CHAPTER 10: CONCLUSIONS AND FUTURE DIRECTIONS

10.1 Conclusions

The conclusions of the project are listed below in summarized form. More discussion of each can be found at the end of each of the relevant chapters.

- GPR technical questions relating to transect location, spacing, frequency choice, signal amplification and calibration are considered in the report and shown to require both some compromise and specification on different surfaces of the valley floor depending upon the sediment stratigraphy and height relative to the groundwater table.

- Radar penetration was greater over gravel-dominated bodies (up to 4+m) than over lower saturate palaeochannels where it could be less than 1m.

- In general penetration increased with height above the river level and local water table although this is complicated by the accompanied systematic changes in sediment type.

- The edge of terrace features and palaeochannels were well represented in the GPR transects and 3D models.

- On all surface levels there was good agreement between the GPR survey and gouge auger transects down to the buried surface of the gravels with the exception of the deepest parts of the lowest palaeochannels.

- In several locations GPR transects suggested sand and gravel bars associated with palaeochannels and these could have high potential for the burial of archaeology (as at Hemington).

- LiDAR intensity values appear to reflect changes in subsurface stratigraphy and sediment types.

- The LiDAR intensity values could not identify individual cropmarks but could identify areas in which cropmarks were likely to form.

- The LiDAR last pulse DTM produced an excellent topographic model of the study area and differentiated between the main geomorphological units.

- The LiDAR last pulse DTM reflected mircrotopographic variation within the geomorphological units and could identify natural features, e.g. ridge and swale and cultural features, e.g. ridge and furrow.

- On the LiDAR last pulse DTM the 1m resolution produced the best results, with a 2m resolution producing acceptable results but the 5m and 10m resolutions producing an appreciable loss in data quality.

- The combination of LiDAR with GPR depth slices has high potential for the 3D modelling of sediment stratigraphy even in such complex alluvial contexts.

- The known archaeological resource in the study area clusters on terrace 2 (upper surface) but not exclusively.

- The patterns of the archaeological resource are a result of differential taphonomy, visibility, and intensity of archaeological survey.

- The archaeological resource on terrace 1 (middle two LiDAR surfaces) has been affected by channel erosion recorded by palaeochannels and deposition by both lateral and overbank sediments.

- Only a small area of the study area, that on the lowest surface (modern floodplain), can be considered archaeological sterile and even this area contains post-medieval archaeology which may or may not be significant depending upon its character.

- The chronostratigraphic model suggests discrete zones of archaeological potential:

    - Palaeolithic to post-medieval (upper surface, terrace 2)
    - Late Devensian to mid Holocene (mid surface and palaeochannels, terrace 1)
    - Late Prehistoric (mid surface and palaeochannels, terrace 1)
    - Roman-Medieval (mid surface and palaeochannels, terrace 1)
    - Post-Medieval (lowest surface, modern floodplain)

- Although difficult to discontinue the use of the term modern floodplain for the lowest surface of the valley floor alone is, at least in this location, misleading on both hydrological and archaeological grounds.

- Using a combination of geomorphological mapping, dGPS, IFSAR, LiDAR and GPR a predictive chronostratigraphic model of the confluence zone was produced. This model will be tested in phase II by coring, sediment characterization and a dating programme.

11.0 Future directions

A full expansion of the Phase 2 project is provided in the Phase 2 UPD drafted by Brown et al. However, in summary, the aims of Phase 2 are to:

- Refine the detailed surface and subsurface landscape models of the study area developed during Phase 1, placing them within a secure, high resolution chronostratigraphic and palaeoenvironmental framework.
- Use this information to study the impact of confluence evolution on the archaeological environment over a time-scale of millennia and at spatial scales appropriate for archaeological management.

- Consider how data capture, archaeological preservation and the development of landscape evolution models and robust chronological frameworks within alluvial environments are affected by physical and chemical factors (i.e. taphonomic processes), especially dating evidence derived from organic-filled palaeochannels and other geomorphological contexts.
- Apply additional geophysical techniques to transect survey lines already surveyed using GPR to compare the effectiveness of different techniques within the alluvial zone.
- Continue to present the results of this work to a range of end-user communities.

These aims will be achieved through:

- coring across of a number of palaeochannel segments of demonstrably different ages to recover sediments for: (1) radiometric dating (^{14}C and OSL); (2) palaeobiological analysis using pollen and insect remains; and (3) measurement of physical and chemical properties.
- Radiometric (OSL) dating of sandy sediments recovered from bar-top and in-channel contexts.
- Refinement of stratigraphic models through the analysis of borehole data supplied for the confluence area by La Farge Aggregates Ltd.
- Characterisation of the hydrological environment using a combination of data provided by La Farge Aggregates Ltd (from borehole well logs) and soil moisture data collected by the research team.
- Additional geophysical survey of established transect lines using Electrical Resistivity Ground Imaging (ERGI), especially being used to investigate palaeochannel deposits.
- Presentation of the results at workshops, conferences, and through written reports/papers aimed at a number of different audiences (e.g. curators, field archaeologists and academics).

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