This paper provides the first detailed, multi-proxy environmental record for the character of Lateglacial conditions in the lowest Pleistocene terrace of the main valley floor of the River Trent at Holme Pierrepont near Nottingham. The analysis of pollen, plant, insect and mollusc remains preserved within organic channels near the base of the terrace, named the Holme Pierrepont Sand and Gravel by the British Geological Survey (historically known as the Floodplain Terrace), provided evidence of cool, though not fully arctic climatic conditions and a largely treeless landscape, roamed by large herbivores. Radiocarbon dating indicates that these sediments were deposited during the Loch Lomond Stadial (Younger Dryas GS-1). Comparison of these dates from Holme Pierrepont with those from morphostratigraphically similar deposits in the wider Trent catchment suggests that the Holme Pierrepont Sand and Gravel may have been laid down in two separate pulses of braidplain aggradation either side of the 'Last Glacial Maximum'. It has been demonstrated from historical documentation and riverine archaeological evidence that the middle Trent has been particularly sensitive to changing flood frequency and magnitude associated with climatic oscillations during the late Holocene; this study demonstrates that such sensitivity appears to extend back into the late Pleistocene. The timing of fluvial aggradation recorded at Holme Pierrepont agrees broadly with that recorded from other sites across England and north-west Europe.