5.2.5 T1 G3 survey

The T1G3 survey used a 5m transect spacing with a 200MHz antenna, collecting twenty transects of data. Data was processed through using a variable velocity migration. No comparative gouge core transect was undertaken within this survey area, so the calibration was made through the T1T1 transect, with the dielectric constant set at 19. The GPR reflectance values vary from –48 to +128. The LiDAR last pulse DTM clearly identifies terrace 1 that has been eroded into by the palaeochannel T1C8 (Fig. 5.38). The LiDAR intensity shows a change in intensity between the palaeochannel T1C6 and terrace 1 (Fig. 5.39).

The 0.4m – 0.6m depth slice clearly shows a difference in reflectance between the palaeochannel and the terrace that it has incised into (Fig. 5.40). At this time slice the palaeochannel shows up as an area of lower reflectance and higher absorption when compared to the terrace. The high reflection values from T1H6 shows the gravels have been encountered, meaning the alluvium on top of the gravels on this area of terrace is thin at circa 50cm or less. The 0.9m – 1.1m depth slice shows the same pattern as the 0.5m depth slice, with T1C8 clearly differentiated from terrace 1 (Fig. 5.41). However, at this depth slice the pattern of reflectance is opposite to the 0.4m – 0.6m time slice. At the 0.9m – 1.1m depth T1C8 is still visible as an area of high reflectance/low absorption, whilst the T1H6 unit is visible as an area of lower reflectance and high absorption. The change in reflectance properties of the sediments at this depth is interpreted as being a product of the water table in the palaeochannel. The water table has been encountered, effectively stopping deeper penetration and causing a high level of reflectance, relative to terrace 1. The terrace gravels do show some higher area of reflectance, interpreted as gravel.

The 1.4m – 1.6m time slice shows some differentiation between T1H6 and T1C8. Effective penetration into the T1C8 is not seen at this depth and general noise is encountered within the palaeochannel (Fig. 5.42). At this depth another feature is evident within the T1H6 gravel unit, labelled T1H6a. This is interpreted as either a section of palaeochannel within the terrace or an area of different sediments within the gravels, e.g. a sand bar. This is the maximum depth of penetration, with the gravel/bedrock boundary not being encountered. The GPR interpretation agrees with the LiDAR interpretation that channel T1C8 is later than the gravel unit T1H6, having partially eroded into it.

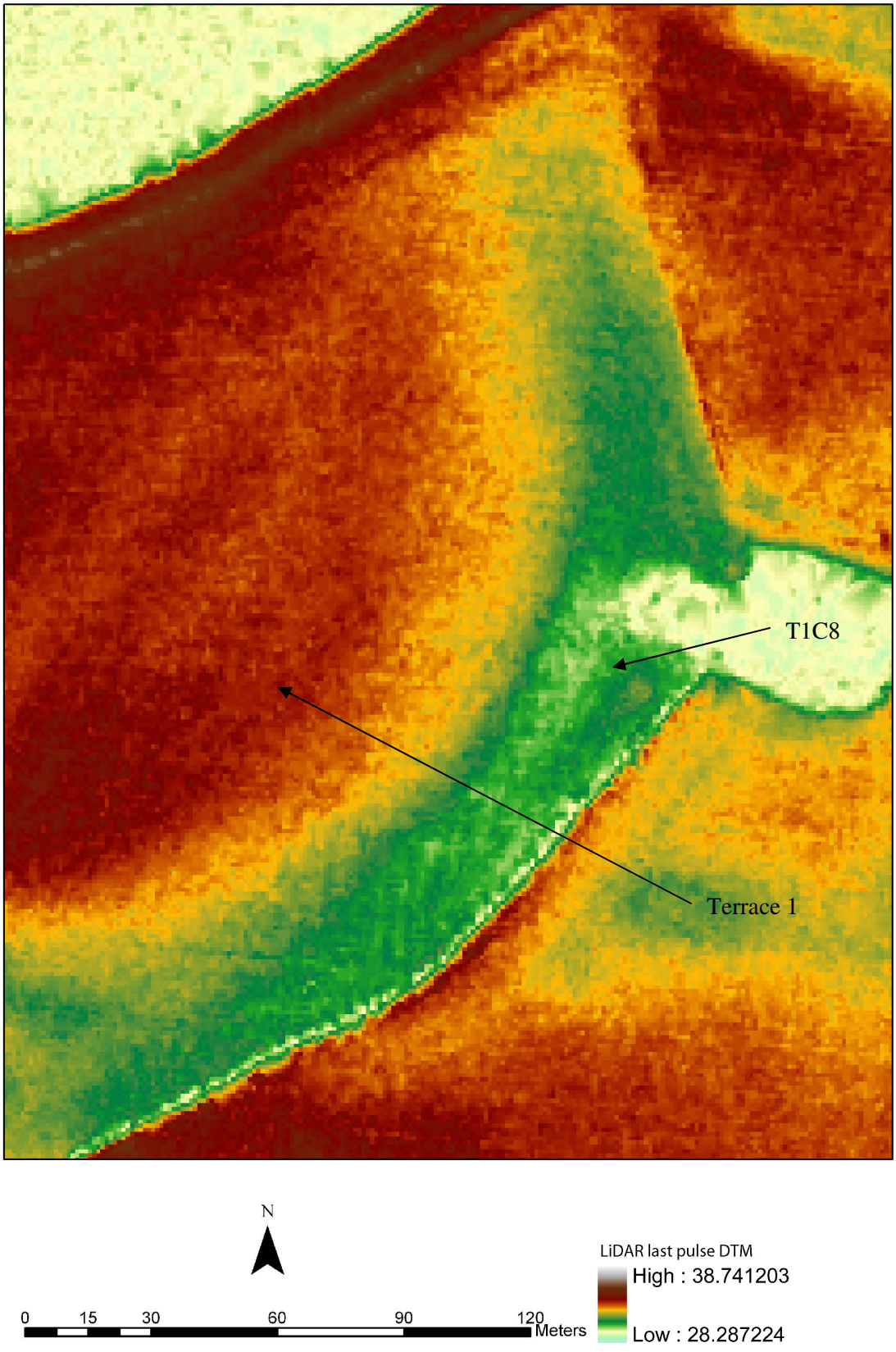

Fig 5.38: The LiDAR last pulse DTM over the T1G3 survey area. Palaeochannel T1C8 and terrace 1 are the dominant features.

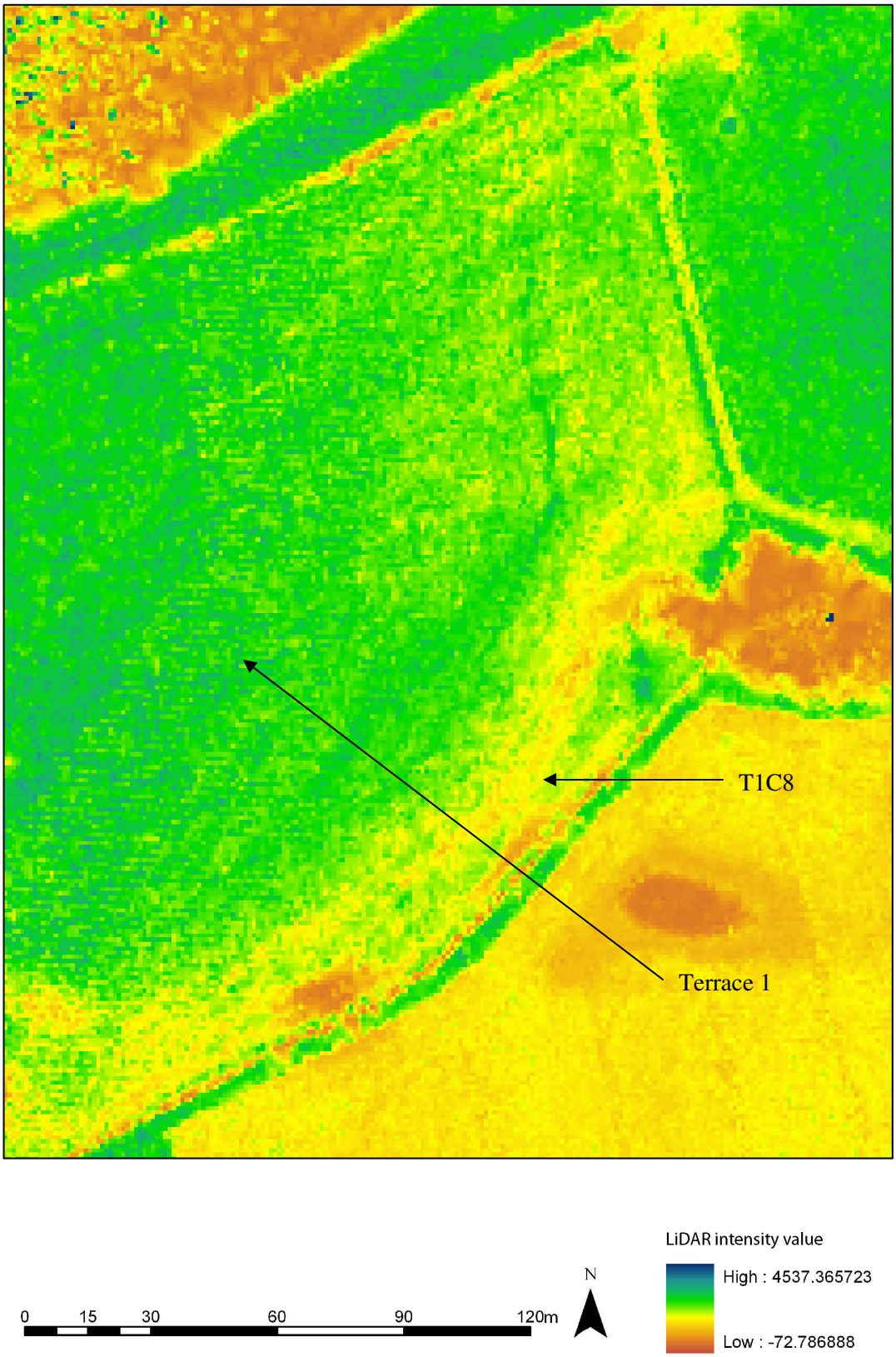

Fig 5.39: The LiDAR intensity plot over the T1G3 survey area. T1C8 and terrace 1 are again visible, although not as obvious as through the DTM.

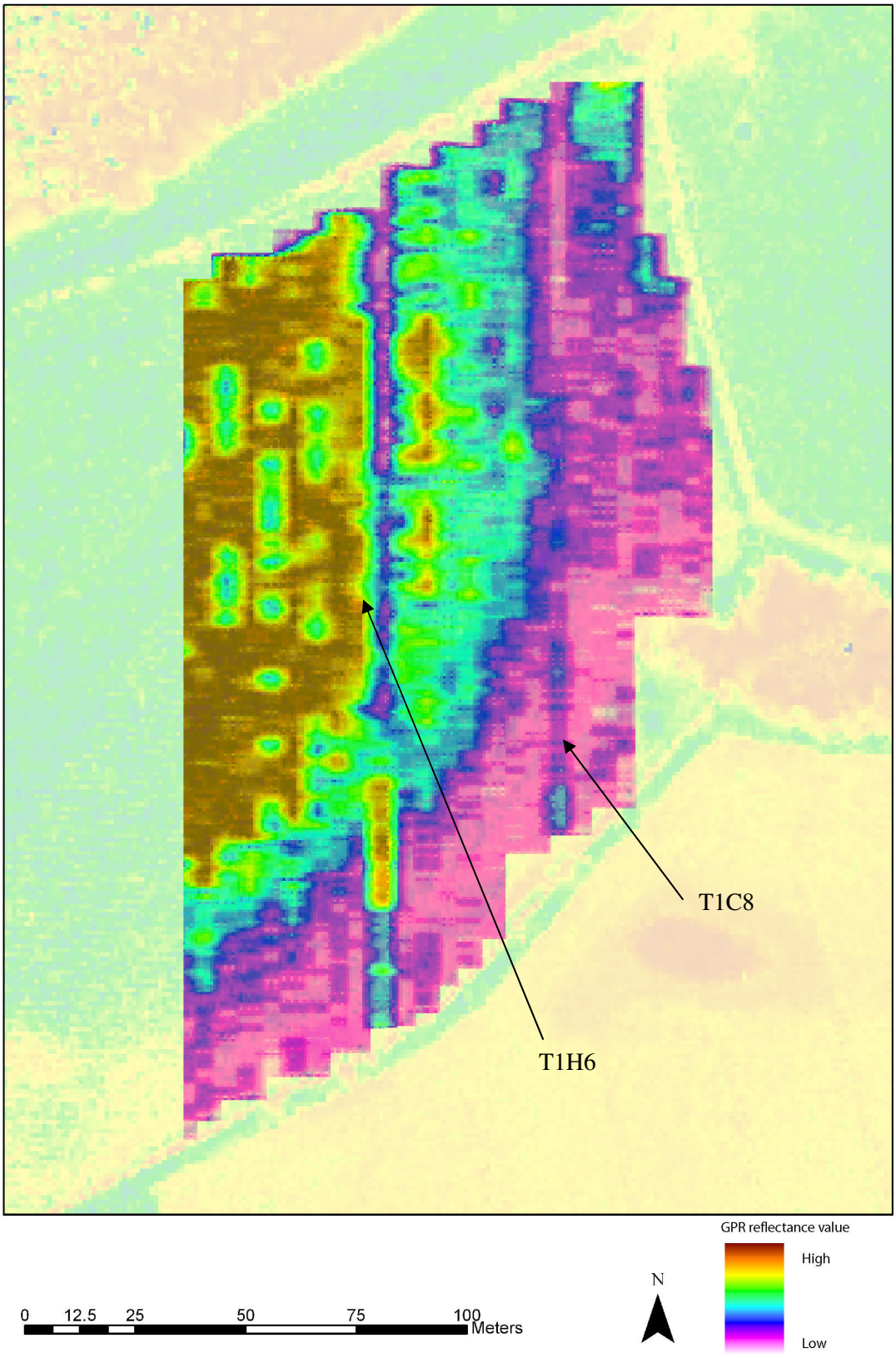

Fig 5.40: The T1G3 survey, 0.4m – 0.6m depth slice. The palaeochannel T1C8 is visible as an area of low reflectance whilst the gravel unit T1H6 is visible on terrace 1.

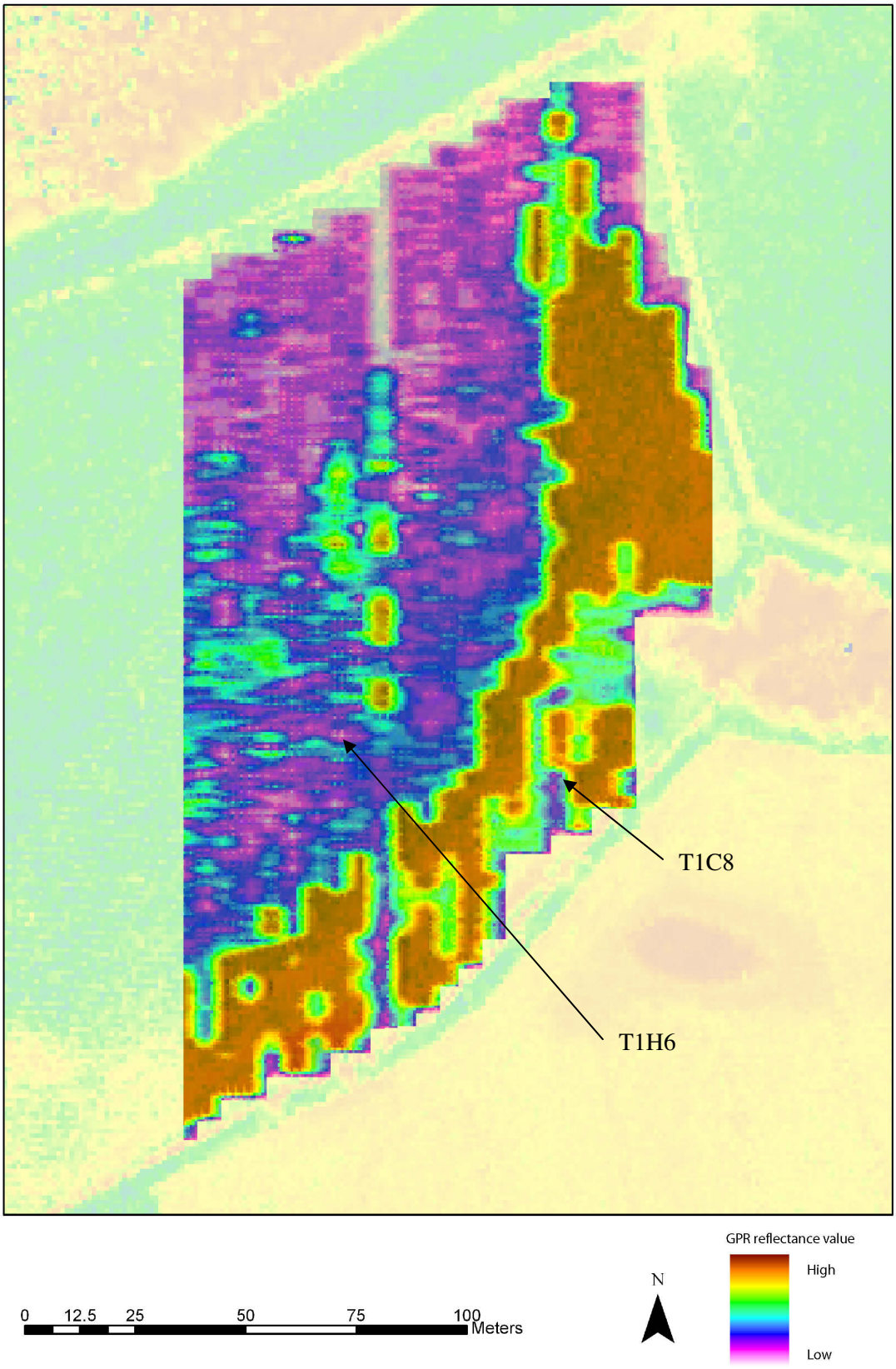

Fig 5.41: The T1G3 survey 0.9m – 1.1m depth slice. At this depth the palaeochannel channel is showing high reflectance values and could be related to its high water table.

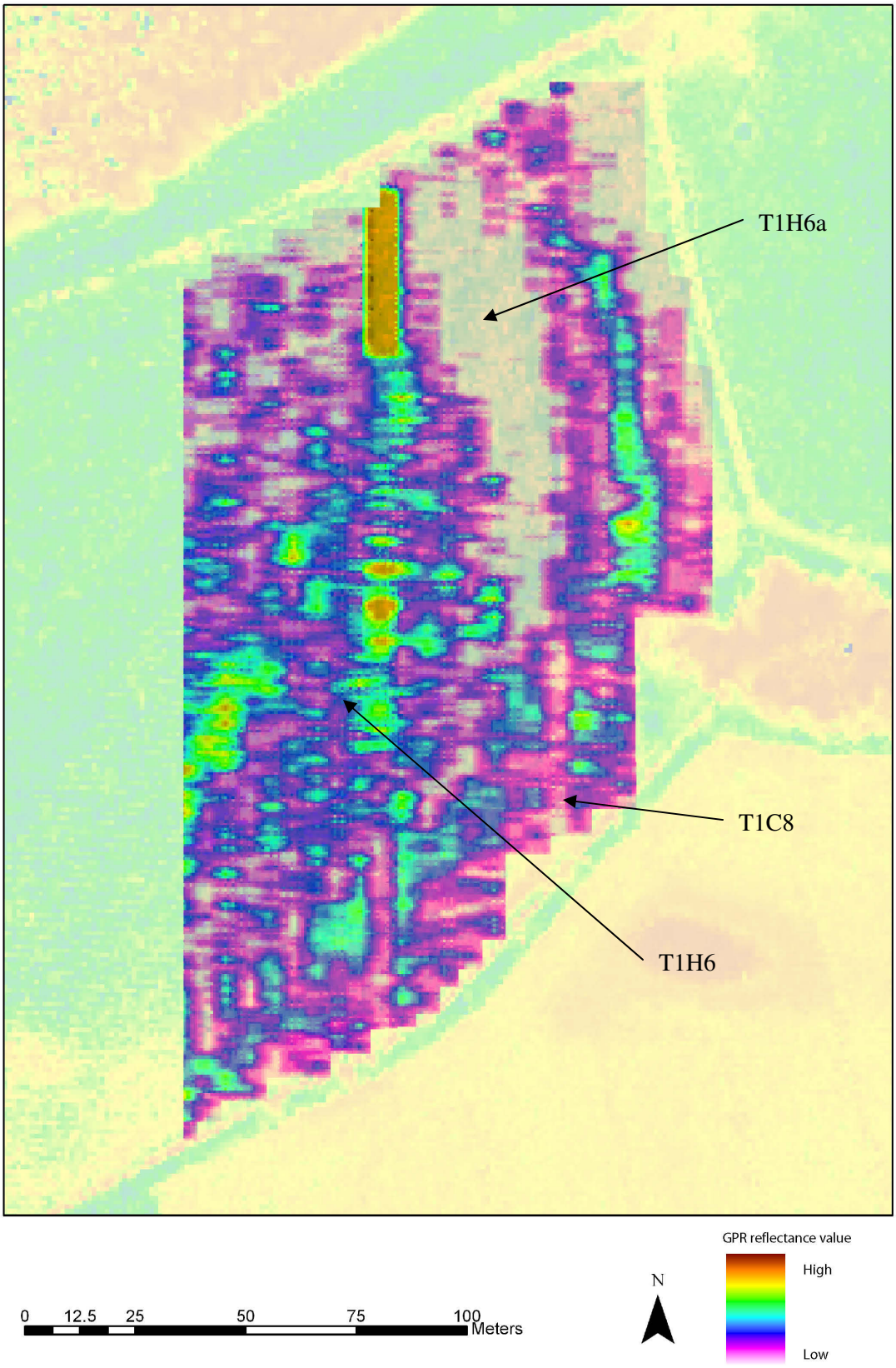

Fig 5.42: The T1G3 survey, 1.4m – 1.6m depth slice. The limit of penetration is being reached, with the palaeochannel just discernable from the gravel unit T1C6.

5.2.6 Summary of the GPR surveys on the middle unit

Three transect surveys and three grid surveys were undertaken on terrace 1. Terrace 1 defines the relationship between the Devensian terrace 2 and the modern floodplain. Terrace 1 is interesting due to the relationship of areas of the terrace 1 with palaeochannels that have undergone avolsion events. The GPR surveys have revealed much information on the stratigraphic organisation of terrace 1 and associated palaeochannels. The key points of the terrace 1 GPR surveys can be summarised as:

Terrace 1 transect 1:

- There was a good correlation between the GPR and gouge core transect.
- The alluvium overlying the terrace 1 gravels is quite shallow at circa 40cm – 50cm, although variation in depth is evident.
- Four definite and one other possible palaeochannel were identified along the transect.
- The terrace 1 gravels have a heterogeneous structure, with a number of sub units being identifiable.
- The gravel sub units maybe the difference between earlier Pleistocene and later Holocene gravels.
- Alternatively all the gravels in the transect may have been produced in the Holocene, the difference in units merely relating to differences in the depositional environment.
- Channel T1C5 was a deep channel with a clay fill ascertained through the gouge core transect, indicating a high palaeoenvironmental and geoarchaeological potential.
- GPR penetration into T1C5 was shallow.
- T1C5 has deposited alluvium onto areas of terrace 1, potentially burying archaeology.

Terrace 1 quarry transect

- A considerable depth of alluvium was seen on the terrace 1 gravels, between 1.5m and 2.5m.
- A series of clay layers lay above the terrace gravels, stopping GPR penetration into the gravels.
- Some of these clay layers produced a high GPR reflection response.
- Correlation between the GPR interpretation and the recorded section was generally good, although some variation was seen between the contact of the alluvium with the gravels.
- Organic deposits were evident in the quarry, most notably three large oak trees.
- Inspection of the gravels within the quarry did not reveal any evidence for bipartite grave units, suggesting that this area of terrace 1 contains only Holocene gravel deposits.

Terrace 1 transect 2 and terrace 1 grid 1:

- The relationship between the gouge core and GPR data was good.
- The 0m – 0.2m depth slice shows that the near field zone has a similar reflectance pattern to the LiDAR intensity data, which is interpreted as a function of water content, between the terrace and channel.
- The terrace gravels start to protrude at the 1.4m – 1.6m time slice and are visible at the 1.9m – 2.1m time slice.
- The level of alluvium on terrace 1 was deep, reaching a depth of 1.4m to sand.

- Some areas of the palaeochannel T1C6 have very high reflectance levels, which may relate to gravel deposits within the channel.
- The definition of the palaeochannel T1C6 was poor due to the fill of the channel being a silty clay that reduced GPR penetration.

Terrace 1 grid 2:

- The LiDAR last pulse DTM revealed no significant topographic variation in the survey area.
- The LiDAR intensity plot clearly identified a difference in sedimentary units in the survey area, interpreted as a product of different soil moisture contents.
- A palaeochannel containing a gravel bar that had cut into terrace has been interpreted from the GPR data.
- The alluvium covering the terrace 1 gravels was relatively shallow, clearly visible by the 0.9m – 1.1m depth slice. An interpreted alluvium depth of 0.6m is suggested.
- The GPR penetration into the palaeochannel was shallow, suggesting a high water content and/or high clay content.
- Due to the interpreted conditions within the palaeochannel T1C7 channel it is suggested the channel is cored for palaeoenvironmental samples.

Terrace 1 grid 3:

- The survey identified a palaeochannel that had eroded into a section of terrace 1.
- The gravels identified on terrace 1 were heterogeneous in their structure.
- The alluvium on this area of terrace 1 gravels was shallow at 0.5m or less.
- Penetration into the palaeochannel T1C8 was shallow suggesting a waterlogged/clay filled channel.
- It is suggested that the palaeochannel is cored for palaoenvironmental samples.

The terrace 1 unit can be seen to be heterogeneous in its composition, a product of the dynamic confluence environment. Several areas of terrace 1 have high levels of alluvium overlying gravels, demonstrated by the T1G1 survey and the T1QT survey. Other areas have relatively shallow alluvium overlying the terrace 1 gravels such as on the T1T1 survey. It is clear that some of the palaeochannels that have eroded into terrace 1 have also deposited significant quantities of alluvium onto the terrace, potentially burying archaeological sites, such as the enclosure identified on the T1T1 survey. Understanding the heterogeneous composition of terrace 1 is important in developing the chronostratigraphic model and for identifying areas of archaeological potential within the survey area.