Soil pH measurements at Sand.

Samples were taken from the foreshore at Sand and from soil in a roadside profile near Sand on the uphill side of the Applecross to Cuaig public road in September 2001 also samples were collected separately along transects A-B and C-D of the dig at Sand. The samples were dried, soil within them was mixed thoroughly and a subsample of 10 g was mixed with 40 ml distilled water, allowed to equilibrate for 10 minutes and the pH measured. For the samples from the roadside and foreshore the pH was also measured in 0.01 m $CaCl_2$. The pH on the roadside was low throughout the profile but increased with increasing depth, as expected. Even the surface however was pH 4, which is not extremely low considering the high rainfall of the area. The increase in pH with depth would ensure that plants roots could easily reach soil of a more moderate pH if there any extent of disturbance. In addition, the rapid increase in pH with depth indicates that in the past the pH throughout the profile would have been considerably higher and would have supported a more eutrophic vegetation than that visible today. Where there is any soil disturbance, as has occurred along the roadside due to the construction of the road, soil with a pH high enough for a wider range of species has been exposed and remnant woodland understory species such as foxglove are seen commonly growing in these situations.

The beach sand has the expected high pH and the very obvious movement of this sand noted in the cove at Sand and blowing of it and sea water onto the area close to the shore would maintain a higher pH environment than would be expected further inland. It is common to find that the plants along the shoreline not only are tolerant of some degree of salt spray but also prefer a higher soil pH.

The samples taken from the dig site varied in pH from 3.67 to 7.59. 25 of the samples had a pH below 5.5, at which bone would disappear rapidly, and of these 12 had a pH below 4. There were also 10 samples with a pH above 6; at this pH bone would be preserved well over a long period.

The dig site had a wider range of pH than that found in the roadside profile. This variation is probably due to the presence nearby of deep peat probably originating soon after the site was occupied - this giving the lowest pH – and also the large amount of shells in parts of the midden excavation – which have been responsible for maintaining the higher pH. It does not seem that the mobile sand seen in 2001 at the south end of Sand cove, but which had vanished in 2003, has ever moved substantially to the north and covered the excavated area.

The figure below the table shows the pH variation along the transect; all of the higher pHs are found along the east-west transect C-D.

Robert S Shiel and Andrew Stewart 2004.

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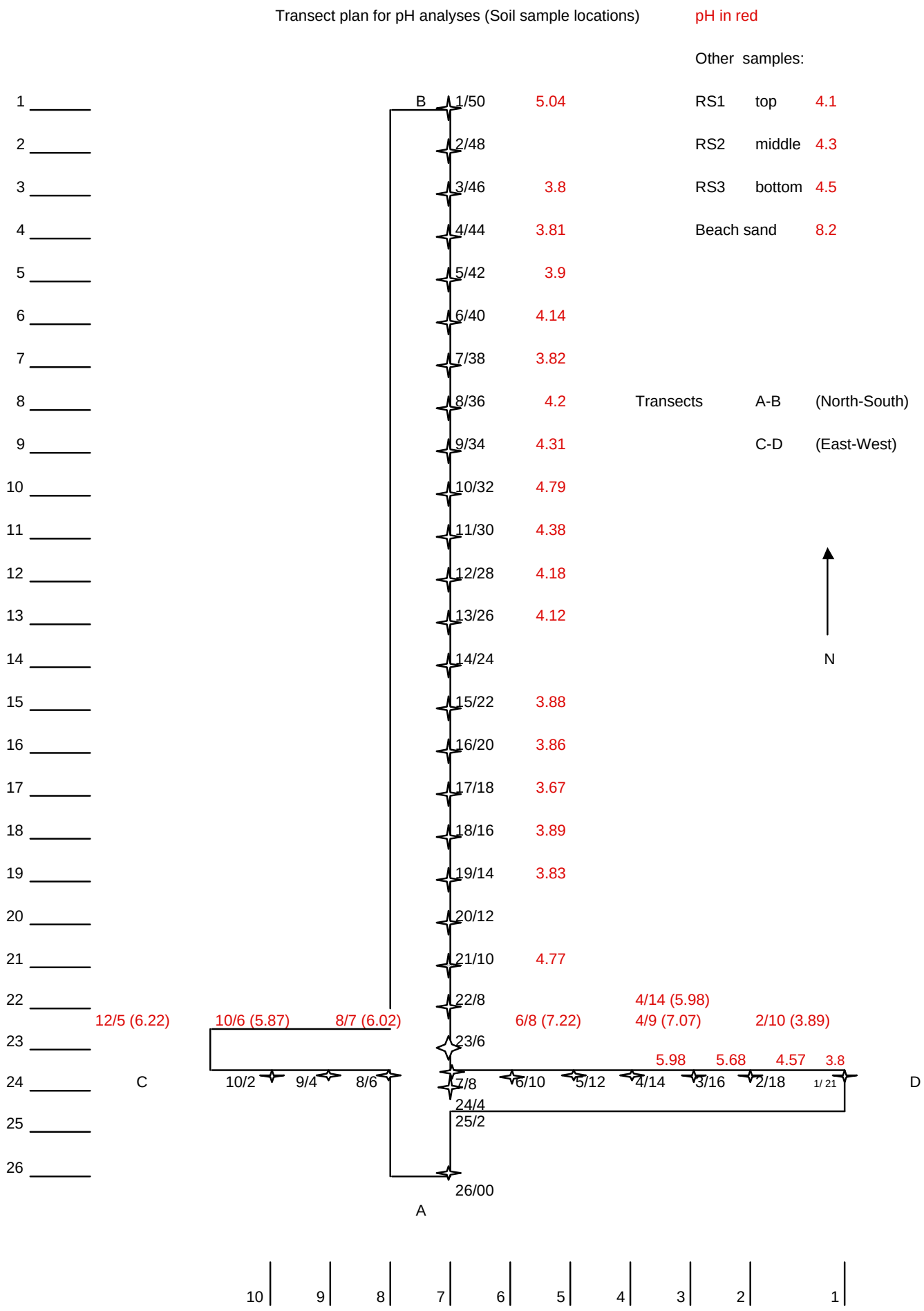
Table of pH samples analyzed 2001/2002

Location	**Transect**	**Sample ref.**	pH (H_2O)	pH($CaCl_2$)
SAND	C-D	1/21	3.82	
SAND	C-D	2/10	3.89	
SAND	C-D	2/18	4.57	
SAND	C-D	3/16	5.68	
SAND	C-D	4/9	7.07	
SAND	C-D	4/14	5.98	
SAND	C-D	6/8	7.22	
SAND	C-D	8/7	6.02	
SAND	C-D	10/6	5.87	
SAND	C-D	12/5	6.22	
SAND		B5B SW Split 5	6.48	
SAND	-	2/10	6.26	
SAND	-	2/48	4.61	
SAND	-	16/0	3.91	
SAND	-	20/12	7.59	
SAND	-	22/8	6.57	
SAND	-	23/6	7.40	
SAND	-	25/2	4.05	
SAND		B4B NE Split 5	7.16	
SAND	A-B	1/50	5.04	
SAND	A-B	3/46	3.80	
SAND	A-B	4/44	3.81	
SAND	A-B	6/40	4.14	
SAND	A-B	8/36	4.20	
SAND	A-B	5/42	3.90	
SAND	A-B	7/38	3.82	
SAND	A-B	9/34	4.31	
SAND	A-B	10/32	4.79	
SAND	A-B	11/30	4.38	
SAND	A-B	12/28	4.18	
SAND	A-B	13/26	4.12	
SAND	A-B (a)	13/26	3.71	
SAND	A-B	15/22	3.88	
SAND	A-B	16/20	3.86	
SAND	A-B	17/18	3.67	
SAND	A-B	18/16	3.89	
SAND	A-B	19/14	3.83	
SAND	A-B	21/10	4.77	
Beach sand	sand		8.18	7.72
profile samples (Road side)				
RS1	top		4.06	3.21
RS2	mid		4.34	3.53
RS3	bottom		4.54	3.92



10. SOIL ANALYSIS

M Cressey

10.1 Soil Transect and Sampling Data

10.1.1 Introduction

Soil samples were taken for future routine analyses to determine their physical properties such as pH, loss on ignition (percent organic carbon), magnetic susceptibility (degree of in situ burning) and phosphate content (nutrient status). Soil sample transect A-B was 50m long and ran up-slope E-W *(Karen can you check this - I think upslope is E-W???)* will check with Mike exactly what he means from the base of the rock shelter to an area covered by *Calluna vulgaris*. Transect C-D ran N-S alongside the excavation trench section. The samples were taken at 2m intervals at a depth of between 0.10-0.20m according to the nature of root impact across the site. The maximum depth within the hand dug test pits was recorded. The soil sample descriptions for each transect are recorded in Appendix 20.

10.1.2 General observations

10.1.2.1 Cultivation has affected the topography of cover soils on site with the formation of N-S (*check dir of rig*) trending rig and furrow resulting in homogeneity of the soil. Previously the site was covered with dense stands of *Pteridium aquilinum* with *Calluna vulgaris* well established on the low cliff overlooking the valley.

10.1.2.2 Prior to taking the samples a walk-over survey was undertaken to identify any features relating to recent land use. Run rig clearly survives within an earthwork enclosure forming an agricultural holding. This will affect any phosphate analyses as it is likely that recent agriculture will have led to an increase in the nutrient budget across the transect area. It seems likely that pH values will increase the nearer one gets to the midden owing to the local presence and dissolution of calcium carbonate. The previous recognition of land snails within the midden deposits suggests carbonate enrichment in an otherwise very acidic environment. It is also seems likely that pH values may be elevated downslope as a result of anthropogenic activity, 19th century cultivation and natural soil creep. It should also be noted that the soil is free draining being derived from weathered Torridonian sandstone with an element of wind blown sand. More detailed analyses will be required to confirm this. Soils up slope towards the dense heather sward in the region of sample area1/50 to 8/36 Transect A-B are in theory likely to exhibit a lower pH according to the nature of *Calluna vulgaris* which thrives on free draining acidic soils.