once potential grave locations have been identified, the forensic archaeologist must then conduct an invasive evaluation in order to confirm or discount the presence of a grave. The invasive evaluation involves two steps. The first step is to excavate a test pit, away from the potential grave locations, in order to evaluate the natural geological composition of the site (Wright *et al*., 2005: 147; Congram 2008: 794). The findings from this test pit will then be used to identify areas in which the natural geology of the site has been disturbed, potentially due to the excavation and backfilling of a grave.

The second step is to excavate rectangular sondages across the width of each of the potential graves in order to identify disturbances to the natural geology of the site, and to locate the presence of human remains (Hunter and Cox 2005). If human remains are found, the forensic archaeologist can then confirm to the Senior Investigator that they have identified the grave. It is at this point that the Coroner or Medical Examiner is notified that human remains have been found, and their permission is requested to continue the investigation (Hunter and Knupfer 1996; Hunter and Cox 2005).

Having obtained permission to continue, the forensic archaeologist then proceeds to excavate the grave. There are a variety of approaches to excavating such features. Practitioners such as Brooks and Brooks (1984), Ubelaker (1989), Spennemann and Franke (1995), Pickering and Bachman (1997), Haglund *et al*., (2001), Stover and Ryan (2001), Oakley (2005), Burns (2006), and Ruwanpura *et al*., (2006) state that access trenches should be excavated around the outline of the identified grave cut, and that excavation should proceed in a series of arbitrarily defined spits, removing both the material contained within the grave feature and the access trenches surrounding it. Any human remains or artefacts found during the excavation process should be left upon a soil pedestal until they have been recorded. Such items can then be removed and transferred to the relevant processing facility.

Similarly, Bass and Birkby (1978), Morse *et al*., (1983), and Connor (2007) recommend that the grave should be excavated in a series of arbitrarily defined spits, and that any human remains or artefacts uncovered during the excavation should be left upon a soil

pedestal. However, unlike the former set of academics they suggest that the grave cut should be maintained throughout the excavation process.

In contrast, Larson *et al*., (2011) suggest that a trench should be excavated around the outline of the grave cut until the bottom of the grave has been reached. The grave should then be undercut and a forensic platform slid underneath the human remains and the in situ grave fill. This 'grave block' is then transferred into a specially designed evidence bag and shock-resistant container. The 'grave block' is then transported back to the laboratory and excavated in controlled laboratory conditions.

Unlike the previous academics Hunter and Cox (2005), Dupras *et al*., (2006), Ruffell *et al*., (2009), Litherland *et al*., (2012), and Hunter *et al*., (2013) state that the grave should be excavated using the Demirant Excavation method. When using this method, the excavation process is contained to within the boundaries of the grave cut. Once the outline of the grave has been defined, the grave is then divided into two halves, each of which are excavated separately. Likewise, Hunter (2009) suggests that the grave cut should be maintained, and that the feature should be divided and excavated following the Demirant Excavation method. However, he recommends that a baulk, along the mid-line of the grave, should be left in place until the end of the excavation process.

Alternatively, Congram (2008) recommends that the Quadrant Excavation method be used. When using this method the grave cut is maintained, but the grave feature is divided into four different quarters, each of which are excavated separately.

In contrast, Wolfe Steadman *et al*., (2009) advocate a method in which the grave's boundaries are maintained, but the grave's fill is excavated by vertically slicing through the fill from one side of the grave to the other. The size of the individual slices is dependent upon the size of the grave that is being excavated, and is left to the discretion of the archaeologist.

Conversely, Powell *et al*., (1997), Connor and Scott (2001), Hunter *et al*., (2001), Hochrein (2002), Skinner *et al*., (2003), Hanson (2004), Blau (2005), Blau and Skinner (2005), Jessee and Skinner (2005), Skinner and Sterenberg (2005), Schultz and Dupras (2008), Cheetham and Hanson (2009), and Nuzzolese and Borrini (2010) argue that the grave should be excavated using the Stratigraphic Excavation method. When using this

method, the grave cut is maintained, and each of the fills contained within the grave are defined and excavated in isolation, in the reverse order of their deposition – "last in = first out" (Congram 2008: 794).

During the excavation, it is crucial that the forensic archaeologist identifies and records any geotaphonomic features that may be present. These features are categorised into six groups: stratification, tool marks, bioturbation, sedimentation, compression/depression, and internal compaction (Hochrein 1997; Hochrein 2002). Such features can indicate: the method by which the grave was constructed, whether or not the grave had been left open prior to the placement of human remains within it, whether or not the perpetrator(s) stood in the grave when constructing it, whether or not the victim was alive when placed into the grave, and whether or not the grave has been disturbed by scavengers during the time period between the human remains interment and subsequent excavation (Hochrein 1997; Hochrein 2002; Menez 2005; Wright *et al*., 2005). Such features can therefore provide evidence to determine whether or not the crime was pre-meditated, which will have significance when the case goes to court, and assist the forensic archaeologist in reconstructing the sequence of events that occurred from the point at which the grave was created up until its excavation (Hunter and Cox 2005; Cox *et al*., 2008).

In addition to geotaphonomic evidence, the grave may also contain entomological, toxicological, and botanical evidence. If such evidence is identified, it is best practice to request assistance from the relevant specialist to ensure that the correct sampling and collection procedures are adhered to (Dirkmaat and Adovasio 1997; Hunter *et al*., 2001; Cox *et al*., 2008).

In regards to the human remains, once they have been uncovered it is a legal requirement for a medical professional to declare that "life is extinct" (Pepper 2005: 111). It is also the point at which a forensic pathologist is required to attend the scene in order to supervise the removal of the human remains and any sampling (Hunter and Cox 2005:6; Pepper 2005: 111). If the remains are skeletonised, a forensic anthropologist may also be requested to assist with the removal and recording of the skeletal remains (Hunter *et al*., 1996; Hunter and Cox 2005: 7).

It is essential that the entire excavation process is documented either in written form – site journals or pre-prepared pro-formas, or in a digital format – digital photographs or digital videos, preferably both (Dirkmaat and Adovasio 1997; Hunter and Cox 2005; Pepper 2005; Cheetham *et al*., 2008). Such records should contain: descriptions of the stratigraphic contexts associated with the grave, a list of the evidence that was found in the grave as well as the exact spatial location in which each piece was found, and a plan of the grave structure (Hunter *et al*., 1996; Hunter and Cox 2005; Menez 2005; Dupras *et al*., 2006). This recording procedure is important, as the process of excavating a grave is destructive, and the records made during the excavation are the only remaining evidence of what was contained within the grave, and, provide the means by which the forensic archaeologist can construct and support their narrative of the sequence of events that occurred from the point at which the grave was dug to the time at which it was excavated (Adams and Valdez 1997; Crist 2001; Saul and Saul 2002; Dupras *et al*., 2006: 107).

Having completed the excavation the forensic archaeologist will then be required to write a report. This report will be submitted to the court as evidence. Such reports are required to:

- Contain the expert's qualifications, relevant experience and accreditation.
- Provide references of any literature that the expert has relied upon whilst making the report.
- Contain a statement summarising all of the facts that were given to the expert which were influential in forming their opinion.
- Outline which of the facts stated in the report are within the expert's expertise.
- State who carried out any examination, measurement, test, or experiment, which the expert has used in the report, and provide the qualifications, relevant experience and accreditation of that person.
- Provide a summary of the expert's findings.

- If there is a range of opinion regarding matters considered in the report, the expert should summarise these opinions, and give the reasons for their own.

- Contain a summary of the conclusions reached.

- Include a statement which explains that the expert has understood their duty to the court, and that they have complied and will continue to comply with this duty throughout the proceedings.

- Include the same declaration of truth as is found in a witness statement.

Having provided the court with the report the forensic archaeologist may then be required to appear in court as an expert witness. This, however, is dependent upon the defendant's plea. If they plead 'guilty' the forensic archaeologist's report will not be contested in the courtroom (Dilley 2005: 196). Whereas, if the defendant pleads 'not guilty', on the basis that the expert evidence is inaccurate, or the investigation was mishandled in some manner, then the forensic archaeologist may be required to give evidence to the court as an expert witness (Dilley 2005: 196). In this role, the forensic archaeologist must assist the court, including barristers, judges, and juries, to understand the technical or scientific data contained within their report that the court deems to be beyond the understanding of the average lay person (Hampton 2004; Dilley 2005; Hunter and Cox 2005). In order to be effective during this process, the forensic archaeologist must ensure that they are "fully cognisant with the contents of their report" (Dilley 2005: 197). This will ensure that the forensic archaeologist is able to present and defend their findings in a convincing and credible manner, during both the examination-in-chief and cross-examination stages of the court proceedings.

International perspectives

Forensic archaeology can be defined as the practical application of archaeological methods and theories to aid in the identification, investigation and interpretation of sites of legal interest (Killam 2004; Oakley 2005; Dupras *et al*., 2006: 5; Cox *et al*., 2008: 216). Most often, forensic archaeological work is focused upon the recovery of human remains (Rainio *et al*., 2001; Jankauskas *et al*., 2005; Gojanović and Sutlović 2007; Komar and Buikstra 2008; Borić *et al*., 2011). However, in recent years, the discipline's

practitioners have become involved in criminal investigations that have sought to recover buried stolen goods, weaponry, and ransom money (Oakley 2005; Cheetham and Hanson 2009). Forensic archaeologists have also assisted in civil investigations in which land boundaries have been under dispute (Pers. Comm. P. Cheetham 2012). It is through involvement in such cases that the discipline of forensic archaeology has become widely accepted as a specialist forensic discipline, both domestically and internationally.

However, despite the discipline's wide scale acceptance within the forensic community, differences in terms of the origins and subsequent development of the discipline internationally, have resulted in discrepancies in how its practitioners have come to define the sub-field of forensic archaeology and the manner in which they have utilised archaeological methodologies during the process of a forensic investigation.

It was in North America where the beneficial application of archaeological techniques and theories to forensic investigations was first recognised by anthropologists such as: Krogman (1943), Morse *et al*., (1976), and Snow (1982) who highlighted how the application of archaeological methodologies to the excavation and recording of graves would result in a better understanding of the grave's formation process and a greater rate of evidence recovery. As with traditional archaeology, universities providing training facilities in forensic archaeology in North America are subsumed under the auspices of anthropology departments, resulting in individuals training in the field of forensic anthropology to regard themselves as "cross-trained between physical anthropology and archaeology" (Scott and Connor 2001: 101).

The extent to which the discipline has developed in North America can be gauged by the fact that North American forensic anthropologists have become increasingly involved in homicide investigations, particularly in cases where investigators are attempting to locate and recover buried human remains (Dupras *et al*., 2006; Connor 2007; Schultz and Dupras 2008; Skinner and Bowie 2009; Larson *et al*., 2011). Moreover, such practitioners are now included in the majority of State and Federal mass disaster teams, and have assisted in recovery operations such as: the World Trade Centre investigation in New York in 2001, and the Rhode Island night club fire investigation in 2003 (Blau 2005).

Due to the increase in interest in forensic anthropology and archaeology universities such as: the University of Montana, Texas State University, Boston University, the University of Tennessee, the University of Florida, the University of Indianapolis, Adelphi University, Mercyhurst Archaeological Institute, St. Mary's University, the University of Toronto, the University of Windsor, and Simon Fraser University have developed courses specialising in forensic archaeology and anthropology. Furthermore, forensic archaeology field schools have been developed by establishments such as Florida State University and the American Academy of Forensic Sciences (AAFS) in conjunction with local law enforcement departments in order to train police investigators in forensic archaeological techniques (Crist 2001; Hunter *et al*., 1996: 21; Schultz and Dupras 2008).

Notably, North American forensic anthropologists are not only being used domestically. Due to the recognition of the discipline's capabilities in regards to the recovery of human remains, numerous organisations have been founded including: Physicians for Human Rights (PHR) in 1986, Necrosearch International in 1991, the International Commission on Missing Persons (ICMP) in 1996, and the POW/MIA Accounting Command (JPAC) in 2002, all of whom employ forensic anthropologists to recover the remains of missing persons, whether it be working in collaboration with organisations such as the United Nations, as was seen with the use of North American forensic anthropologists in the missing persons recovery operations during the International Criminal Tribunal for the Former Yugoslavia (ICTY) and the International Criminal Tribunal for Rwanda (ICTR), or recovering the remains of American soldiers who have been killed in action (Hunter and Cox 2005; Juhl 2005; Dupras *et al*., 2006; Skinner and Bowie 2009: 94).

Similarly, in the United Kingdom and Ireland, forensic archaeological expertise has been "increasingly utilised in the search, location and recovery of materials associated with buried crime scenes" (Oakley 2005: 170; Ruffell *et al*., 2009; Davenport and Harrison 2011). Unlike North America, forensic archaeology in the United Kingdom and Ireland is not regarded as a sub-discipline of forensic anthropology, but as a discipline in its own right, concerned primarily with excavation and field skills (Hunter *et al*., 1996; Hunter and Cox 2005; Blau and Ubelaker 2009). Thus, when forensic archaeologists are invited to partake in forensic investigations, they are first and

foremost archaeologists, rather than physical anthropologists (Scott and Connor 2001). Forensic archaeology's widespread acceptance in the United Kingdom owes much to the discipline's formal accreditation by the Council for the Registration of Forensic Practitioners (CRFP), allowing for its acceptance amongst other forensic fields that have long been utilised in forensic investigations (Ebsworth 2000; Kershaw 2001). However, since the CRFP's disbandment in 2009, formal accreditation of the discipline and its practitioners has been transferred to the Institute for Archaeologists Forensic Archaeology Special Interest Group, which was formed in 2011, which accredits its members according to their experience, publications and qualifications.

The increase in awareness of the discipline of forensic archaeology also resulted in the formation of university post-graduate courses at: Bournemouth University, Cranfield University, the University of Bradford, and University College London, each of which focus on training individuals in the principles and practices of forensic archaeology (Menez 2005). In addition, increasing involvement of forensic archaeologists in criminal investigations dealing with the recovery of human remains has resulted in the integration of forensic archaeological methods into the basic training programmes of Police Search Advisors (POLSA) and Crime Scene Investigators (CSI) (Hunter and Cox 2005: 6).

The presence of forensic archaeological expertise in the United Kingdom and Ireland has also led to the formation of organisations such as: the Centre for International Forensic Assistance (CIFA) in 2001, and the International Centre of Excellence for the Investigation of Genocide (INFORCE) in 2001. Both of these organisations employ forensic archaeologists to assist with the recovery of human remains in investigations of human rights abuses, war crimes, genocide, and mass disasters (Hunter and Cox 2005: 23; Cox 2009: 32).

In Australasia, the situation is somewhat different. Despite Australian forensic archaeologists becoming involved in the international investigations of mass graves at Serniki (1990) and Ustinovka (1991) in the Ukraine (Wright 1995), and in domestic contexts such as the search for Samantha Knight (McDonald 1999) and the exhumation of Sally Anne Huckstepp (Donlon 2009), and universities such as: James Cook University, the University of Adelaide, Flinders University, the University of Queensland, the University of New England, and the Australian National University

offering degree programmes in forensic archaeology (Colley 2004; Donlon 2009), the expertise of forensic archaeologists in domestic cases is relatively underutilised as an investigative tool in Australia, New Zealand, New Guinea and the surrounding Pacific Islands (Blau 2004; Blau 2005; Oakley 2005; Pers. Comm. R. Wright 2011). Moreover, the discipline of forensic archaeology is also yet to be recognised by the Senior Managers of Australian and New Zealand Forensic Laboratories (SMANZFL) and its associated Scientific Advisory Group (SAG) (Donlon 2009; Pers. Comm. S. Blau 2011). However, in the relatively few cases in which Australasian practitioners have been invited to assist in forensic investigations, forensic archaeologists and forensic anthropologists have been utilised separately (Pers. Comm. R. Wright 2011).

Despite the underutilisation of forensic archaeology in Australasia, the discipline's practitioners have established an organisation known as Australian – Forensic Archaeology Recovery (Aus-FAR) in 2003, whose members provide forensic archaeological expertise when required (Blau 2005: 20). Additionally, Australian forensic archaeologists have become involved in the creation of Australian Disaster Victim Identification (DVI) programmes and have been added to their list of mass disaster responders. This has resulted in Australian forensic archaeologists becoming involved in disaster recovery operations such as: the Bali Bombings in 2002, and the Thailand Tsunami in 2004 (Blau 2005).

Due to the differential development and categorisation of forensic archaeology internationally, it is evident that practitioners have come to define their roles within forensic investigations differently, resulting in a variety of approaches being utilised during the recovery of human remains in forensic contexts. Tuller and Đurić (2006) and Congram (2008) have argued that those individuals whom classify themselves as forensic anthropologists and archaeologists, such as in North America, tend to be body-centric in their approach to the excavation of human remains, as their primary goal is to retrieve the remains in order to establish an accurate biological profile and determine the manner and the cause of the individual's death.

In contrast, in the United Kingdom, Ireland and Australasia, where practitioners define the sub-field of forensic archaeology as a separate speciality, and are employed solely as forensic archaeologists, their approach to the excavation of a forensic grave differs (Thompson 2003; Menez 2005). Scholars such as Hanson (2004), Tuller and Đurić

(2006) and Congram (2008) state that such practitioner's primary focus during the excavation is to understand the grave's formation process in order to interpret and reconstruct the sequence of human activity surrounding the grave's construction, during which human remains form a part of the material evidence collected, and are viewed as a depositional event within the overall sequence of the grave's formation process (Connor and Scott 2001; Saul and Saul 2002; Tuller and Đurić 2006).

Qualifications and experience

As a consequence of participating in a forensic investigation a forensic archaeologist may be required to appear in a court as an expert witness (Dilley 2005; Pepper 2005). In such circumstances, the forensic archaeologist will have to demonstrate to the court that they have gained enough experience and relevant qualifications in the sub-field of forensic archaeology to qualify to be considered as an expert by the court (Hunter *et al*., 1996; Dilley 2005).

In terms of the appropriate level of experience and qualifications that a forensic archaeologist should have in order to participate within a forensic investigation and qualify as an expert witness in court, scholars are unanimous in their claims that a forensic archaeologist should have gained at least an undergraduate degree in archaeology or anthropology, and be an experienced field archaeologist (Sigler-Eisenberg 1985; United Nations 1991; France *et al*., 1992; Spennemann and Franke 1995; Crist 2001; Hunter *et al*., 2001; Wright *et al*., 2005; Cox *et al*., 2008; Cheetham and Hanson 2009). Such qualifications and experience, they argue, will ensure that when a forensic archaeologist is called upon to participate within a forensic investigation they will be able to successfully evaluate, adapt and implement excavations in a variety of contexts rapidly, and record as second nature (Connor and Scott 2001; Hunter and Cox 2005).

However, despite statements claiming that archaeological and anthropological qualifications and experience are vital components in defining a forensic archaeologist's competence, and determining if they are suitably qualified to be deemed as an expert by the court, little research has been conducted to gauge how much experience a forensic archaeologist must have in order to become sufficiently experienced to ensure an effective and complete recovery of all of the forensic evidence present at a crime scene

(Haglund 2001; Kershaw 2001; Hunter and Cox 2005; Cheetham and Hanson 2009; Cox 2009). There are a few references within the literature that refer to the need for forensic archaeologists to have 'many years experience' (Sigler-Eisenberg 1985; Haglund 2001; Hunter and Cox 2005) but only Scott and Connor (2001) quantify the amount, stating that in order to be deemed as a capable practitioner the forensic archaeologist should have at least "3 years full-time fieldwork experience" (Scott and Connor 2001: 104). Within organisations such as the American Academy of Forensic Sciences (AAFS), other forensic disciplines such as forensic engineering and criminalistics have set levels of experience required for a candidate to be accepted as an associate member, ranging from 4-5 years with a baccalaureate degree, 3-4 years with a masters degree, and 2-3 years with a doctorate (AAFS 2012). As yet, no such standards exist for the forensic anthropology section (AAFS 2012). However, currently, in the United Kingdom, the Institute for Archaeologists Forensic Archaeology Special Interest Group is in the process of developing a rank system for forensic archaeological practitioners, based upon their level of experience and qualifications.

In a legal context, as experience is regarded as one of the key factors in establishing oneself as a credible expert witness, the current lack of a quantified and internationally agreed upon level of experience necessary for a forensic archaeologist to be recognised as a capable practitioner may have serious ramifications in terms of the admissibility of a forensic archaeologist as an expert witness in a court of law (Cheetham and Hanson 2009; NAS Report 2009).

In order to fully understand these ramifications, it will be necessary to discuss, in the following chapter, the admissibility regulations and the legislative requirements of the international courts, and the impact that these have on the disciple of forensic archaeology.

2.3 Legal concerns: How international legislation and admissibility regulations impact forensic archaeological investigations

In order to appreciate the impact that international admissibility regulations and legislative requirements have on forensic archaeological investigations, it is necessary

to examine a number of factors. Firstly, one must examine the domestic legislative acts and the admissibility regulations that are currently in use in the countries involved in the study, including: the United Kingdom, Ireland, Australia, New Zealand, Canada and the United States. In addition, as forensic archaeologists are also employed in international contexts, to aid in the investigation of genocide, crimes against humanity, war crimes, and crimes of aggression, it is necessary to consider the legislative acts and the admissibility regulations upheld by the International Criminal Court (ICC), and the impact that these have on the work undertaken by forensic archaeologists. Finally, one must evaluate whether or not current forensic archaeological practice meets the admissibility and legislative requirements of these different legal systems, and if not, how this impacts the status of forensic archaeology as an accepted forensic discipline.

Domestic contexts

When forensic archaeologists are called upon to participate in forensic investigations within domestic contexts, there a number of legislative acts and admissibility regulations in place which influence how forensic archaeological investigations are conducted, and outline what is expected of forensic archaeologists when acting in the capacity of an expert witness during court proceedings.

The major legislative acts and admissibility regulations that are currently in place within the various domestic courts of the countries involved in the study are as follows:

- The Police and Criminal Evidence Act (1984), the Criminal Justice Act (2003), the Criminal Evidence (Experts) Act (2011), and the Criminal Procedure Rules (2011) in England and Wales.

- The Criminal Procedure (Scotland) Act (1995), and the Criminal Justice (Scotland) Act (2003) in Scotland.

- The Criminal Evidence Act (Northern Ireland) (1923), the Police and Criminal Evidence Act (1984), and the Criminal Justice (Evidence) (Northern Ireland) Order (2004) in Northern Ireland.

- The Criminal Justice (Forensic Evidence) Act (1990), and the Rules of the Superior Courts (Evidence) (2007) in Ireland.

- The Criminal Procedure Ordinance (1993), the Evidence Act (1995), the Evidence Amendment Act (2008), and the Practice Note CM7 Expert Witnesses in Proceedings in the Federal Court of Australia (2009) in Australia.

- The Evidence Act (2006), the Practice Notes – Expert Witness – Code of Conduct (2011), and the Criminal Procedure Act (2011) in New Zealand.

- The Canada Evidence Act (1985), the Criminal Code (1985), and the Federal Court Rules – SOR/98-106 in Canada.

- The Frye Standard (1923), the Daubert Standard (1993) and the Federal Rules of Evidence (2011) in the United States.

These domestic admissibility regulations and legislative acts establish five key requirements that must be considered by the court to determine if the expert testimony and the evidence retrieved by the forensic archaeologist during the course of the forensic archaeological investigation can be deemed as reliable, and therefore admissible in the court.

Empirical testing

The first requirement is whether the techniques that were used by the forensic archaeologist during the course of the forensic investigation have been empirically tested. Currently, little testing has been done in the field of archaeology, or forensic archaeology, to comparatively assess the various excavation methods and recording systems utilised by forensic archaeologists to excavate burials. The only significant experimental research that has been conducted in this area thus far has been completed by Tuller and Đurić (2006), Pelling (2008), and Evis (2009), each of whom comparatively assessed two different excavation methods – Arbitrary and Stratigraphic excavation using mass graves or grave simulations. However, these studies failed to use large enough sample sizes to thoroughly compare these two excavation methodologies, and failed to compare archaeological recording systems (Tuller and Đurić 2006; Pelling 2008; Evis 2009). Another weakness of these studies is that they failed to test other excavation methodologies, such as the Demirant Excavation method and the Quadrant Excavation method, each of which have been used by practitioners in forensic casework

(Hunter and Cox 2005; Dupras *et al*., 2006; Congram 2008; Hunter 2009; Ruffell *et al*., 2009). As a result, these three studies should be regarded as pilot studies that need to be expanded upon by further experimental research. Therefore, currently, forensic archaeologists should not state to the court that the methodological approaches that they used to excavate and record a forensic burial have been thoroughly tested, and as a result, the court could deem these methodological approaches as potentially unreliable, and consequently inadmissible.

Peer review

The second requirement is whether the techniques that were used by the forensic archaeologist have been subjected to peer review and have been published. Within the discipline of forensic archaeology and archaeology, numerous scholars have published articles, books, and archaeological manuals discussing excavation methods and recording systems, including: Phillips *et al*., (1951), Wheeler (1954), Pallis (1956), Kjolbye-Biddle (1975), Harris (1979), Joukowsky (1980), Barker (1993), Hester (1997), Roskams (2001), Hanson (2004), Balme and Paterson (2006), Burns (2006), Blau and Ubelaker (2009), and Carver (2009) to name but a few. However, depending on their own personal preferences, training and experience different scholars advocate and publish different methodological approaches. Therefore, if a forensic archaeologist was to justify their methodological approach to the court by referring to publications, they would be able do so, as a number of excavation methods and recording systems have been published and peer reviewed. However, the fact that there is no standardised and widely accepted methodological approach for the excavation and recording of burials, could arguably weaken forensic archaeologists attempts to demonstrate to the court that the techniques that they used during the forensic investigation were reliable, and thus admissible.

Error rates

The third requirement is whether the techniques that were used by the forensic archaeologist have known or potential rates of error. As stated earlier, due to the fact that there has been very little testing of archaeological excavation methods and recording systems, there are no published error rates for individual excavation methods and their associated recording systems. This means that this requirement has not yet

been met by the discipline of forensic archaeology. Consequently, forensic archaeological techniques could be deemed by the court to be potentially unreliable, as there is no data to suggest otherwise, and lead to the forensic archaeologist's testimony and evidence collected as a result of their participation in the investigation being dismissed from the court proceedings.

Professional standards

The fourth requirement is whether the techniques that were used by the forensic archaeologist have standards controlling their operation, and whether these standards were maintained during the course of the forensic investigation. In terms of an accepted standardised protocol for domestic forensic archaeological investigations, the only organisation that has created one is the Institute for Archaeologists Forensic Archaeology Special Interest Group in the United Kingdom, who published 'Standards and Guidance for Forensic Archaeologists' in October of 2011 (Powers and Sibun 2011).

This document outlines a protocol for forensic archaeologists to follow when conducting forensic archaeological investigations in the United Kingdom. However, in terms of providing a standardised methodological approach for the excavation and recording of clandestine burials, this guidance document is vague, stating that "features are investigated and excavated using the archaeological technique most suited to the specific circumstances of the case" (Powers and Sibun 2011: 16) and that the "forensic archaeologist must undertake all excavation with the aim of maintaining stratigraphic integrity, maximise the recovery of evidence, carrying out in situ evidence recording, and ensure that the details of the scene are reproducible through the production of written, illustrative and photographic records" (Powers and Sibun 2011: 16). This guidance document, therefore, does not provide any specific procedures for the excavation and recording of clandestine graves, and merely reiterates statements outlined in text books dedicated to the discipline of forensic archaeology (Hunter and Cox 2005; Dupras *et al*., 2006, Connor 2007; Blau and Ubelaker 2009).

As this guidance document fails to outline a specific excavation and recording protocol for forensic archaeological investigations, it provides forensic archaeologists in the United Kingdom with the freedom to excavate using any archaeological approach that

has been used previously, or that has been published, and does not provide specific standards for forensic archaeologists to follow when conducting a forensic archaeological investigation. Furthermore, as not one of the archaeological excavation methods and recording systems that are published and used by forensic archaeologists to excavate and record clandestine burials have been thoroughly tested, these methodological approaches and this guidance document do not satisfy the requirements of the British or international courts.

The fact that no other domestic forensic archaeological organisations, working in the other geographical regions covered by this study, have attempted to create standard protocols for forensic archaeological investigations also means that, in international contexts, the discipline of forensic archaeology is failing to meet the fourth requirement for admissibility (Law Commission 2011). This could result in the findings and testimonies of forensic archaeologists being deemed as inadmissible and dismissed from court proceedings.

Widespread acceptance

The fifth requirement is whether the techniques that were used by the forensic archaeologist have gained widespread acceptance within the particular field to which they belong. As with the second requirement, several scholars have published and advocated a variety of different archaeological approaches to the excavation and recording of clandestine burials (Bass and Birkby 1978; Pickering and Bachman 1997; Haglund *et al.*, 2001; Hunter *et al.*, 2001; Skinner *et al.*, 2003; Hunter and Cox 2005; Burns 2006; Dupras *et al*., 2006; Connor 2007; Congram 2008; Cheetham and Hanson 2009; Hunter 2009; Wolfe Steadman *et al*., 2009; Larson *et al*., 2011). The approaches that they recommend vary according to when and where they received their training and experience, and their own personal preferences. Furthermore, many of the techniques that these scholars advocate originate from field archaeology and have been used for a long period of time, and continue to be used on a regular basis within the commercial archaeology sector. Thus, if a forensic archaeologist was required to prove that the techniques that they used during the forensic investigation were widely accepted within the field of archaeology, they would be able to provide many examples to attest to the fact that they were.

However, as with the second requirement, the fact that all of the methodological approaches that are currently used within the field of archaeology and forensic archaeology are generally accepted, as long as the selection of each approach is justified, may in turn, weaken a forensic archaeologist's attempts to highlight to the court that the technique that they chose was the most reliable and suitable to use. This is because there is no data, as yet, from which a forensic archaeologist can reliably state that one methodological approach is more reliable and consistent than another, and therefore, the forensic archaeologist may find that their testimony is regarded with caution, due to the potential for the technique that they chose to be unreliable.

The primary reason why forensic archaeology has, to date, remained unaffected by the legislative requirements and admissibility regulations set by domestic courts was recently highlighted in a review of expert evidence conducted by the Law Commission which stated that "expert evidence is often trusted like no other category of evidence" (The Law Commission 2011:12) and "cross-examining advocates tend not to probe, test or challenge the underlying basis of an expert's opinion evidence" (The Law Commission 2011:13) as they "do not feel confident or equipped to challenge the material underpinning the expert opinion" (The Law Commission 2011:13), leading to forensic archaeologists and the methods they utilise remaining unquestioned in a court environment.

However, in light of recent reviews of expert evidence conducted in the United States, Canada, Australia and the United Kingdom (Australian Law Reform Commission 2005; Glancy and Bradford 2007; Edwards 2009; NAS Report 2009; The Law Commission 2009, 2011; Robertson 2009; Edmond 2010; Robertson 2010; Selby 2010), admissibility regulations are now being increasingly enforced and expert witnesses and the legal practitioners with whom they are working are now required to prove, prior to appearing in court, that the methods used by the forensic archaeologist during the course of a forensic investigation meet the admissibility requirements of the court. If the forensic archaeologist or the legal practitioner fails to do so, the evidence gathered by the forensic archaeologist in support of the case will be deemed unreliable and dismissed from the court proceedings (NAS Report 2009; The Law Commission 2009, 2011). This is illustrated by the case of Hunter v. United States, 48F. Supp. 2d 1283, 1288 (D. Utah 1998) during which the government sought to prosecute Hunter for

defacing the Santa Clara River Gorge Shelter site in the Dixie National Forest and looting other archaeological sites (Hutt 2006). Two archaeologists were commissioned to assess the damage to the site and estimate how much it would cost to repair and restore the site back to its former state, and in turn, how much Hunter would be required to pay in damages (Hutt 2006). However, the two reports contradicted each other, and the Judge presiding over the case stated that the methods used by each of the archaeologists in order to complete their archaeological site damage assessment reports "lack[ed] sufficient reliability to be used for sentencing purposes" (ID. At 1291.) (Hutt 2006). Consequently, both of the reports that had been submitted as evidence by the two archaeologists were dismissed from the court proceedings, and were not taken into consideration by the judge when he calculated the amount of damages that the defendant would have to pay towards the archaeological site's restoration (Hutt 2006).

International contexts

In addition to domestic investigations, forensic archaeologists are also requested to assist in investigations in international contexts. Such investigations require forensic archaeologists to assist in the search, location, recovery and recording of evidence from scenes of crime relating to genocide, crimes against humanity, war crimes, and crimes of aggression. Currently, investigations into these four types of crime are conducted under the auspices of the International Criminal Court (ICC). Prior to the establishment of the ICC in 2002, after the ratification of the Rome Statute, investigations of these crimes were conducted and prosecuted by International Criminal Tribunals, such as the International Criminal Tribunal for the Former Yugoslavia (ICTY) and the International Criminal Tribunal for Rwanda (ICTR) (Kittichaisaree 2001; Cordner and McKelvie 2002; Cox *et al*., 2008).

Unlike the domestic court systems discussed previously, the ICC does not follow an adversarial system of justice. Rather, it uses a hybrid system, of adversarial and inquisitorial systems, utilising the strengths of both approaches to investigate crimes under its jurisdiction. Under this hybrid system, it is important to note that there is no jury; instead, professional judges are elected to preside over the trial, determining the weight of the evidence brought before them and the sentence that ought to be given to the accused. As a result, the judges who preside over such trials are not required to act

as “gate keepers against bad science” on behalf of juries, as their professional training and experience ought to provide them with the ability to consider each piece of evidence that has been presented to them, and ascertain the weight that it ought to be given (Roberts and Willmore 1993; Schabas 2006; Klinkner 2008; 2009). Therefore, the ICC does not have strict procedures or rules governing the admissibility of evidence or expert witness testimonies, and tends to follow an approach of “admit everything, determine weight later” (Zahar and Sluiter 2008: 384; Klinkner 2009).

There are however, ‘Rules of Procedure and Evidence’ that are followed by the ICC, which state in Rule 64 that “evidence that is ruled irrelevant or inadmissible shall not be considered by the Chamber” (The International Criminal Court 2013: 21). Therefore, if the methodological approaches utilised by forensic archaeologists during the course of the investigation are proved to be unreliable, then the evidence retrieved by the forensic archaeologists and the testimony provided by the forensic archaeologist in charge of the investigation, would then lack relevance to the case and be deemed inadmissible, and ought not to be considered by the trial chamber when determining the sentence of the accused. However, as there have been relatively few studies focused on evaluating the reliability of forensic archaeological excavation methods and recording systems, there is no data for the defence or prosecution to use to critique or defend the methodological approaches used by forensic archaeologists during such investigations (Klinkner 2009).

This issue is exacerbated by the fact that when forensic archaeologists are called to participate in such investigations they are employed by the prosecution, and are directed by the prosecution’s senior investigator in all operational matters (Klinkner 2009). At no stage during this investigative process are the defence’s forensic archaeological experts given the opportunity to observe or conduct independent investigations at these scenes of crime. Given that excavation is a destructive process, and once a grave, be it a mass or single grave, has been excavated it cannot be re-excavated, any operational errors in terms of methodological or recording processes cannot be observed at the scene, and any evidence that may have contradicted the prosecution’s report’s findings will have been lost during the investigative process (Barker 1993). Therefore, the current system of providing the defence with the prosecution’s forensic archaeological report *post-facto* to review and critique clearly has a flaw, as issues that may have gone unnoticed or were overlooked by the prosecution’s team during the investigation will

not be present in the report. Thus, the defence's forensic archaeological experts will not have the entire picture of the investigative process, and will not be able to evaluate it fully.

This issue also applies to the court's process of employing independent experts to evaluate reports provided by the prosecution in cases where the defence and prosecution disagree over evidential reliability matters, as they too will only be able to review the 'polished' end of investigation report. Given that such investigations are planned over a long period of time, the fact that courts are aware of whom they wish to prosecute, and the vast amount of money that is invested in investigating these crime scenes, it would be beneficial and possible for the court to inform the defence of when and where forensic archaeological investigations are to take place, and to invite them to send defence forensic archaeological experts to observe these investigations as they take place. This will ensure that they, the defence, are satisfied that the evidence that is collected and recorded is being done so in a reliable manner.

Furthermore, as with the domestic legal systems, the reliance on the cross-examining advocates' and the professional judges' experience to highlight and evaluate the reliability of the methods used by experts during the course of an investigation poses a problem. Given the vast array of different forensic disciplines that are required to assist with such investigations and present evidence in ICC trials, these legal practitioners cannot be expected to have gained sufficient experience and knowledge in each of these disciplines to be able to effectively evaluate each discipline's methodological approaches to determine if they are reliable enough to be admitted (Roberts and Willmore 1993; Boas 2001; Klinkner 2009; The Law Commission 2011:13). Moreover, as there are no admissibility requirements in place, current procedure does not demand that methods be shown to be reliable before they are admitted. Thus, each judge may use different evaluative criteria when assessing the admissibility of particular methods, which may result in judges having contradicting opinions as to whether a particular methodological approach was appropriate (Boas 2001: 59). This may explain why, to date, the "reliability of particular scientific methods and techniques appears to be more fully canvassed as a question of weight, rather than admissibility" and highlights why the methodological approaches of disciplines such as forensic archaeology, have remained unquestioned during trials at the International Criminal Court and

International Criminal Tribunals for the Former Yugoslavia and Rwanda (Boas 2001: 59).

It is evident, through reviewing the admissibility regulations and the legislative requirements of courts in both domestic and international contexts that forensic archaeology has, to date, failed to satisfy the requirements of the international court systems. This is primarily due to the fact that practitioners in the sub-field of forensic archaeology have yet to test the methodological approaches that they use and advocate. This has resulted in a multitude of excavation methods and recording systems continuing to be used without any proof that they produce consistent and accurate results. Furthermore, the fact that there is no internationally agreed upon, standardised, peer-reviewed protocol for forensic archaeological investigations, weakens the credibility of the sub-field, as it implies that there is a lack of professionalism within the discipline, and that its practitioners use ad hoc approaches during forensic investigations. Consequently, the court systems discussed in this Project should not allow evidence retrieved through excavation by forensic archaeologists into their courts. Therefore, if the discipline of forensic archaeology is to continue to be accepted as a forensic discipline, these weaknesses must be addressed, otherwise, forensic archaeologists' testimonies and the evidence that they collect during the course of a forensic investigation may be dismissed from the court proceedings as the methodological approaches underpinning the investigation were deemed unsafe, potentially unreliable, and therefore inadmissible.

In light of these issues, it will be necessary to evaluate, in the following chapter, previous research that has been undertaken to test forensic archaeological excavation methods and recording systems, and to discuss how such research can be improved upon in order to ensure that the discipline of forensic archaeology continues to be accepted by the international courts.

2.4 The search for standardisation in forensic archaeological investigations

In order to evaluate how the discipline of forensic archaeology has attempted to address the issue of the lack of empirical testing of archaeological excavation methods and

recording systems. One must first evaluate existing research that has been conducted into archaeological excavation methods and recording systems. After which, one needs to discuss how this research can be improved upon and expanded in order to ensure that the discipline of forensic archaeology meets the admissibility regulations and the legislative requirements of the international court systems.

Testing of archaeological techniques

The process of controlled excavation is perhaps the most common aspect of archaeology with which archaeologists are associated. The process of "excavation is the prime method available to archaeologists for the recovery of new data" (Clarke 1978:63), whereas the process of recording provides the only current means of preserving the new data obtained through the excavation activity. It is universally accepted that the excavation and recording of sites, be it in archaeological or forensic contexts, by competent personnel with adequate facilities represents both the most important and best means of acquiring additional information (Clarke 1978; Sigler-Eisenberg 1985; Haglund 2001; Scott and Connor 2001; Hunter and Cox 2005).

However, excavation methods and recording systems have, to a large extent, developed independently from one another, each evolving to their current state according to the intellectual, technical, and theoretical developments within the discipline, and the professional and ethical codes of practice advocated by professional bodies such as: the Institute for Archaeologists (IfA) in the United Kingdom, the Institute of Archaeologists of Ireland (IAI) in the Republic of Ireland, the Society for American Archaeology (SAA) in the United States, the Canadian Archaeological Association (CAA) in Canada, the Australian Archaeological Association (AAA) in Australia, and the New Zealand Archaeological Association (NZAA) in New Zealand. Consequently, different combinations of excavation methods and recording systems are utilised by different archaeological practitioners, in accordance with their individual preferences, experience, academic training, and the legislative requirements present within the geographical area in which they are working.

Therefore, numerous practitioners advocate different excavation methods and recording systems as the works of Phillips *et al*., (1951), Wheeler (1954), Pallis (1956), Kjolbye-Biddle (1975), Harris (1979), Joukowsky (1980), Barker (1993), Roskams (2001),

Harris (2006) and Carver (2009) demonstrate. However, as different excavation methods such as: the Stratigraphic method, the Schnitt method, the Gezer method, the Quadrant method, the Arbitrary method, and the Box method, and different recording systems such as: Single Context Recording, Multi-Context Recording, Unit Level Recording, and Pre-determined Strata Recording continue to be utilised and advocated (along with their theoretical justifications) within academic literature these different techniques have come to be attributed the status of 'standardised methods' within the countries, traditions, schools and institutes in which they are practiced (Kidder and Kidder 1917; Fowler 1977; Daniel 1978; Willey and Sabloff 1980; Joukowsky 1980; Bar-Yosef and Mazar 1982; Browman and Givens 1996; Hester 1997; Lymen and O'Brien 1999; Darvill 2000; Drewett 2000; Lucas 2001; Collis 2002; Desert Archaeology, 2008; Greene and Moore 2010).

Although a variety of excavation techniques and recording systems have been allocated the status of a "standardised method" the suitability of certain excavation methods and recording systems have been called into question and sparked debate within the academic community (see Phillips *et al*., 1951; Harris 1989; Harris *et al*., 1993 for an overview). However, little research has been conducted to directly measure, contrast and compare differing excavation methods and recording systems, or to understand the impact that variations in approaches to excavation and recording may have on data recovery and interpretation(s). This is largely because no two archaeological sites are exactly alike and the excavation of an archaeological site cannot be replicated, as the process of excavation is one of destruction. Methods cannot, normally, be tested and compared on the same set of deposits, although there are examples of archaeological sites that have been re-excavated and the findings of previous archaeological investigations re-evaluated – Ian Hodder's work in Çatalhöyük and the re-excavation of the 'Lazete 2' Srebrenica mass grave site being two prominent examples (Çatalhöyük 2011; ICTY 2007).

Additionally, in recent experimental research conducted by Tuller and Đurić (2006), Pelling (2008), and Evis (2009) it is apparent that the assumption that excavation methods are suitable for use on the basis of their widespread adoption and 'standardised' status should be called into question and re-evaluated.

Each of these experimental studies directly compared two standardised excavation methods – the Arbitrary Excavation method and the Stratigraphic Excavation method. In Tuller and Đurić's (2006) study they compared these two excavation methods in the excavation and recovery of skeletal remains within two mass graves in an attempt to identify which method was the most effective. Their results established that the Stratigraphic method of excavation was the most effective at maintaining the provenience and articulation of the remains. However, each grave was excavated by differing teams of experts, one consisting of archaeologists and the other of a mix of pathologists and biological anthropologists, and therefore was not an objective or direct comparison of each methodological approach (Tuller and Đurić 2006).

In Pelling's (2008) study, the primary aim was to define which of these two methods was the most effective at recovering 'evidence' from simulated graves which included: artefacts, geotaphonomic features and stratigraphic deposits and interfaces. Pelling's study found the Stratigraphic method of excavation to be the most effective and resulted in 94.4% of material evidence placed within the grave being recovered in situ, whereas 50% of material evidence was found in situ using the Arbitrary Excavation method (Pelling 2008). In addition, the Stratigraphic approach recovered 100% of geotaphonomic features introduced into the grave whereas the Arbitrary approach failed to recover any (Pelling 2008). However, Pelling's (2008) study only simulated one grave for each method and therefore was not a large enough sample size to effectively compare these methodological approaches.

In light of this, Evis (2009) conducted a similar experiment to Pelling and created eight mock graves in order to assess which of these two excavation methods was the most effective at correctly interpreting the graves' formation sequence and recovering 'evidence' which, again, included: artefacts, geotaphonomic features, and stratigraphic deposits and interfaces. Evis enlisted four archaeologists to excavate two graves each (Evis 2009). The results of the study indicated that the Stratigraphic Excavation method was the most effective, recovering an average of 71% of all defined evidence types, whereas the Arbitrary Excavation method recovered an average of 56% (Evis 2009). In terms of consistency of interpretation of the graves formation sequence, again the Stratigraphic method of excavation proved to have a higher rate of consistency, correctly identifying an average of 71% of the deposits and interfaces present and an

average of 62.5% of the geotaphonomic features introduced into the graves, whereas the Arbitrary Excavation method correctly identified an average of 51% of the deposits and interfaces present and an average of 12.5% of the geotaphonomic features (Evis 2009). In addition, through conducting the experiment with multiple archaeologists it became apparent that additional variables may have affected the percentage of evidence recovered and the consistency of subsequent interpretations. Factors such as experience and time caused variation in the results gained, findings which were supported by experiments conducted by Tuller and Đurić (2006), Scherr (2009) and Roberts (2009). However, this study only compared four graves for each methodological approach and therefore was not a large enough sample size to effectively compare these two excavation methods. Furthermore, the experiment only compared two excavation methods and therefore did not take into account or test all of the published methodological approaches used in the field of archaeology. Also, the experiment did not assess the affect of variables such as sight, sound, touch and smell which could have had an influence on the overall findings.

Improvement and expansion of existing research

Because of the limitations of the aforementioned studies they should be regarded as pilot studies that need to be expanded upon through further research and experimentation. Moreover, not one of the discussed studies comparatively assessed archaeological recording systems. This is an important aspect of the archaeological process not to have investigated, as the records produced during the course of an excavation will provide the evidence from which the archaeologist will construct and justify their narrative of how the archaeological feature or site under investigation was formed. Therefore, the impact that different recording systems may have on the overall representation and interpretation of an archaeologist's findings is as yet unknown, and must also be addressed through further research and experimentation.

This Project aimed to complete such tasks by increasing the sample size and increasing the number of methodological approaches assessed. It also comparatively assessed recording systems to determine whether different approaches had any impact on the representation and subsequent interpretation of archaeological data. It is also recognised that archaeological excavation and recording is a highly perceptual skill and can be

affected by a number of extrinsic factors. However, an evaluation of these factors was outside the remit of this Project.

Despite the limitations of the previous studies their findings have significant implications for the field of archaeology, as the processes of excavation and recording provide the raw data to which theories are applied and interpretations are formed. If certain excavation methods and recording systems and additional influential variables are proven to result in the loss of contextual information, artefacts, features or deposits, then any interpretations based on assemblages excavated and recorded via these methods may be incomplete, or at least subject to different interpretation. Subsequently, any individuals reading the interpretations may be mislead and the results potentially misused, one needs only to refer to the 'Ahnenerbe' and the 'Amt Rosenberg' organisations in Nazi Germany to highlight this point (Arnold 1990; Arnold 1996; Pringle 2006). Members of these archaeological organisations focused their investigations on proving Gustaf Kossinna's 'Kulturkreis Theory' which stated that geographical regions could be associated with specific ethnic groups based on the presence of material culture, and that cultural diffusion was a process whereby influences and ideas were passed on by more advanced societies to the less advanced societies with whom they came into contact (Arnold 1996:550). As a result, "wherever a single find of a type designated as Germanic was found the land was declared ancient German territory" (Sklenář 1983:151), thus providing the theoretical justification for the Nazi's expansion into Czechoslovakia and Poland, as it was deemed that the Nazis were claiming back their ancient ancestral heritage (Arnold 1990; Arnold 1996; Pringle 2006). Moreover, in a forensic context, it could result in a perpetrator not being convicted or the wrongful conviction of an innocent individual (Gould 2007; Cheetham and Hanson 2009).

It was therefore important for this Project to be undertaken as it empirically tested the excavation and recording techniques currently used in the field of archaeology and resulted in the formulation of bespoke recommendations for archaeological investigations conducted in forensic contexts. The development of this Project was timely, as it was directly responding to the latest legislative requirements of the international courts, and will help to ensure that archaeologists and the evidence retrieved as a consequence of their involvement in a forensic investigation will meet the

legislative requirements and the admissibility regulations of the international courts, and will continue to be accepted in international court proceedings in the future.