CHAPTER 5: THE GROUND PENETRATING RADAR SURVEYS

5.1 The GPR surveys on the modern floodplain

The GPR surveys on the modern floodplain consisted of one GPR gouge core survey (MFT1) and two grid surveys (MFG1 and MFG2). The survey areas were selected after consulting the LiDAR images, targeting a series of palaeochannels and gravel deposits. The surveys on the modern floodplain were also used to investigate the data resolution of using three different sample intervals for the geomorphological investigation of alluvial landscapes.

5.1.1 Modern floodplain transect 1

The location of the modern floodplain transect 1 (MFT1) investigated three palaeochannels with associated gravels deposits, shown through the LiDAR last pulse DTM (Fig. 5.1). The transect used a 200MHz antenna. The modern floodplain presented a difficult environment for GPR survey caused by radically sediment types, i.e. palaeochannels and gravels units, combined with a high soil water content. The gouge core transect calibrated the dielectric constant at 30. The transect was processed through migrating the data with a variable velocity model, accounting for the differences in the electrical properties of the units surveyed. Further processing of the transect used a horizontal high pass filter at 80 scans length, a vertical high pass filter of 100MHz and vertical low pass filter of 600MHz. The GPR reflection values had a minimum of –120 and a maximum of 128.

Three palaeochannels are evident within the GPR section (MFC1, MFC2 and MFC3), shown against the interpretation of the GPR section and the gouge core data (Fig. 5.2). There are also a series of interpreted gravel deposits, units MF1, MF3, MF4, MF5 and MF6. These gravel units are not homogeneous and variation is seen in their structure. For example MF3 and MF4 are large gravel deposits with a series of strongly reflecting layers, whilst MF6 is a much smaller unit, which has a lower number of higher reflecting layers. The strongly reflecting layers shows a sequence of units with different electrical properties.

The identification of structure within the palaeochannels is limited, a product of the nature of their fills. The unit MF2 is visible located within the palaeochannel MFC1. From the gouge core transect it is known that MF2 is below the depth that gravel deposits were encountered. However, the identification of MF2 as a gravel/sand deposit is subjective, a product of the rapid attenuation of GPR signal in the palaeochannel above MF2. This inhibited effective GPR penetration. The structure of the palaeochannel deposits was not realised and the gouge core transect showed the palaeochannels to have a fill composed of red brown clay combined with a high water content. Palaeochannels MFC2 and MFC3 both have variation in their fill revealed through the gouge core transect, which is not identifiable in the GPR section. When considering the high water content of the soils on the lower floodplain the GPR penetration was good, achieving a depth of just over 2m under the gravel units. Penetration was less within the palaeochannels, generally under 1m.

Support for the GPR interpretation comes from the gouge core transect, which correlates well with the GPR section. From the GPR interpretation a stratigraphic sequence is suggested where the gravels units MF3 and MF4 are the earliest features in the transect. The channels MFC1, MFC2 and MFC3 are later and erosive into the earlier gravel units. MF2 is associated with palaeochannel MFC1 and thus post dates units MF3 and MF4.

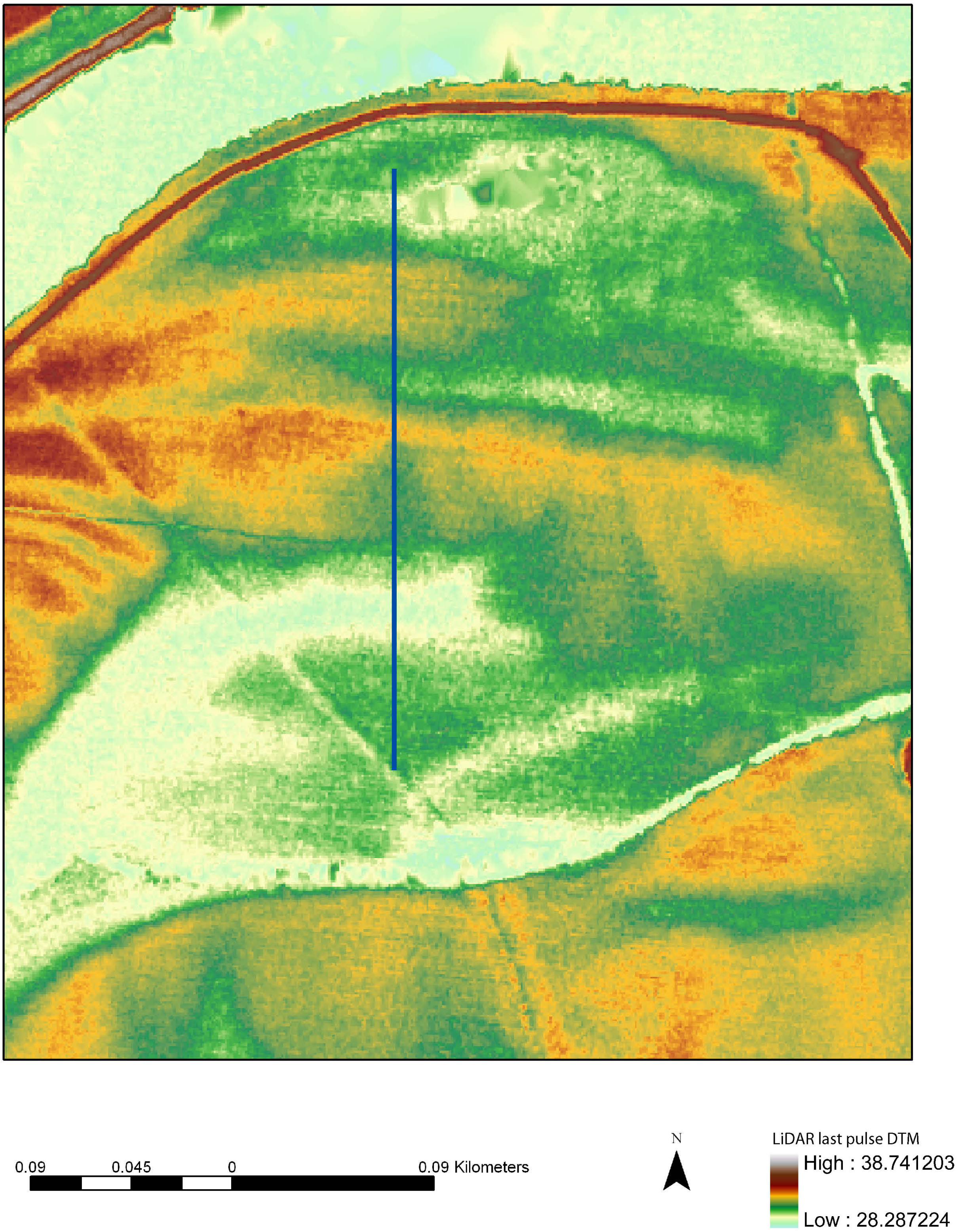

Fig 5.1: The location of the MFT1 transect on the modern floodplain.

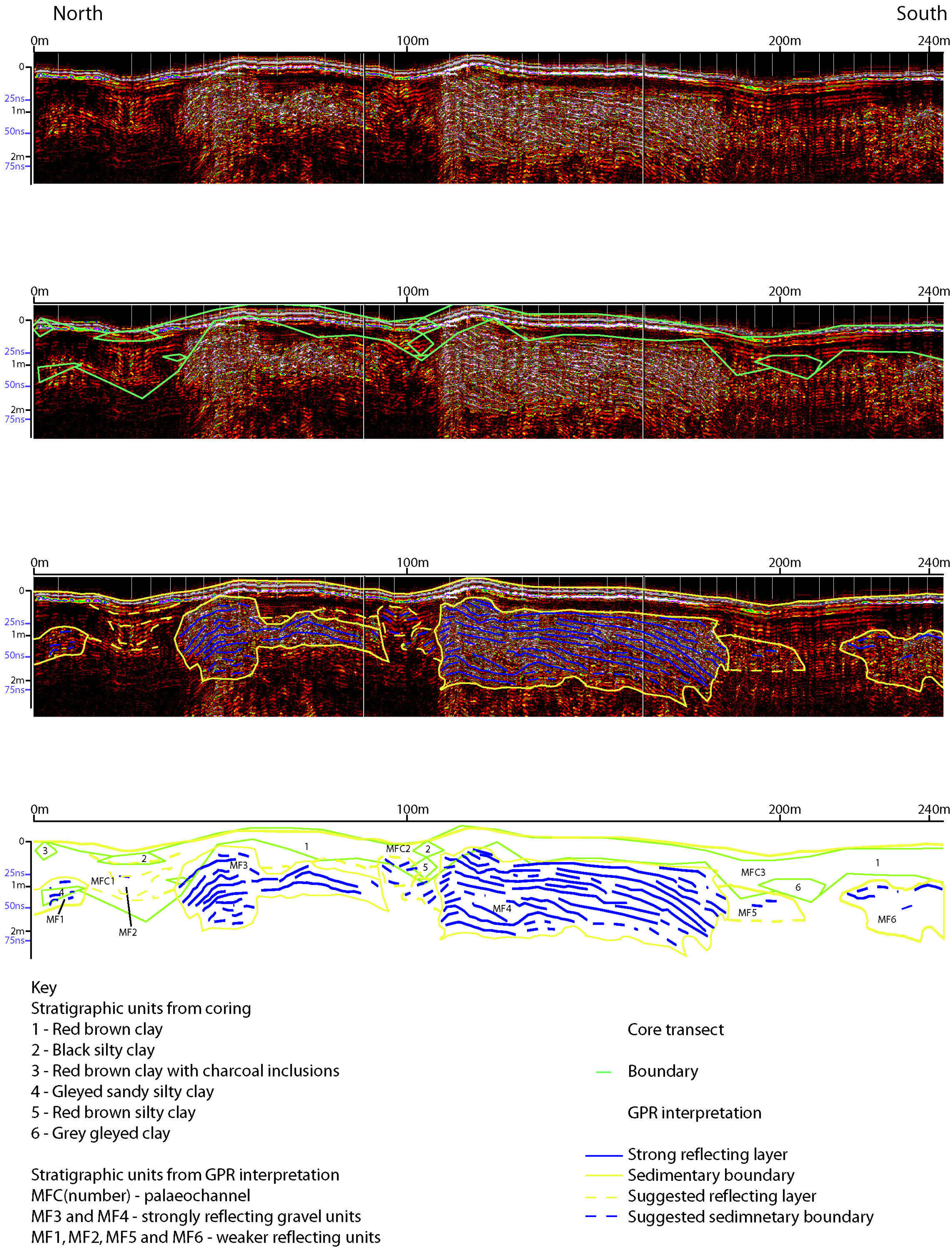

Fig 5.2: The MFT1 transect, shown with the gouge core transect and also with an interpretation of the data. The transect clearly shows the structure of the gravels but penetration in the palaeochannels is poor.