HbRf-39 stratigraphy and zonation

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Introduction

As noted below, the complex stratigraphy and soils at Tse'K'wa are difficult to interpret. Numerous observations (e.g. colour, texture) were made in the field and recorded on standard forms. Fladmark took column samples in 1983 and conducted a detailed sedimentological analysis (summarized in the report on the 1983 excavations and in the 1988 article in *American Antiquity*). Fladmark's original data are stored in the physical archive. In 1990/91 excavators took bulk samples from many layers, and a selection of these are studied by Gregg Sullivan, a graduate student at SFU who also participated in excavations. Sullivan's preliminary report is included in the digital archive. Andrew Latimer (undergraduate student) conducted a research project on selected sediment samples, and also prepared remaining sediment samples from the 1983 excavations for long-term storage in stable containers.

The remainder of this document describes the stratigraphic sequence as a series of Zones and Subzones, based on the 1990/1991 excavations, and provides alternate scenarios for the formation of the site. Individual layers and levels from the 1983 season are integrated into the 1990/1991 Zones and Subzones. Individual layer descriptions from 1990 and 1991 are also included.

A separate folder with information on radiocarbon dates is included in the digital archive (HbRf39900). Plotting radiocarbon dates against the stratigraphic sequence demonstrates the integrity of the stratigraphic sequence.

Stratigraphic sequence

The stratigraphic sequence at Charlie Lake Cave is extremely complex. When interpreting the sequence, the following factors should be considered:

1. There were probably four major sources for sediments at the site: fine sediments washed downslope into the gully; fine sediments derived from the cave and moved into the gully; sand particles weathered from the sandstone bedrock; and larger pieces of sandstone (gravel to boulders) derived from the sandstone bedrock. There may also have been an aeolian component.

2. Sediments entered the gully from numerous directions. Although much of the sediment came from upslope, it entered the gully area along distinct "chutes" caused by joints in the underlying bedrock. Thus, it is possible to faintly distinguish differences in sediments derived from a chute to the west of the main excavation area and another chute which lies above the cave mouth. There was also a small but noticeable

accumulation of distinctly different layers along the edge of the parapet, derived from weathering of the north face of the parapet.

3. The base of the gully, when it was originally formed, was neither horizontal nor smooth. As will be seen below, the base of the gully sloped steeply to the south and was littered by an irregular collection of boulders, producing a relief difference of up to one metre. Thus much of the early sedimentation at the site took place around a jumble of boulders, while some of the later sedimentation took place on a fairly steep slope. As the gully filled with sediment, the angle of slope of the deposits seems to have become less steep through time, so the modern surface is close to horizontal.

4. Various rockfalls have occurred during the period when the gully was filling with sediment.

5. Soils have developed at various times in the gully, thus modifying sediments.

6. Water has percolated through the sediments, leaching organic materials and depositing insoluble minerals. The degree of percolation has varied from one area to another, but appears to have had the greatest impact in sediments closest to the northern side of the gully. Bone preservation is poor on the north side of the gully, but much better in the centre and southern part of the gully.

7. Rodents and tree roots have disturbed various parts of the site, mainly detectable in the upper half of the deposits.

8. Excavation and recording methods were different in 1983 and 1990/91 (see history of excavations).

9. The gully containing the excavated sediments was created when a massive piece of sandstone (the parapet) was detached from the bedrock escarpment containing the cave. It is possible that this was not a single event, and there is some evidence that the north side of the parapet rested roughly along the N22 line before moving further downslope to its current position roughly along the N21 line. In other words from the time of the first use of the site (about 12,000 cal BP) to about 11,000 cal BP there may have been more than one episode of the parapet moving downslope to create the gully.

As a result of all of the above, it is extremely rare to find layers which run across all excavated areas, thus making it difficult to tie together sequences in excavation units which do not lie adjacent to each other. It also means that stratigraphic sections only show a small proportion of layers excavated, because many layers were limited in their horizontal extent and do not show up in a cross-section of the deposits. The excavation strategy in 1990/91 was more "open plan" than in 1983. It is therefore somewhat easier to produce a composite stratigraphic description for those seasons.

For the purposes of this study, the stratigraphy is based mainly on the southern side of the site in the area excavated in 1990/91. This area preserves a complex stratigraphic sequence with numerous thin layers. In contrast, the north side of the site contains massive deposits of homogenous silt/sand, which cannot be differentiated into discrete layers. This is probably because of post-depositional leaching in the northern site area (as discussed above). Thus, while a sequence of visibly discrete layers and soil horizons can be proposed for the southern excavation units, most of the sediments in the northern units were excavated by arbitrary levels. These arbitrary levels can still be tied into the southern stratigraphic sequence.

It is possible to divide the sequence into a series of stratigraphic zones and subzones. These can be linked to the stratigraphy defined in the 1983 season, at least for 1983 units which are contiguous with 1990/91 units. In addition, every layer excavated in 1990/91 is described separately later. The stratigraphic sequence presented below is based on the 1990/91 layers, but radiocarbon dates from 1983 have been included. The relationship of the 1983 stratigraphy and the 1990/91 stratigraphy is discussed at the end of the section.

After the 1983 excavations, five major stratigraphic zones were defined. As the last of these Zones (Zone V) was defined simply by the presence of historic artifacts, it was later discarded, and Zones IV and V were combined as Zone IV. The Zones were also divided into Subzones. The subzones presented in the 1988 publications have now been discarded, and new subzones defined, based on a more detailed examination of stratigraphy in the 1990/91 excavations. These zones and subzones were included in Handly's 1994 MA thesis and the summary publication in Arctic in 1996. They have been used to subdivide the time periods at the site in all subsequent theses and publications.

Note that in the descriptions below the radiocarbon dates are given in conventional format. To provide an estimate of the calendrical age these need to be calibrated. See the section of the archive on radiocarbon dates for calibrated dates.

Stratigraphic sequence

Zone I
Layers 108, 109
Radiocarbon dates : none
Layer 109 is a formation of massive sandstone slabs over which the parapet moved after it was detached from the bedrock. This represents the base of the 1991 excavations. The slabs could not be broken up, and may well represent bedrock, as slabby bedded sandstone is visible in situ in a quarry to the west of the site area. Layer 108 is a layer of sandstone rubble lying over 109. It appears to consist of fractured pieces of sandstone, and was presumably created as the parapet detached from the bedrock and moved downslope. Lying directly over 108 in some places are large boulders, which have not been given a layer number. These were detached from the

base of the parapet as it broke away from the bedrock. They are only found in the north side of the gully. The fact that many of these boulders lie along the N22 lie is one of the pieces of evidence for suggesting that the parapet may have initially moved to that point, before moving further downslope.
Zone I is interpreted as the debris associated with the detachment of the parapet from the bedrock, and its movement downslope. It is possible that this took place in two stages. The first stage saw the parapet detach from the bedrock and move about a metre downslope. After a brief interval it moved about another 1.5 metres further downslope. The position of the boulders supports this interpretation, as does the stratigraphic position of layers in Subzone IIa.

Subzone IIa
Layers 106, 07
Radiocarbon dates : 10,500 +/- 80 BP (CAMS 2129) on large artiodactyl bone
10,440 +/- 40 BP (UCIAMS 142221) on same bone

Layers 106 and 107 are found in a restricted area, to the north of the large boulders left on the bottom of the gully after the parapet detached. They appear to be *in situ* or redeposited till, contain relatively high amounts of clay and small allochthonous pebbles, and their southern edge is an abrupt, almost vertical, boundary that may mark the first position of the north side of the parapet. Layer 106 is virtually identical to a diamicton exposed in a backhoe trench a few hundred metres northwest of the site. Layer 107 is more clayey, and may represent clay washed out of layer 106 and redeposited against the base of the bedrock.
Subzone IIa is the first depositional event of fine sediments at the site. It may represent the slumping of deposits into the newly created gully formed as the parapet moved downslope. The distribution of these layers suggests that they may have been deposited before the parapet had moved to its final position.
It should be noted that much of this part of the Peace River region displays thick deposits of glacial lake silts (rythmites). These sediment can be found on the top of the hill above the site, and were observed both in a backhoe trench being excavated for a water line, and in unit 37. However, no rythmites were observed at the base of the gully. This suggests either that sedimentation in the gully began after Glacial Lake Peace had drained, or that *in situ* rythmites were eroded out of the gully prior to the deposition of faunal remains and artifacts.
Note that the radiocarbon dates on a fragment of bone from this Subzone suggest the same time period as Subzone IIb, suggesting very little time occurred between the two depositional episodes.

Subzone IIb
Layers 102, 103,104, 105
Radiocarbon dates: 10450 +/- 150 (SFU300) Bison bone
10770 +/- 120 (SFU 454) Bison bone (likely too old – see below)
10290 +/- (UCIAMS 142220) on the same specimen as SFU 454

10,560 +/- 80 BP (CAMS 2134) Bison third phalanx near base of layer 105.
10290 +/- 100 B.P. (CAMS 2317) Raven scapula near base of layer.
10380 +/- 160 (SFU 378) Bison bone
10378 +/- 36 (OxA 11961) Large ungulate
10285 +/- 40 (UCIAMS 142219) Same specimen as OxA 11961 (above)
10340 +/- 40 (OxA 12084)
10435 +/- 25 (UCIAMS 11346) Bison bone
10430 +/- 30 (UCIAMS 11347) Bison bone
10260 +/- 40 (UCIAMS 142222) Bison
10505 +/- 45 (OxA 12085) Bison bone
10270+/-25 (UOC 20750) Raven thoracic vertebra (same as CAMS 2317)

These layers were deposited after the parapet reached its final position. Layer 105 is mainly found in the southern area of the gully, and consists of a deep massive silt/sand layer with no internal structure visible. It appears to represent the rapid redeposition of glacial lake silts from the slope above the site. (Rythmites were found in a backhoe trench and a test excavation to the north of the site). Deposition must have been quite rapid because bone is extremely well preserved; for example, a relatively complete raven skeleton was recovered from this layer, and included the extremely fragile tracheal rings lying in an articulated position. Layer 104 occurs above 105, and is very similar to it, being transitional to the overlying layer 98. Layers 102 and 103 are from the northern area of the site. Layer 103 appears to contain somewhat more clay than 105, but the area from which this layer was excavated was quite wet, and the difference between 103 and 105 may simply reflect the fact that different modern moisture content gave the layer a different apparent texture. Layer 102 was quite thin, and overlay a very large boulder in the northwest corner of the excavation area. It seems to be the stratigraphic equivalent of 104 and 105, but as it was perched in an isolated position it was not possible to correlate the two layers.
Subzone IIb is associated with the deposition of most of the Paleoindian artifacts recovered in the 1991 season, and with many of the formed artifacts recovered in 1991. Subzone IIb is interpreted as a period of rapid downslope erosion on the hillside above the site, resulting in rapid deposition of reworked glacial lake silts in the bottom of the gully.
Given the many refits of faunal specimens in this Zone, it is possible that IIb sediments were initially deposited when the gully was quite narrow and the parapet was resting roughly along the N21.50 line. The parapet then moved further downslope, to its present position, resulting in sediments slumping south.

Subzone IIc
Layer 98

Radiocarbon dates : 9670 +/- 150 BP (CAMS 2316) Bison first phalanx - part of an articulated foot from near the top of the layer.
9760 +/- 160 (SFU 355) Bison sacrum
10100 +/- 210 (RIDDL 392) Ground squirrel femur
9990 +/- 150 (RIDDL 393) Bison humerus
10170 +/- 40 (UCIAMS 142218) Same specimen as RIDDL 393 (above)
10230 +/- 55 (OxA 10580) Bison bone
10060 +/- 35 (UCIAMS 142217) Bison bone
9980 +/- 40 (UCIAMS 142223) Bison bone

This layer covers most of the excavated area, and is a sandy silt, very similar to layers in Subzone IIb, except that the clay content is slightly lower, making the layer much easier to excavate. It appears to be a continuation of the downslope deposition seen in Subzone IIb.

Subzone IId

Layer 93

This layer covers layer 98. It is a continuation of the same depositional process, but a slightly different texture allowed this layer to be separated from the underlying layer. It is thought to be a continuation of the same relatively rapid deposition process.

Subzone IIIa

Layers 82, 83, 84, 86, 87, 91, 92. Unit 26 Layers 7-4 and 7-5 . Unit 20 Layer 7-23 .
Radiocarbon date : Layer 92 9490 +/- 140 BP (CAMS 2318) Raven scapula.

Deposition rates slowed, allowing a soil horizon to develop across the bottom of the gully. Layer 82 represents the development of an A horizon, and it ranges from a well defined black colour in the south to a very faint brown stain in sediments to the north. Layers 83, 84, 86, 87, 91, and 92 are all relatively small and thin lenses of slightly different colour and texture associated with layer 82, and all occur in the southern units. They presumably represent minor changes in the soil formation process, perhaps associated with minor differences in vegetation cover, or minor episodes of slightly more rapid deposition of sediments. As for all subsequent events, layer 7 deposits represent a mixture of downslope sediments and locally derived sandstone deposited on the north side of the gully and subsequently leached. It is likely that if the leaching had not occurred that they would demonstrate a similar complexity to the more southern layers. However, leaching has rendered deposits on the north side of the gully fairly homogenous from top to bottom, and, as discussed above, these deposits (layers 7 and 39) were excavated in arbitrary levels in 1 by 1 metre units.
The radiocarbon date provides an estimate for the appearance of the first stable surface at the site. Zone III is defined by alternating periods of deposition and soil formation, resulting in a banded appearance to the sediments. In the field these bands

were treated as separate sedimentary units, but many may result from pedogenic processes rather than depositional events. Zone III is generally interpreted as a period when down-slope movement of sediments slowed down, allowing soils to develop within the gully.

Subzone IIIb

Layers 77, 79, 80, 81. Unit 20 Layer 7-22. Unit 23 Layers 7-20, 7-21. Unit 24 Layers 7-17, 7-18, 39-9, 39-10. Unit 25 Layer 39-14. Unit 26 Layer 39-5.

Radiocarbon dates : 8400 +/- 240 BP (SFU 357) Charcoal
7800 +/- 800 BP (SFU 370) Charcoal*
*could be IIIb or IIIc

Subzone IIIb is very similar to Subzone IIIa. Layer 77 is a soil horizon which is well developed in the southern units, but becomes less well defined towards the north. Layers 79, 80 and 81 are small layers associated with Layer 77 in the south. The arbitrary levels in layers 7 and 39 represent sediment addition of roughly the same time period. As for all subsequent events, layer 39 deposits (like layer 7) are sediments deposited on the north side of the gully with subsequent leaching removing most colour variation. Layer 39 appears to originate from the northeast (the cave and the "chute" over the cave mouth) while Layer 7 originates from the northwest.

Subzone IIIc

Layers 62, 64, 67, 70, 71, 72, 74, 76. Unit 20 Layer 7-21. Unit 23 Layers 7-18, 7-19. Unit 25 Layer 39-13.

Radiocarbon dates: 8819 +/- 48 (UOC 10453). Charred twig

This event consists of a layer of brown silt/sand (62), associated layers of sand and rockfall (71, 72, 74, 76) overlain by a black layer (64 and 70) and an associated layer of sand (67), all in the southern area of the site. The event consists of the deposition of fine sediments, followed by a period of stability when a thin soil formed.

Subzone IIId

Layers 60, 61, 63. Unit 25 Layers 39-11, 39-12.

Radiocarbon date: 8692 +/- 33 (UOC 9763) Snowshoe hare bone

This represents a minor soil formation period, characterized in the southern units by a thin A horizon over a thin B horizon developed in a layer of silt/sand.

Subzone IIIe

Layers 55, 56, 57, 58, 59. Unit 20 Layer 7-20. Unit 23 Layer 7-17. Unit 24 Layer 7-15, 7-16, 39-7, 39-8. Unit 26 Layers 7-3, 39-6.

Radiocarbon dates: 7100 +/- 350 BP (SFU 452) Charcoal

As with the previous two Subzones there is a complex of thin brown or black silt/sands in the southern area of the gully which represent a relatively short period of soil formation following active sedimentation. Deposition also occurred on the north side of the gully (layers 7 and 39).

Subzone IIIf

Layers 48, 49, 50, 53, 54. Unit 20 Layers 7-18, 7-19. Unit 21 Layers 7-17, 7-18, 39-3, 39-4. Unit 23 Layers 7-14, 7-15, 7-16. Unit 24 Layers 7-14, 39-5, 39-6. Unit 25 Layers 39-8, 39-9, 39-10. Unit 26 Layers 39-4, 39-5.

Radiocarbon date : 7400 +/- 300 (RIDDL 10) Charcoal*
*could be Subzone IIIf or IIIg
7925 +/- 64 (UOC 10455) Charcoal

In the southern area of the gully there are quite thick silt/sand deposits with evidence for soil formation creating black horizons. To the north the sediments are thick, but organics have been leached out.

This is similar to other subzones of Zone III, although thicker.

Date added in 2023: 8698+/-27 (UOC20746) Snowshoe hare

Subzone IIIg

Layers 40, 41, 42, 43, 46. Unit 20 Layers 7-16, 7-17. Unit 21 Layers 7-15, 39-1, 39-2. Unit 23 Layers 7-12, 7-13. Unit 24 Layers 7-11, 7-12, 7-13, 39-1, 39-2, 39-3, 39-4. Unit 25 Layers 39-3, 39-4, 39-5, 39-6, 39-7. Unit 26 Layers 39-2, 39-3.

Radiocarbon dates : 1130 +/- 240 BP (SFU453)*
*completely wrong for this location. Could have been mixed up with SFU 356 (6700 +/- 290 BP) (see Subzone IVb, below)
7072 +/- 30 (UOC 9761) Bison bone

The same as IIIf, but thicker and with a better developed B horizon.

Subzone IIIh

Layers 30, 31, 32, 35, 36, 38, 94, 95, 96, 97, 101. Unit 20 Layers 7-9, 7-10, 7-11, 7-12, 7-13, 7-14, 7-15. Unit 21 Layers 7-12, 7-13, 7-14. Unit 23 Layers 7-7, 7-8, 7-9, 7-10, 7-11. Unit 24 Layers 7-8, 7-9, 7-10. Unit 25 Layers 39-1, 39-2. Unit 26 Layer 39-1.

Radiocarbon dates : 4800 +/- 640 BP (SFU 451) Charcoal
4400 +/- 400 BP (SFU 385) Charcoal
5827 +/- 46 (UOC 10454) Charcoal (Lab later corrected to 5828+/-27)

Layer 31 dominates the southern half of the gully. It represents a period of silt/sand deposition, and is notable for a pink tinge to its predominantly brown colour. This layer could represent the formation of a thick B horizon below the darker sediments in Zone IV.

Date added in 2023: 6553+/-25 (UOC 20747) Snowshoe hare

Subzone IVa

Layers 22, 23, 24, 25, 27, 28, 75, 78, 88, 89, 90. Unit 20 Layers 7-6, 7-7, 7-8. Unit 21 Layers 7-6, 7-7, 7-9, 7-10, 7-11. Unit 22 Layer 7-6. Unit 23 Layers 7-4, 7-5, 7-6. Unit 24 Layers 7-4, 7-5, 7-6, 7-7. Unit 25 Layer 7-4, 7-5, 7-6.

Radiocarbon dates : 4400+/- 70 BP (CAMS 3174) Large cervid bone
4270 +/- 160 BP (SFU 382) Bison innominate
2900 +/- 400 BP (SFU 358) Charcoal
5052+/-23 (UOC 20748) Snowshoe hare

Dark brown/black sediments characterize the southern area, suggesting a significant period of soil development following deposition. Layer 27 is a rockfall, and there are quite large quantities of sandstone gravel associated with Layer 22. Layers 22 and 23 run into the northern units, probably because there has been less time available for groundwater leaching of the organics to occur. All Zone IV sediments contain quantities of burnt animal bone and charcoal, and more intensive human use of the site may date from this time.

Subzone IVb

Layers 15, 16, 17, 18, 19, 20, 21, 69, 73. Unit 20 Layers 7-4, 7-5. Unit 21 Layers 7-4, 7-5. Unit 22 Layers 7-4, 7-5. Unit 23 Layers 7-2, 7-3. Unit 24 Layers 7-2, 7-3. Unit 25 Layers 7-2, 7-3. Unit 26 Layer 7-2.

Radiocarbon dates: 6700 +/- 290 BP (SFU 356) Charcoal *

* Almost certainly wrong for this location. Probably mixed up with SFU 453 (1130 +/- 240 BP) See Subzone IIIg.

1400 +/- 400 BP (SFU 379) Charcoal

1550 +/- 100 BP (RIDDL 59) Charcoal

2217 +/- 25 (UOC 10456) Charcoal

Similar to Subzone IVa. In the southern area there is a series of dark brown/black layers, presumably reflecting soil development. Associated with this is a small hearth (Layer 19) which had been capped by a slab of sandstone. Large amount of burnt bone and burnt sandstone fragments were found, especially in the southern units in Layer 16 which was characterized by some excavators as "midden-like".

Subzone IVc

Layers 1, 2, 3, 4, 5, 6, 8, 9, 12, 13, 66, 68, 99, 101. Unit 20 Layers 7-1, 7-2, 7-3. Unit 21 Layers 7-1, 7-2, 7-3. Unit 22 Layers 7-1, 7-2, 7-3. Unit 23 Layer 7-1. Unit 24 Layer 7-1. Unit 25 Layer 7-1. Unit 26 Layer 7-1.

Radiocarbon date: 1555 +/- 15 (UCIAMS 208860) Cougar tooth

These layers represent a variety of A horizons formed relatively recently, as well as some historic period disturbances to the site. They record a gradual accumulation of sediment with fairly consistent A horizon development.

Summary

The stratigraphic evidence presented here is essentially in agreement with the system of Zones and Subzones described for the 1983 excavations, except that Zone V (which was characterized by the presence of post-colonial artifacts) has been integrated into Zone IV. The overall sequence can be summarized as follows.

Sediments on the hill to the north of the site were revealed in two excavations north of the house on the property and just north of Butte Lane. In both cases excavations revealed a diamicton overlain by laminated silts. This fits the local regional glacial sequence, with the final glaciation laying down the diamicton, followed by the extensive

Glacial Lake Peace into which silts were deposited. Further investigations would be required to establish the presence of a raised beach of that lake downslope from the site, but Unit 36 produced sediments that seem to suggest a beach was present there. The detachment of the parapet from the bedrock and its subsequent movement down the slope created a sterile layer of crushed sandstone and a jumble of large sandstone boulders. These boulders were extremely hard when excavated and, in contrast to all other sandstone boulders found at the site, could not be significantly damaged with a hammer and cold chisel, nor with a power saw fitted with a masonry blade. This suggests that the boulders were unweathered when deposited and were covered rapidly afterwards.

The exact sequence of events during the early period of site formation is unknown. However, it seems likely that the cave was formed by sub-glacial water erosion that exploited structural weaknesses in the sandstone bedrock. When the parapet detached from the bedrock escarpment is unknown. It occurred after the formation of the cave. Two scenarios are presented below.

Scenario I: Gully formed before Glacial Lake Peace drained

Order	Regional	Action	Evidence
1	Ice sheet	Cave formed in bedrock by subglacial water	Cave entrance much narrower than cave. Remnant of cave preserved on north side of parapet as a small niche. Erosion features visible on bedrock, including inside cave, consistent with water erosion. Diamicton on hill above cave.
2	Ice sheet.	Parapet detaches and moves about 1 to 1.5 metres downslope	Position of large boulders in bottom of gully. Diamicton underlying glacial lake sediments on hill north of cave. Layer 106 (subzone IIa) deposited as till.
3.	Glacial lake forms and drains	Hypothetical deposition and erosion of rhythmites in gully.	No evidence in gully. Rhythmites deposited on hill above cave.
4	Upland	Glacial lake sediments upslope from gully are eroded and redeposited into gully.	Deposition of subzone IIb sediments begins
5	Upland	Parapet moves about 1.5 m further downslope. Layer 105 slumps	Refitting of faunal specimens in layer 105 suggests movement of sediment

			subsequent to their deposition.
6	Upland	Parapet in final position. Redeposition of glacial lake deposits from upslope location continues.	Subzone IIb, IIc and IId sediments deposited
7	Upland	Parapet in final position. Rate of deposition slows. Soil formation.	Zones III and IV

Scenario II: Gully formed after Glacial Lake Peace Drained

Order	Regional	Action	Evidence
1	Ice sheet	Cave formed in bedrock by subglacial water	Cave entrance much narrower than cave. Remnant of cave preserved on north side of parapet as a small niche. Erosion features visible on bedrock, including inside cave, consistent with water erosion. Diamicton on hill above cave.
2	Glacial lake forms and drains	No impact on site.	Glacial lake sediments cover diamicton on hill above cave.
3	Upland	Parapet detaches and moves about 1 to 1.5 metres downslope	Position of large boulders in bottom of gully. Diamicton redeposited as layer 106.
4	Upland	Glacial lake sediments upslope from gully are eroded and redeposited into gully.	Deposition of subzone IIb sediments begins
5	Upland	Parapet moves about 1.5 m further downslope. Layer 105 slumps	Refitting of faunal specimens in layer 105 suggests movement of sediment subsequent to their deposition.
6	Upland	Parapet in final position. Redeposition of glacial lake deposits from upslope location continues.	Subzone IIb, IIc and IId sediments deposited
7	Upland	Parapet in final position. Rate of deposition slows. Soil formation.	Zones III and IV

Regardless of which of these scenarios is correct, it does appear that the parapet was in its current position quite early in the depositional history of the site, and that most of Zone II deposits are redeposited glacial lake sediments. The only datable specimen from Subzone IIa fits the time range for dates from Subzone IIb. This makes it more likely that the diamicton in layer 106 does not represent *in situ* till deposited under the last ice sheet, which dates thousands of years earlier. Instead, it seems more likely that layer 106 is till that slumped into the gully as the parapet broke away from the bedrock.
As an example of the rapidity of these early depositional events, if we assume that redeposition of glacial lake sediments began at about 12,000 cal BP and ended at about 11,000 BP, then over a metre of sediment was deposited against the parapet in the first 1000 years of deposition. The next three metres of sediment were deposited in 11,000 years, at a much slower rate of sedimentation.
After about 11,000 cal BP there is a repeated pattern of processes in Zones III and IV. Sediments were deposited at the site, but from time to time sedimentation rates slowed sufficiently to allow soil development to proceed. In some cases fairly thick A and B horizons were developed; in other cases the soils were thin. Nevertheless there appears to be a pattern of sediment deposition followed by relative stability, and this accounts for most of the depositional events after 11,000 cal BP. The soil horizons probably originally ran from one side of the gully to another, as one sees in the modern soil profile. However, water percolates through sediments on the north side of the gully, and this seems to have leached out soil horizons in the north half of the site. As can be seen from the north-south section from the 1990/91 excavations, hard pans are formed in the area where soil horizons are missing. One can also see that generally the northern extent of soil horizons is reduced as one goes deeper, suggesting more extensive leaching of the earliest soils.
It is important therefore to realize that many of the "layers" excavated are not discrete depositional units, because their distinctive coloration (and even texture) may have formed during pedogenesis after sediments had been deposited. The upper surfaces of A horizons should mark temporal boundaries, and may indeed reflect quite long periods of time when deposition was slow. (I am grateful to Peter Bobrowsky for this insight). Thus many of the subzones described above consist of a period of sedimentation followed by a period of soil development when deposition rates had slowed down. In Zone IV deposition rates may have slowed even more, because A horizons are well developed. Alternatively, this might reflect the lack of leaching in the recently formed soils.

Tying in the 1983 sequence

The sequence from 1983 was based on somewhat different excavation methods and recording system. Because excavation units were not contiguous, layers were numbered sequentially as they were encountered in each unit. Thus, the same layer might be given different layer numbers in different excavation units. In 1983 the tendency was to "lump" rather than "split" layers, so that the number of layers identified per excavation unit tends to be smaller than in the 1990/91 excavation units. For example, unit 26 (excavated in 1990/91) lies between units 4 and 5 (excavated in

1983). Unit 4 contains 5 layers; unit 5 contains 14 layers; unit 26 contains more than 40 layers. Not surprisingly, this tendency to lump and split extends into the stratigraphic summaries for the different seasons. The 1983 excavations resulted in the definition of five Zones, divided into a total of 10 stratigraphic units (subzones), whereas the 1990/91 excavations resulted in the definition of 4 Zones divided into 16 stratigraphic units (see above). Clearly, these differences reflect different approaches to excavation and interpretation, but one should still be able to correlate strata from adjacent excavation units, regardless of the season of excavation, and thus produce a combined sequence.

For the purposes of this study, the 1983 layers and levels will be fitted as well as possible to the 16 stratigraphic Subzones defined from the 1990/91 excavations. Because layer and level designations from the 1983 season only make sense in terms of the individual units from which they were excavated, each excavation unit from 1983 will be considered separately. Only excavation units from 1983 which are contiguous with excavation units from 1990/91 can be correlated in this way.

Unit 1
This unit lies beside unit 33 (1991) and 3 (1983). It was excavated at the same time as unit 3, and the layer and level numbers used were the same as for Unit 3. Note that 1-19 and 1-20 are Subzone IIIh and Layer 8 is Subzone IIId and IIIe.

Unit 2
This unit was not completed in 1983. It was excavated entirely by layers (i.e. no arbitrary levels were used to divide up thick layers).
Layers 1,2,3,4,5,6 equate with Subzone IVc
Layers 7,8,9 equate with Subzone IVb.
Layer 10 equates with Subzone IVa.
Layers 11 and 12 equate with Subzone IIIh.
Layers 13, 14, 15 equate with Subzone IIIg.
Layer 16 equates with Subzone IIIf.
Layer 17 equates with Subzone IIIe.

Unit 3
Layers 1-1 through 1-6 equate with Subzone IVc.
Layers 1-7 through 1-12 equate with Subzone IVb.
Layers 1-13 and 1-14 equate with Subzone IVa.
Layers 1-15 through 1-18, 2-1, 3-1 and 4-1 equate with Subzone IIIh.
Layers 5-1,6-1, 7-1, 7-2 equate with Subzone IIIg.
Layers 7-3 through 7-5 equate with Subzone IIIf.
Layers 9,10,11 equate with Subzones IIId and IIIe.
Layer 12 equates with Subzone IIIc.
Layer 13 equates with Subzone IIIb.
Layer 14 equates with Subzone IIIa.

Layer 15 equates with Subzones IIb, IIc and IId. (It is not possible to assign levels 15-1 through 15-10 precisely).

Unit 4
Layers 1-1, 2-1 and 2-2 equate with Subzone IVc.
Layers 2-3 through 2-7 equate with Subzone IVb.
Layers 3-1, 4-1, and 4-2 equate with Subzone IVa.
Layers 4-3 through 4-7 equate with Subzone IIIh.
Layers 4-8 through 4-10 equate with Subzone IIIg.
Layers 4-11 through 4-13 equate with Subzone IIIf.
Layer 4-14 equates with Subzone IIIe.
Layer 4-15 equates with Subzone IIId.
Layer 4-16 equates with Subzone IIIc.
Layers 4-17 through 4-19 equate with Subzone IIIb.
Layers 4-20 and 4-21 equate with Subzone IIIa.
Layers 4-22 and 5-1 through 5-3 equate with Subzone IId.
There is a problem below this because arbitrary levels 5-4 through 5-9 do not seem to have been excavated at a steep enough angle. As a result, some of these levels probably included parts of what in 1991 we called Layer 98 and part of 105, the later which underlay 98. Thus Unit 4 Layers 5-4 through 5-9 encompass all of Subzone IIc and part of Subzone IIb. In 1991 the very lowest portions of Unit 4 were excavated as Layer 105. When trying to relate artifacts and bones from the lower part of Unit 4 to stratigraphy established in 1991 it would be better to look at the position of individual objects rather than their assignment to a particular arbitrary level in Layer 5.

Unit 5
Layers 1-1 through 1-4 equate with Subzone IVc.
Layers 2-1 and 3-1 through 3-3 equate with Subzone IVb.
Layers 4-1 and 5-1 equate with Subzone IVa.
Layers 5-1, 6-1, 6-2 equate with Subzone IIIh.
Layers 7-1, 7-2, 8-1, 9-1 equate with Subzone IIIg.
Layers 9-2, 9-3, 9-4 equate with Subzone IIIf.
Layers 9-5 through 9-7 equate with Subzones IIId and IIIe.
Layer 9-8 equates with Subzone IIIc.
Layer 9-9 equates with Subzone IIIb.
Layers 9-10 and 10-1 equate with Subzone IIIa.
Layers 10-2 and 11-1 equate with Subzone IId.
Layers 11-2 through 11-6 equate with Subzone IIc.
Layers 12-1, 13-1 and 14-1 equate with Subzone IIb.

Unit 6
Much of the upper part of this unit had already been excavated by a pre-1983 test pit. The unit was excavated at the same time as Unit 5, but different layer and level numbers were used. There was also a column sample taken from this unit in 1983. The

column samples were numbered sequentially. A few faunal remains were found in these samples.
Layers 1-1 through 1-3 equate with Subzone IVc.
Layers 1-4 through 1-8 equate with Subzone IVb.
Layer 1-9 equates with Subzone IVa.
Layer 1-10 equates with Subzone IIIh.
Layers 2-1 and 2-2 equate with Subzone IIIg.
Layer 2-3 equates with Subzone IIIf.
Layer 2-4 equates with Subzones IIId an IIIe.
Layer 2-5 equates with Subzones IIIb and IIIc.
Layer 3-1 equates with Subzone IIIa.
Layer 3-2 equates with Subzone IId.
Layers 4-1 through 4-4 equate with Subzone IIc.
Layers 5-1, 6-1 through 6-3 equate with Subzone IIb.

Unit 7
Layers 1-1 through 1-6 equate with Subzone IVc.
Layers 1-7 through 1-11 equate with Subzone IVb.
Layers 1-12 and 1-13 equate with Subzone IVa.
Layers 1-14, 2-1 through 2-4 equate with Subzone IIIh.
Layers 2-5 through 2-8 equate with Subzone IIIg.
Layers 2-10 through 2-12 and layers 3 and 4 equate with Subzone IIIf.
Layer 5-1 equates with Subzones IIId and IIIe.
Layer 5-2 equates with Subzone IIIc.
Layers 5-3 and 5-4 equate with Subzone IIIb.
Layers 5-5 through 5-9 equate with Subzone IIIa.
Layers 5-10 and 5-11 equate with Subzone IId.
Layer 6-1 equates with Subzones IIb and IIc.

Unit 9
Layers 1-1 and 1-2 equate with Subzone IVc.
Layers 1-2 through 1-5 equate with Subzone IVb.
Layer 1-6 equates with Subzones IIIh and IVa.
Layers 2-1 to 2-4 equate with Subzone IIIg.
Layers 2-5 through 2-7 equate with Subzone IIIf.
Layers 2-8 and 2-9 equate with Subzones IIId and IIIe.
Layer 2-10 equates with Subzone IIIc.
Layer 2-11 equates with Subzones IIIa and IIIb.
Layer 3-1 equates with Subzone IId.
Layers 3-2 equate with Subzones IIb and IIc

Unit 11
Layers 1-1 to 1-3 equate with Subzone IVc
Layers 1-4 to 1-8 equate with Subzone IVb

Unit 13
Layers 1 to 4 equate to Subzone IVc
Layers 5 to 10 equate to Subzone IVb

Unit 14
Layer 1 and 2-1 equate to Subzone IVc
Layer 10-1 equates to Zone IV

Layer descriptions 1990 and 1991. Note that these do NOT apply to 1983 layer numbers

These layer descriptions provide some basic information on each of the 109 layers defined during the 1990/91 excavations. Layers excavated in 1990 (up to layer 64) did not have Gregg Sullivan's standard texture descriptions applied to them, unless the same layer was also excavated in 1991 as well as in 1990. Descriptions are taken from all layer records kept for a particular layer. Thus, variable Munsell colour descriptions result from the various versions of colour given by different excavators, in different parts of the site, and sometimes reflect variation in colour with depth.
The stratigraphic relationships of layers are defined in a Harris Matrix in Handly's 1994 MA thesis. This diagram does not include rodent holes. As noted elsewhere, layers 7 and 39 occur in the northern half of the site, and are the result of the leaching of sediments by groundwater, resulting in a uniform appearance for most of the excavated depth of the site. The correlation of arbitrary levels in layers 7 and 39 with other strata is given in the previous section on stratigraphy.

Layer 1
Loose organic Ah horizon. Possibly deposited since the 1983 excavations, or includes a lot of 1983 backdirt. 10YR3/1, 10YR3/2, 7.5YR3/2.
Units 20, 21, 22, 23, 24, 25, 26, 27, 28, 29.

Layer 2
Black/dark brown heavily organic Ah horizon. 10YR2/1, 10YR3/1, 10YR2/2, 10YR3/2 (dry).
Units 20, 21, 22, 23, 24, 25, 26, 27, 28, 29.

Layer 3
Decayed sandstone and sandstone fragments. 10YR3/2.
Unit 22.

Layer 4
Fill of small historic period fire pit. 10YR2/2
Unit 25

Layer 5

Black/dark brown soil. Much organics and charcoal. 10YR2/1, 10YR2/2 (wet), 10YR3/2 (dry), 10YR4/2 (dry).
Units 20, 21, 22, 23, 24, 25, 26, 27, 28, 29.

Layer 6
Black/dark brown sandy silt.
Units 23, 24, 25, 26, 27, 28, 29.

Layer 7
Silty sand with sandstone fragments. Forms a massive depositional unit against the northern bedrock face of the site, and was excavated mainly in arbitrary levels. Very low in organics and charcoal. The variation in Munsell colours probably reflects the very large number of times Munsell colours were assessed. Although it was difficult to distinguish changes within layer 7, observation of the west section after excavation suggests that it becomes less pink and more olive as one gets deeper. Probably severely leached.
2.5Y4/4 (wet), 7.5YR4/4, 10YR3/1, 10YR3/2, 10YR3/3 (wet), 10YR3/4 (dry), 10YR4/3 (wet), 10YR4/4, 10YR4/6, 10YR5/2,10YR5/3 (dry), 10YR5/4 (dry)
Units 20, 21, 22, 23, 24, 25, 26

Layer 8
Brown silt with relatively few organics. Some sandstone fragments weathered from the parapet included. 10YR3/4, 10Yr4/3.
Units 26, 27, 28, 29

Layer 9
Black, highly organic loamy silt. Considerable charcoal in upper part of this layer. 10YR2/1 (wet).
Units 23, 24, 25, 26, 27, 28, 29

Layer 10
Rodent hole in Unit 27.

Layer 11
Rodent hole in Unit 29.

Layer 12
Dark brown/black silt, with patches of high organic content and patches of decayed sandstone. Appears to have been deposited as a series of very small, thin lenses or laminae. 10YR2/1.
Units 26, 27, 28, 29.

Layer 13
Black silty/sandy loam. 10YR2/1 (wet), 10YR3/1 (dry), 10YR3/2 (dry).

Units 23, 24, 25, 26.

Layer 14
Rodent hole in Unit 22.

Layer 15
Black loam. 10YR2/2.
Unit 23.

Layer 16
Dark brown silt, which appeared to have a reddish tinge when seen in section.
7.5YR4/6, 10YR2/2 (wet), 10YR3/3 (wet), 10YR3/4, 10YR4/3 (wet).
Units 26, 27, 28, 29.

Layer 17
Dark brown/black silty sand. 10YR2/2.
Units 24, 25, 26.

Layer 18
Dark brown/black silt, with much charcoal. May be part of Layer 17.
Unit 29.

Layer 19
Black fill of a hearth feature. Much charcoal. 10YR2/1.
Unit 26.

Layer 20
Dark brown/black silty loam. 10YR2/2 (wet), 10YR3/2 (dry), 10YR3/4, 10Yr4/3.
Units 23, 24, 26.

Layer 21
Very thin black layer, possibly a feature. 10YR2/2 (wet).
Units 20, 21, 23, 24.

Layer 22
Sand and sandstone fragments in a dark brown matrix. 2.5Y5/2 (wet), 2.5Y6/2, 10YR3/2, 10YR3/4, 10YR4/2, 10YR5/3.
Units 22, 24, 25, 26, 27, 28, 29.

Layer 23
Black sandy silt. 10YR2/1 (wet), 10YR2/2 (dry), 10YR2/2 (wet),10YR4/1.
Units 22, 24, 25, 26, 27, 28, 29.

Layer 24

Black fill of irregular feature.
Unit 29.

Layer 25
Small patch of dark brown/black silt associated with Layer 27 (rockfall). 10YR3/2.
Units 24, 25.

Layer 26
Rodent hole in unit 26.

Layer 27
Rockfall in sandy dark brown matrix. 10YR3/3.
Units 24, 25.

Layer 28
Dark brown silty loam. 10YR3/3 (dry). Oxbow point.
Units 24, 26.

Layer 29
Rodent hole in Unit 26. (No layer form)

Layer 30
Possible feature filled with black silty sand. 10YR2/1.
Units 24, 26

Layer 31
Reddish brown silt. 2.5Y4/3, 2.5Y4/4 (wet), 7.5YR3/2, 7.5YR3/4, 7.5YR3/4 (wet), 7.5YR4/3, 7.5YR4/4, 10YR3/6, 10YR4/4, 10YR4/4 (dry), 10YR4/4 (wet), 10YR4/6.
Units 21, 23, 24, 25, 26, 27, 28, 29, 33, 34

Layer 32
Pieces of sandstone and black silt lying under a large igneous boulder. 10YR2/1.
Units 26, 28, 29.

Layer 33
Rodent hole in Units 23, 26.

Layer 34
Rodent hole in Units 23.

Layer 35
Decayed sandstone lens within Layer 31-2 in Unit 29 only. 10YR5/3.

Layer 36

Dark lens within 31-1 and 31-2 in Unit 29 only. 10YR2/2.

Layer 37
Rodent hole in Unit 24.

Layer 38
Sand and sandstone fragments. 10YR3/4 (wet), 10YR4/3, 10YR5/3 (dry).
Units 24, 25, 26.

Layer 39
Olive sand. 2.5 Y4/4 (wet), 2.5Y5/6, 7.5YR3/4, 10YR3/3 (wet), 10YR3/4, 10YR4/3 (dry), 10YR4/4 (wet), 10YR4/6, 10YR5/3 (wet), 10YR5/3 (dry), 10YR5/6.
Units 24, 25, 26.

Layer 40
Dark brown/black silt. Similar to 31, but with more charcoal. 10YR2/1.
Units 24, 26, 27, 28, 29.

Layer 41
Dark brown/black loamy silt. 10YR2/1, 10YR2/2 (wet), 10YR3/2 (dry).
Units 24, 26, 28.

Layer 42
Narrow band of decayed sandstone beside parapet. Dark yellowish brown silty sand. 10YR3/4 (wet), 10YR4/4 (dry).
Units 27, 28.

Layer 43
Dark brown/black silty sand with lighter mottling. 10YR2/1 (wet), 10YR2/2 (dry), 10YR3/4 (wet), 10YR4/4 (dry).
Units 26, 27, 28.

Layer 44
Rodent hole in Unit 23.

Layer 45
Rodent hole in Unit 24.

Layer 46
Compact brown silty sand with a pink tinge. 10YR3/2, 10YR3/4, 10YR4/3, 10YR5/3 (dry).
Units 23, 24, 26, 27, 28, 29.

Layer 47
Rodent hole in Unit 26.

Layer 48
Mottled orange/black stain in Layer 39. 10YR3/4, 10YR4/4 (dry).
Units 21, 24, 25.

Layer 49
Dark brown silt with high humus and charcoal content. 7.5YR3/2 (dry), 10YR2/1 (wet), 10YR2/2 (dry), 10YR2/2, 10YR4/3 (dry).
Units 23, 24, 25, 26, 27, 28, 29.

Layer 50
Mottled silty sand, with larger sandstone pieces near parapet. 10YR2/1 (wet), 10YR3/2 (dry), 10YR4/3.
Units 23, 24, 26, 28, 29.

Layer 51
Rodent holes in Unit 24.

Layer 52
Rodent holes (= Layer 44) in Unit 20.

Layer 53
Black gritty silt. 10YR2/1.
Units 24, 25, 26.

Layer 54
Brown gritty silt. 7.5YR4/4 (dry), 10YR3/3, 10YR3/4(wet), 10YR4/4.
Units 23, 24, 26, 27, 29.

Layer 55
Black gritty silt. 10YR2/1 (wet), 10YR2/2 (wet), 10YR3/2 (dry), 10YR3/3 (dry).
Units 23, 24, 25, 26, 27, 28, 29.

Layer 56
Sand and sandstone against parapet. 5Y4/3 (wet), 5Y6/4 (dry).
Unit 29.

Layer 57
Brown gritty silt. 10YR3/3 (dry), 10YR4/3.
Units 26, 27, 28.

Layer 58
Brown silt. 10YR3/3.
Unit 29.

Layer 59
Brown silt. 7.5YR3/4.
Unit 29.

Layer 60
Black silty loam. 10YR2/1 (wet), 10YR2/2.
Units 26, 27, 28, 29.

Layer 61
Black gritty silty sand. 10YR2/1 (wet), 10YR3/2 (dry), 10YR3/3 (dry).
Units 23, 24, 26.

Layer 62
Brown gritty silt. 20-30% gravel. Slightly sticky. Slightly plastic. 10YR3/3 (wet), 10YR4/3 (dry), 10YR2/2, 10YR4/4, 10YR3/4 (wet), 10YR3/6, 2.5Y4/4.
Units 20, 23, 24, 25, 26, 27, 28, 29

Layer 63
Brown gritty silt. 10YR4/2 (wet), 10YR5/3 (dry).
Units 26, 27, 28.

Layer 64
Dark brown loam. Non sticky. Slightly plastic. 10YR2/1.
Unit 26, 27, 28

Layer 65
Material kicked down by vandals at the start of the 1991 season from the corner of Unit 32 (otherwise an unexcavated unit). Probably mainly Layer 23. Screened for artifacts and fauna, but not included in any analysis.

Layer 66
Surface layer in Units 33, 34, 35. Probably the equivalent of Layer 1 and some other upper layers in the remainder of the site. Slightly sticky. Slightly/non plastic.

Layer 67
Fairly clean sand and silt. Non sticky. Non plastic. 10YR4/3.
Unit 26.

Layer 68
Ash lens in shallow hearth. Slightly sticky. Slightly plastic. 10YR4/3.
Units 33, 35.

Layer 69

Dark grey silty sandy loam. Slightly sticky. Slightly plastic. 10-20% gravel. 10YR2/1.
Units 33, 34.

Layer 70
Shallow depression with a fill of dark brown/black loam. Slightly plastic. Slightly sticky. 20% gravel. 10YR2/1.
Unit 29.

Layer 71
Small layer o clean sand. Non sticky. Non plastic. 30% gravel. 5Y4/4.
Units 28,29.

Layer 72
Pale olive sand. Slightly sticky. Slightly plastic. 20-30% gravel. 5Y5/6.
Units 27, 28.

Layer 73
Sandstone and decayed sandstone. >50% gravel. Non sticky. Non plastic. 2.5Y4/2.
Units 33, 34.

Layer 74
Sandstone rockfall within layer 62 in Unit 29.

Layer 75
Mottled. Non sticky. Slightly plastic. 30-40% gravel. 2.5Y2/0 and 2.5Y3/2 (wet). 10YR2/1. 10YR2/2.
Units 33, 34.

Layer 76
Sand lens. Non sticky. Non plastic. 30% gravel. 5Y4/4.
Unit 29.

Layer 77
Non sticky/slightly sticky. Non plastic/slightly plastic. Gritty. 5-10% gravel. 10-20% gravel. 30-40% gravel. 10YR3/4. Mottled 7.5YR3/2 and 10YR2/1. 10YR3/3. 10YR2/2 (wet). Mottled 10YR4/3 and 10YR2/1. 10YR2/1.
Units 20, 23, 24, 25, 26, 27, 28, 29.

Layer 78
Dark brown/black fill of small depression. 10YR2/1.
Unit 34.

Layer 79
Sand. Non sticky/slightly sticky. Non plastic/slightly plastic. 30% gravel. 10YR4/6.

Units 27, 28.

Layer 80
Sand. Non sticky. Non plastic. 5-10% gravel. 2.5Y4/4.
Unit 29.

Layer 81
Dark brown silty sand. Slightly plastic. Slightly sticky. Gritty. 10-20% gravel. 5YR3/3.
Units 26, 28, 29.

Layer 82
Non sticky/slightly sticky/sticky. Non plastic/slightly plastic/plastic. <5% gravel. 20% gravel. 10Yr4/3. 10YR3/2 (dry). 10YR3/3 (wet). 10YR3/4 (wet). 10YR2/1. 10YR2/2. 5Y2.5/1. Mottled 2.5Y2/0 and 10YR3/3. Mottled 10YR2/2 (wet) and 10YR2/1 (wet).
Units 20, 23, 24, 25, 26, 27, 28, 29.

Layer 83
Non sticky/slightly sticky. Non plastic. 10-20% gravel. 20-30% gravel. 50% gravel. 2.5Y4/2 (wet). 5Y4/3. 2.5Y5/4 (dry).
Units 26, 27, 28, 29.

Layer 84
Dark brown silty clay. Slightly sticky. Slightly plastic. 10% gravel. 10YR2/1. 10YR2/2. 2.5Y3/2 (dry).
Units 26, 27, 28, 29.

Layer 85
Very small depression filled with black silt. Probably a small rodent disturbance.
Unit 26.

Layer 86
Sand. Non sticky/slightly sticky. Non plastic/slightly plastic. 30% gavel. 2.5Y3/2. 10YR3/2 (wet). 2.5Y4/2 (dry).
Units 27, 28, 29.

Layer 87
Sand. Non sticky. Non plastic. 40% gravel. 10YR2/2.
Unit 28.

Layer 88
Decayed sandsstone. Non sticky. Slightly plastic. 10YR3/2.
Unit 33.

Layer 89

Sand. Non sticky. Slightly plastic. <5% gravel. 5Y4/3.
Units 33, 34.

Layer 90
Yellow/brown sand lens.
Unit 33.

Layer 91
Non sticky. Non plastic. 5-10% gravel. 10YR3/3 (wet).
Unit 26.

Layer 92
Olive brown sandy silt. Non sticky. Slightly plastic. Gravel 5-0%. 2.5Y4/4 (wet).
Units 27, 28.

Layer 93
Olive silty sand. Non sticky/slightly sticky. Non plastic/slightly. <5% gravel. 10% gravel. 40% gravel. 40-50% gravel. 5Y4/4. 2.5Y4/2. 5YR4/4 (dry). 5YR4/3 (wet). 5Y4/3 (wet). 5Y4/4 (dry). 2.5Y4/4 (dry). 2.5Y4/4 (wet). 10YR3/4. 2.5Y3/2.
Units 20, 24, 25, 26, 27, 28, 29.

Layer 94
Dark lens in layer 31. <5% gravel. Non sticky. Slightly plastic. 10YR2/1.
Unit 33.

Layer 95
Sand lens. Non sticky. Non plastic. 30-40% gravel. 5Y4/3.
Unit 33.

Layer 96
Slightly sticky. Slightly plastic. <5% gravel. 5Y2.5/1.
Unit 33

Layer 97
Slightly sticky. Slightly plastic. <5% gravel. 10YR3/2.
Unit 33.

Layer 98
Sticky/slightly sticky. Plastic/slightly plastic. Clay content increases with depth. 5% gravel. 10-20% gravel. 20-30% gravel. 30-40% gravel. >50% gravel. 2.5Y4/2 (wet). 2.5Y5/4 (dry). 5Y5/3 (wet). 2.5Y4/4 (dry). 2.5Y5/4 (wet). 5Y5/4 (wet). 5Y6/3. 5YR4/3 (wet). 5YR4/3 (dry). 5YR4/4. 5Y4/3 (wet). 5Y4/4 (wet).
Units 23, 24, 25, 26, 27, 28, 29.

Layer 99
Slightly sticky. Non plastic. 20% gravel. 5Y4/3.
Unit 35.

Layer 100
Rodent hole.

Layer 101
Non sticky. Non plastic. 10-20% gravel. Small lens. 10YR3/2.
Unit 34.

Layer 102
Rockfall in clay/silt matrix. Very sticky. Very plastic. 50% gravel. 2.5Y4/4. 2.5Y4/2. 2.5Y5/4.
Unit 23.

Layer 103
Sticky. Plastic/very plastic. 10-20% gravel. 2.5Y4/4 (wet). 2.5Y5/2 (dry).
Units 24, 25.

Layer 104
Slightly sticky. Slightly plastic/plastic. 20% gravel. >50% gravel. Transitional between 98 and 105. 2.5Y5/6. 2.5Y4/2.
Units 26, 28, 29.

Layer 105
Slightly sticky/sticky. Plastic. Red, white and black flecks. Many allochthonous pebbles. 10-15% gravel. 30% gravel. 20-50% gravel. >50% gravel. 2.5Y4/4 (wet). 5Y4/4. 10YR3/3. 2.5Y5/4. 2.5Y4/4 (wet).
Units 4 (under 1983 excavations), 5 (under 1983 excavations), 24, 26, 27, 28, 29.

Layer 106
Slightly sticky/sticky. Plastic. Red, white and black flecks. Many allochthonous pebbles. 10YR3/3 (wet). 5Y4/2 (wet). 2.5Y4/4 (dry). 2.5Y3/2.
Unit 24.

Layer 107
Very sticky. Very plastic. 10% gravel. Many allochthonous pebbles.
Unit 24.

Layer 108
Sandstone rubble.
Units 24, 26, 28 (only these units excavated to this depth).

Layer 109
Sandstone slabs, possibly bedrock.
Units 24, 26, 28 (only these units excavated to this depth).