APPENDIX 1

Table 1. Evaluation of potential prediction methods

EVALUATION CRITERIA	PREDICTION METHODS						
	USLE	SLEMSA	RUSLE	MUSLE	CREAMS	WEPP	ACED
Erosion prediction	Soil loss	Soil loss	Soil loss	Sediment yield	Soil loss and sediment yield	Soil loss and sediment yield	Soil loss
Type of model	Empirical soil loss	Empirical soil loss	Conceptual soil loss	Empirical sediment-runoff	Physically-based	Process-based	Field assessment
Purpose for which model was developed	Prediction of soil loss	Predict soil loss under southern African conditions	Prediction of soil loss	Predict daily, monthly, and annual sediment yield for basins sized catchments	Evaluate non-point source pollution from field-sized catchments	Intended to apply to all situations where water erosion occurs on hillslopes and field-sized catchments	Monitor and asses soil loss from recent erosion damage
Applicable area	Plot – field sized areas	Plot – field sized areas	Plot – field sized areas	Basin-sized catchments	Field-sized catchments	Plot-sized areas – field-sized catchments	On hillslopes and plot or field sizes
Type of erosion simulated	Interrill Rill Do not include: gully streambank bedload empoundment	Interrill Rill Do not include: gully streambank bedload empoundment	Interrill Rill Do not include: gully streambank bedload empoundment	Interrill Rill Do not include: gully streambank bedload empoundment	Interrill Rill Ephemeral gully Empoundment Do not include: classical gully streambank bedload	Interrill Rill Ephemeral gully Empoundment Do not include: classical gully streambank bedload	Rill Gully

Continued...

EVALUATION CRITERIA	PREDICTION METHODS						
	USLE	SLEMSA	RUSLE	MUSLE	CREAMS	WEPP	ACED
Simulation of processes	Detachment and transport by rainfall impact and overland flow	Detachment and transport by rainfall impact and overland flow	Detachment and transport by rainfall impact and overland flow	Detachment and transport by runoff of overland flow	Detachment and transport by runoff of overland flow	Detachment and transport by rainfall impact and overland and stream flow	Detachment and transport by runoff of overland flow
Factors that are taken account for	Rainfall erosivity (R) Soil erodibility (K) Slope steepness and length (LS) Crop and vegetation management (C) Eosion control practices (P)	Soil erodibility (K) Slope steepness and length (LS) Crop and vegetation management (C)	Rainfall erosivity (R) Soil erodibility (K) Slope steepness and length (LS) Crop and vegetation management (C) Eosion control practices (P)	Runoff (Q) Peak discharge (q_p) Soil erodibility (K) Slope steepness and length (LS) Crop and vegetation management (C) Eosion control practices (P)	Rainfall erosivity (R) Runoff (Q) Peak discharge (q_p) Interrill soil erodibility (Ki) Rill soil erodibility (Kr) Slope steepness and length (LS) Crop and vegetation management (C) Eosion control practices (P)	Rainfall erosivity (R) Runoff (Q) Peak discharge (q_p) Interrill soil erodibility (Ki) Rill soil erodibility (Kr) Slope steepness and length (LS) Crop and vegetation management (C) Eosion control practices (P)	Crop and vegetation management; topography (LS)

Continued...

EVALUATION CRITERIA	PREDICTION METHODS						
	USLE	SLEMSA	RUSLE	MUSLE	CREAMS	WEPP	ACED
Applied in South Africa	Most often	Most often in KwaZulu-Natal	Often	Not applied. The locally developed model, ACRU, that uses the MUSLE principle, was used for sediment yield predictions	To a very limited extend	Have only recently been released and must still be tested in South Africa	Not applied
Data file preparation	Relative ease	Relative ease	Relative ease	Less complex	Less complex	Complex	Relative ease
Spatial distribution of input data	Lumped: land facets	Lumped: land facets	Lumped: land facets	Lumped: catchments	Semi - distributed: hillslopes catchments	Semi-distributed: hillslopes catchments Distributed: grid-based	Lumped: land facets
Temporal distribution of input data	Climate: annual average long term estimates Soil: once Topography: once Management and plant cover: frequently	Climate: annual average long term estimates Soil: once Topography: once Management and plant cover: frequently	Climate: annual average long term estimates Soil: seasonal Topography: once Management and plant cover: frequently	Climate: daily Soil: once Topography: once Management and plant cover: frequently	Climate: daily Soil: once Topography: once Management and plant cover: frequently	Climate: daily Soil: once Topography: once Management and plant cover: frequently	Climate: daily Soil: once Topography: once Management and plant cover: once

APPENDIX 2

Table 1. Impact of minimum inputs on the selection and as required by the models

(a) CLIMATE

Model inputs	ACED	SLEMSA	USLE	RUSLE	MUSLE	ACRU	CREAMS	WEPP
No. of storms	+							
No. of major storms	+							
Date/period of rainfall	+							
Rainfall amount (mm)	+							
Maximum intensity (mm/h)	+							
Rainfall-runoff Erosivity	+	*	*	*				
Daily maximum temperature, monthly means						*		*
Daily minimum temperature, monthly means						*		*
Precipitation, daily					*	*	*	*
Precipitation, annual					*	*		
Monthly lake evaporation, average					*			
Rainfall distribution for 24h					*			
Two year return period 30-minute rainfall intensity					*			
Average monthly temperatures							*	
Average monthly solar radiation							*	
Duration of precipitation								*
Ratio of time to rainfall peak / rainfall duration								*
Ratio of maximum rainfall intensity / average rainfall intensity								*
Daily solar radiation								*
Wind velocity								*
Wind direction								*
Dew point temperature								*

(b) SOIL

Model inputs	ACED	SLEMSA	USLE	RUSLE	MUSLE	ACRU	CREAMS	WEPP
Surface roughness	*							
Drainage	*	*						
Depth of top soil	*							
Texture	*	*						*
Soil form		*						
Soil family		*						
Depth of soil		*						
% Organic matter			*	*	*	*	*	*
% Very fine sand			*	*	*	*	*	
% Silt			*	*	*	*	*	*
% Sand			*	*	*	*	*	*
% Clay							*	*
Permeability class			*	*	*	*	*	
Soil structure class			*	*	*	*	*	
Soil moisture depletion coefficient					*			
Soil texture class					*	*		
Effective saturated conductivity							*	
Fraction of pore space filled at field capacity							*	
Fraction of plant-available water storage filled when simulation begins							*	
Soil evaporation							*	
Soil porosity							*	
Immobile soil water content at 15 bars tension							*	
Weight density of soil							*	
Erodibility for concentrated flow							*	
Specific surface of clay particles							*	
Specific surface of silt particles							*	
Specific surface of sand particles							*	
Specific surface of sand particles								*
Albedo								*
Initial saturation level								*
Depth of soil horizons								*
Cation exchange capacity								*
% Rock								+
Interrill erodibility								+
Rill erodibility								+
Critical shear								+
Effective hydrological conductivity								

(c) TOPOGRAPHY

Model inputs	ACED	SLEMSA	USLE	RUSLE	MUSLE	ACRU	CREAMS	WEPP
Slope angle	*	*	*	*				*
Slope shape	*							*
Slope length across the contours	*	*	*	*				*
Slope conditions at top of hillslope								*
Slope conditions at bottom of hillslope								*
Aspect								*

(d) EROSION CONTROL PRACTICES

Model inputs	ACED	SLEMSA	USLE	RUSLE	MUSLE	ACRU	CREAMS	WEPP
Type of soil and water control measures	*							
Gradient (if any)	*							
Failures observed	*							

(e) VEGETATION

Model inputs	ACED	SLEMSA	USLE	RUSLE	MUSLE	ACRU	CREAMS	WEPP
Type of plant cover	*			*				
% Canopy cover	*		*	*				
Cover roughness			*	*				
Fall height			*	*				
Root mass				*				
Residue type				*				
Surface residue decomposition rate				+				
Buried residue decomposition rate				+				
% Area covered with residue				*				
Leaf area index					*	*	*	
Maximum rooting depth							*	
Winter cover factor							*	

(f) MANAGEMENT PRACTICES

Model inputs	ACED	SLEMSA	USLE	RUSLE	MUSLE	ACRU	CREAMS	WEPP
Land use type	+		*	*				
Type of management	*							
Tillage direction	*							
% Surface area disturbed			*	*				
% External residue added to surface			*	*				
Depth of incorporation			*	*				
Initial roughness			*	*				
Final roughness			*	*				
% Surface residue after cultivation			*	*				
% Remaining surface residue			*	*				
Ridge height			*	*				

(g) EROSION and RUNOFF

Model inputs	ACED	SLEMSA	USLE	RUSLE	MUSLE	ACRU	CREAMS	WEPP
No. of rills	*							
Average length of rills	*							
Average width of Rills	*							
Average depth	*							
Occurrence of runon	*							
Upslope area immediately adjacent	*							
List all upslope areas contributing to the damage	*							
Occurrence of Runoff	*							
Downslope area immediately adjacent	*							
List all downslope areas with subsequent erosion damage	*							
Particle diameter of the subcatchment sediment, median					*			
Particle diameter of inflow sediment into ponds and reservoirs, median					*	*	*	
SCS curve number							*	
Initial abstraction coefficient for SCS curve number							*	
Channel slope							*	
Catchment length / width ratio							*	
Kinematic viscocity							*	
Manning's n for overland flow over bare soil							*	
Manning's n for channel flow over bare soil							*	
Yalin constant for sediment transport								

(h) LOCATION

Model inputs	ACED	SLEMSA	USLE	RUSLE	MUSLE	ACRU	CREAMS	WEPP
Field size	*						*	
Altitude of base temperature station						*		
Area of catchment					*	*		
Area of subcatchment					*	*		
Elevation						*		

* Required input available

\+ Required input not available

APPENDIX 3

Table 1. Erodibility of the soil and topography factors on hillslope 1

K-FACTOR								LS-FACTOR		
Land facet no.	Depth of topsoil (cm)	Texture	Soil form	% C	Permeability class	Hydrologic class	Soil structure class	Angle (%)	Shape	Length across the contour (m)
1	10	SaClLm	Ms_{10}	1.18	6	D	C	54	convex	32
2	10	SaClLm	Ms_{10}	1.18	6	D	C	32	convex	22
3	2	SaClLm	Ms_{10}	1.18	6	D	C	38	convex	20
4	30	SaClLm	Ms_{10}	1.18	6	D	C	52	convex	22
5	30	SaClLm	Ms_{10}	1.37	6	D	C	34	linear	26
6	30	SaClLm	Gs_{16}	1.37	5	C	C	32	irregular	38
7	30	SaLm	Es_{13}	1.24	5	D	C	32	irregular	54
8	30	SaClLm	Hu_{16}	0.99	3	A	C	32	linear	42
9	30	SaClLm	Hu_{16}	0.99	3	A	C	32	concave	65
10	30	SaClLm	Cv_{16}	0.99	2	A	C	6	concave	30

NB. Permeability, hydrologic and soil structural class's symbols and numbers are defined in Table 9 – 11.

Table 2. Vegetation and land use practices and protection factors on hillslope 1

CP-FACTOR						
Land facet no.	Type of plant cover	% Canopy cover	% Ground cover	Type of management	Land-use type	Type of soil water conservation measure
1	grass	60	10	communal grazing	Natural Grassland	none
2	grass	40	5	communal grazing	Natural Grassland	none
3	grass & shrubs	20	5	communal grazing	Natural Grassland	none
4	grass & shrubs	40	5	communal grazing	Natural Grassland	none
5	grass	60	10	communal grazing	Natural Grassland	drainage furrow
6	grass	80	15	communal grazing	Natural Grassland	terracing
7	grass	60	10	communal grazing	Natural Grassland	none
8	grass	30	5	communal grazing	Natural Grassland	none
9	grass	30	5	communal grazing	Natural Grassland	none
10	grass	80	15	communal grazing	Natural Grassland	none

Table 3. Erodibility of the soil and topography factors on hillslope 2

K-FACTOR								LS-FACTOR		
Land facet no.	Top soil depth (cm)	Texture	Soil form	% C	Permeability class	Hydrologic class	Soil structure class	Slope angle (%)	Shape	Length across the contour (m)
1	10	SaClLm	Ms_{10}	1.18	6	D	C	54	convex	34
2	10	SaClLm	Ms_{10}	1.18	6	D	C	32	convex	22
3	2	SaClLm	Ms_{10}	1.18	6	D	C	38	convex	20
4	30	SaClLm	Ms_{10}	1.18	6	D	C	52	convex	22
5	30	SaClLm	Ms_{10}	1.37	6	D	C	34	linear	26
6	10	SaClLm	Gs_{16}	1.37	5	C	C	32	irregular	38
7	30	SaLm	Hu_{16}	1.5	3	B	C	34	linear	9
8	30	SaLm	Hu_{16}	1.5	3	B	C	40	linear	9
9	30	SaLm	Hu_{16}	1.5	3	B	C	32	linear	14
10	30	SaLm	Hu_{16}	1.5	3	B	C	30	linear	5.5
11	30	SaLm	Hu_{16}	1.5	3	B	C	40	linear	6
12	30	SaLm	Hu_{16}	1.5	3	B	C	19	linear	13
13	30	SaLm	Hu_{16}	1.5	3	B	C	3	flat	10

NB. Permeability, hydrologic and soil structural class's symbols and numbers are defined in Table 9 – 11.

Table 4. Vegetation and land use practices and protection factors on hillslope 2

CP-FACTOR						
Land facet no.	Type of plant cover	% Canopy cover	% Ground cover	Type of management	Land-use type	Type of soil water conservation measure
1	grass	60	10	communal grazing	Natural Grassland	none
2	grass	40	5	communal grazing	Natural Grassland	none
3	grass & shrubs	15	5	communal grazing	Natural Grassland	none
4	grass & shrubs	40	5	communal grazing	Natural Grassland	none
5	grass	40	10	communal grazing	Natural Grassland	drainage furrow
6	houses	5	3	housing	homestead	terracing
7	*Canibus sativa*	80	10	min. tillage	cultivated land	contour ridge
8	*Canibus sativa*	30	5	ploughing	cultivated land	none
9	maize	55	5	ploughing	cultivated land	contour ridge
10	maize	60	5	ploughing	cultivated land	none
11	maize	60	5	ploughing	cultivated land	none
12	maize	20	5	ploughing	cultivated land	none
13	maize	30	5	ploughing	cultivated land	none

Table 5. Erodibility of the soil and topography factors on hillslope 3

K-FACTOR								LS-FACTOR		
Land facet no.	Top soil depth (cm)	Texture	Soil form	% C	Permeability class	Hydrologic class	Soil structure class	Slope angle (%)	Shape	Length across the contour (m)
1	20	Cl	Ms_{10}	3.08	6	D	C	7	linear	22
2	15	Cl	Ms_{10}	3.09	6	D	C	26	convex	22
3	15	Cl	Ms_{10}	3.09	6	D	C	38	linear	20
4	30	SaClLm	Gs_{16}	1.94	6	C	C	49	irregular	24
5	30	SaClLm	Ms_{10}	1.94	6	C	C	33	linear	32
6	25	SaClLm	Sd_{10}	3.12	3	C	C	37	linear	46
7	25	SaClLm	Sd_{10}	3.12	3	C	C	26	linear	38
8	25	SaLm	Cv_{16}	0.98	2	B	C	22	linear	48
9	30	SaLm	Cv_{16}	0.98	2	B	D	13	linear	36
10	30	SaClLm	Cv_{16}	0.91	2	B	D	15	linear	48
11	30	SaLm	Cv_{13}	0.68	3	B	D	13	linear	42
12	20	SaLm	Cv_{13}	0.68	3	B	D	12	linear	42
13	25	SaLm	Cv_{13}	0.4	3	B	D	11	linear	48
14	20	SaLm	Av_{13}	0.65	3	B	D	9	linear	72

NB. Permeability, hydrologic and soil structural class's symbols and numbers are defined in Table 9 – 11.

Table 6. Vegetation and land use practices and protection factors on hillslope 3

CP-FACTOR						
Land facet no.	Type of plant cover	% Canopy cover	% Ground Cover	Type of management	Land-use type	Type of soil water conservation measure
1	grass	60	50	communal grazing	grassland	-
2	grass & shrubs	50	45	communal grazing	grassland	-
3	grass & shrubs	30	20	communal grazing	grassland	-
4	grass & shrubs	50	35	communal grazing	grassland	-
5	grass & shrubs	25	15	communal grazing	grassland	-
6	grass & shrubs	25	10	communal grazing	grassland	-
7	grass	20	10	communal grazing	grassland	-
8	dagga	10	5	homestead	housing	-
9	maize	70	5	ploughing	maize cultivation	grass strip
10	maize	70	5	ploughing	maize cultivation	hedge row
11	maize	70	5	ploughing	maize cultivation	grass strip
12	grass	60	15	homestead	maize cultivation	grass strip
13	maize	65	10	ploughing	maize cultivation	grass strip
14	maize	65	10	ploughing	maize cultivation	grass strip

Table 7. Erodibility of the soil and topography factors on hillslope 4

K-FACTOR								LS-FACTOR		
Land facet no.	Depth of topsoil (cm)	Texture	Soil form	% C	Permeability class	Hydrologic class	Soil structure class	Angle (%)	Shape	Length across the contour (m)
1	10	Cl	Ms_{10}	3.38	6	C	C	7	convex	182
2	30	ClLm	Ms_{10}	2.37	6	C	C	25	convex	68
3	15	ClLm	Ms_{10}	2.37	6	C	C	9	convex	82
4	20	ClLm	CV_{10}	2.37	2	B	C	11	convex	32
5	5	SaLm	Cv_{10}	1.35	2	B	C	19	linear	42
6	-	SaLm	Gf_{11}	1.35	3	B	C	19	irregular	48
7	10	SaLm	Gf_{11}	1.35	3	B	C	14	irregular	52
8	11	SaLm	Gf_{11}	1.35	3	B	C	13	linear	54
9	30	SaLm	Gf_{11}	1.35	3	B	C	11	concave	114

NB. Permeability, hydrologic and soil structural class's symbols and numbers are defined in Table 9 – 11.

Table 8. Vegetation and land use practices and protection factors on hillslope 4

CP-FACTOR						
Land facet no.	Type of plant cover	% Canopy cover	% Ground Cover	Type of management	Land-use type	Type of Soil Water Conservation measure
1	grass	70	10	communal grazing	Natural Grassland	none
2	grass	60	5	communal grazing	Natural Grassland	none
3	grass & shrubs	60	5	communal grazing	Natural Grassland	none
4	grass & shrubs	40	5	communal grazing	Natural Grassland	none
5	grass	20	10	abandoned cultivated land	Natural Grassland	contour ridges
6	grass	20	15	abandoned cultivated land	Natural Grassland	contour ridges
7	grass	80	10	communal grazing	Natural Grassland	contour ridges
8	grass	70	5	communal grazing	Natural Grassland	contour ridges
9	grass	70	5	communal grazing	Natural Grassland	none

Table 9. Description of soil hydrological classes (Haarhoff *et al.,* 1994)

HYDROLOGICAL CLASS	DESCRIPTION	ASSOCIATED SOIL FORMS
A	Lowest runoff potential, includes deep sands with very little silt and clay (infiltration rates of 8 – 12 mm/hr)	Av, Cv, Hu (Rangeland)
B	Moderate low runoff potential; sandy soils less deep than A (infiltration rates of 4 – 8 mm/hr)	Av, Cv, Hu (Ploughed)
C	Moderately high runoff potential; shallow soils and those containing considerable clay and colloids though less than D (infiltration rates of 1 – 4 mm/hr)	Gs, Ms (association) & Gs (rangeland)
D	High runoff potential, mostly clays of high swelling percent, and shallow soils with nearly impermeable sub-horizons near the surface (infiltration rates of 0 –1 mm/hr)	Ms, Es

Table 10. Description of soil permeability classes (Haarhoff *et al.,* 1994)

PERMEABILITY CLASS	DESCRIPTION	SATURATED HYDRAULIC CONDUCTIVITY
1	Rapid	>60
2	Moderate to rapid	20 – 60
3	Moderate	5 – 20
4	Slow to moderate	2 – 5
5	Slow	1 – 2
6	Very slow	<1

Table 11. Description of soil structural classes (Haarhoff *et al.,* 1994)

CLASSES	DESCRIPTION
A	Very fine granular (< 1 mm) (fine single grain, granular or crumb)
B	Fine granular (1 – 2 mm) (medium to coarse single grain, granular or crumb)
C	Medium or coarse granular (2 – 5 mm) (weak to moderate fine subangular blocky, granular)
D	Blocky, platy or massive (> 5 mm) (massive, platy, medium to coarse angular blocky, subangular blocky, prismatic or columnar)

Table 12. Description of soil loss classes and erodibility rating (Bergsma, 1986)

CLASSES	RATING	SOIL LOSS (T/HA/YR)
1	Very low	0 – 5
2	Low	5 – 12
3	Moderate	12 – 25
4	High	25 – 60
5	Very High	60+

The lowest two classes are within suggested range of soil loss tolerance values. The moderate class is aimed to cover situations where erosion is somewhat high but needs to be accepted, as on most farms, for the present. The class of high erosion is unacceptable for any land use aiming at sustained productivity. The erosion in the very high class is destructive for land over even a short period, for instances less than 10 years (Haarhoff *et al.,* 1994).

APPENDIX 4

Table 1. Soil loss of hillslope 1

(a) ACED method

Land facet	No. of rills	Av. Length (m)	Av. Width (cm)	Av. Depth (cm)	Field Size (m^2)	Soil Loss (m^3)	Soil Loss (m^3)	Area of Actual Damage (m^2)	Area of Actual Damage (m^2)	Area of Actual Damage as % of Field Size	Soil Loss/ha (m^3/ha)	Soil Loss per Area of Actual Damage/ha (m^3/ha)	[1]Soil Loss (t/ha)	[2]Soil Loss (t/ha)
1	1	5	35	6	544	0.1	0.1	1.8	1.8	0.3	1.9	600	2.7	2.7
2	5	2.5	20	12	440	0.3	0.3	2.5	2.5	0.6	6.8	1,200	9.5	9.5
3	3	2.5	40	15	520	0.5	0.5	3	3	0.6	8.7	1,500	12.1	12.1
4	8	7	22	15	660	1.8	1.8	12.3	12.3	1.9	28	1,500	39.2	39.2
5	5	1.5	24	6	1,144	0.1	0.1	1.8	1.8	0.2	0.9	600	1.3	1.3
6	6	3	65	22	1,748	2.6	2.6	11.7	11.7	0.7	14.7	2,200	20.6	20.6
7	10	12	36	5	4,860	2.2	2.2	43.2	43.2	0.9	4.4	500	6.2	6.2
8	26	11	40	20	2,856	22.9		114.4			80.1		112.2	112.2
8***	2	28	330	40	2,856	73.9	96.8	184.8	299.2	10.5	338.9	3,235.3	474.5	0
9	3	4.3	31	15	3,770	0.6		4			1.6		2.3	2.3
9~	2	69.5	660	180	3,770	1651.3	1651.9	917.4	921.4	24.4	4,381.8	17,928.4	6,134.5	0
10	0	0	0	0	960	0	0	0	0	0	0	0	0	0
10~	1	30	70	106	960	12.6	12.6	21	21	2.2	131.3	6,000	183.8	0
Total	**72**	**176.3**	**137.3**	**39.6**	**17,502**	**1,768.9**	**1,768.9**	**1,317.9**	**1,317.9**	**42.2**	**4,999.2**	**35,263.7**	**6,998.8**	**206.1**

Land facets 8 – 10 are represented twice to differentiate the various sizes of the erosion features as indicated in Table 5.

(b) SLEMSA model.

Land facet	[3]Soil family	F_b/F_m	#E (E x 103 joules/m2/annum)	K (t/ha/yr)	C*	X	Z (t/ha/yr)	Z* (t/ha/yr)	Erodibility rating
1	Ms10	6	11,577.54	4.6	0.05	52.783	12.1	0.4	M
2	Ms10	6	11,577.54	4.6	0.057	16.502	4.3	0.1	M
3	Ms10	6	11,577.54	4.6	0.057	21.115	5.5	0.2	M
4	Ms10	6	11,577.54	4.6	0.057	39.850	10.4	0.4	M
5	Ms10	6	11,577.54	4.6	0.05	20.356	4.7	0.3	M
6	Gs16	6.5	11,577.54	2.8	0.045	23.726	2.9	0.3	M
7	Es13	3	11,577.54	80.9	0.05	30.713	124.2	34.5	V.H
8	Hu16	7.5	11,577.54	1.1	0.057	25.479	1.6	0.3	L
9	Hu16	7.5	11,577.54	1.1	0.057	35.529	2.2	0.5	L
10	Cv16	7.5	11,577.54	1.1	0.045	4.142	0.2	0.01	M
Total		**6.2**	**11,577.54**	**11**	**0.053**	**27.019**	**-**	**36.9**	

M = Medium, L= low, H = High & V.H = Very High

(c) RUSLE model

Land facet	R	K	LS	C	P	A (t/ha/yr)	Z* (t/ha/yr)
1	118	0.25	8.17	0.01	1	9.0	0.28
2	118	0.25	4.54	0.01	1	5.7	0.14
3	118	0.25	5.17	0.02	1	9.9	0.29
4	118	0.25	6.93	0.03	1	17.2	0.65
5	118	0.26	5.08	0.03	1	10.6	0.69
6	118	0.24	5.41	0.02	1	6.8	0.68
7	118	0.26	6.15	0.04	1	18.7	5.19
8	118	0.15	5.59	0.11	1	24.2	3.95
9	118	0.15	6.43	0.09	1	24.2	5.21
10	118	0.13	0.71	0.03	1	0.7	0.04
Total	**118**	**0.22**	**5.42**	**0.04**	**1**	**-**	**17.13**

Table 2. Soil loss of hillslope 2

(a) ACED method

Land facet	No. of rills	Av. Length (m)	Av. Width (cm)	Av. Depth (cm)	Field Size (m^2)	Soil Loss (m^3)	Soil Loss (m^3)	Area of Actual Damage (m^2)	Area of Actual Damage (m^2)	Area of Actual Damage as % of Field Size	Soil Loss/ha (m^3/ha)	Soil Loss per Area of Actual Damage/ha (m^3/ha)	[1]Soil Loss (t/ha)
1	3	6	25	7	1,020	0.3	0.3	4.5	4.5	0.4	3.1	700	4.3
2	8	2.5	20	2	924	0.1	0.1	4	4	0.4	0.9	200	1.2
3	18	13	60	15	920	21.1	21.1	140.4	140.4	15.3	228.9	1,500	320.5
4	9	9	35	20	1,452	5.7	5.7	28.4	28.4	2	39.1	2,000	54.7
5	7	3.5	42	13	2,080	1.3	1.3	10.3	10.3	0.5	6.4	1,300	9
6	0	0	0	0	3,040	0	0	0	0	0	0	0	0
7	13	1.2	10	3	630	0.05	0.05	1.6	1.6	0.2	0.7	300	1
8	16	0.9	8	3	630	0.04	0.04	1.2	1.2	0.2	0.5	300	0.8
9	4	1	10	3	980	0.01	0.01	0.4	0.4	0	0.1	300	0.2
10	29	4.5	13	3.5	385	0.6	0.6	17	17	4.4	15.4	350	21.6
11	29	1.6	19	3	420	0.3	0.3	8.8	8.8	2.1	6.3	300	8.8
12	13	2.5	18	2	715	0.1	0.1	5.9	5.9	0.8	1.6	200	2.3
13	3	0.7	12	2	320	0.01	0.01	0.3	0.3	0.1	0.2	200	0.2
Total	**152**	**46.4**	**272**	**76.5**	**13,516**	**29.54**	**29.54**	**222.5**	**222.5**	**26.5**	**303.3**	**7,650**	**424.6**

(b) SLEMSA model

Land facet	Soil family	F_b/F_m	#E (E x 10^3 joules/m^2/annum)	K (t/ha/yr)	C*	X	Z (t/ha/yr)	Z* (t/ha/yr)	Erodibility rating
1	Ms10	6	11,577.54	4.6	0.050	54.649	12.6	0.9	M
2	Ms10	6	11,577.54	4.6	0.057	16.502	4.3	0.3	M
3	Ms10	6	11,577.54	4.6	0.057	21.115	5.5	0.4	M
4	Ms10	6	11,577.54	4.6	0.057	39.850	10.4	1.1	M
5	Ms10	6	11,577.54	4.6	0.057	20.356	5.3	0.8	M
6	Gs16	6.5	11,577.54	2.8	0.741	23.726	49.2	11.1	M
7	Hu16	5	11,577.54	12.0	0.045	10.922	5.9	0.3	L
8	Hu16	5	11,577.54	12.0	0.09	14.869	16.1	0.7	L
9	Hu16	5	11,577.54	12.0	0.058	12.546	8.7	0.6	L
10	Hu16	5	11,577.54	12.0	0.050	6.590	4	0.1	L
11	Hu16	5	11,577.54	12.0	0.050	11.989	7.2	0.2	L
12	Hu16	5	11,577.54	12.0	0.057	4.932	3.4	0.2	L
13	Hu16	5	11,577.54	12.0	0.165	0.831	1.6	0.04	L
Total		**5.5**	**11,577.54**	**8.446**	**0.118**	**18.375**	**-**	**16.8**	

M = Medium, L= low, H = High & V.H = Very High

(c) RUSLE model

Land facet	R	K	LS	C	P	A (t/ha/yr)	Z* (t/ha/yr)
1	118	0.25	8.35	0.01	1	7.7	0.58
2	118	0.25	4.54	0.02	1	6.8	0.46
3	118	0.25	5.17	0.05	1	17.8	1.21
4	118	0.25	6.93	0.03	1	17.2	1.85
5	118	0.26	5.08	0.04	1	15.2	2.34
6	118	0.24	5.41	0.2	1	70.4	15.83
7	118	0.17	2.87	0.18	1	24.2	1.13
8	118	0.17	3.27	0.18	1	26.4	1.23
9	118	0.17	3.49	0.18	1	28.6	2.07
10	118	0.17	1.97	0.19	1	17.2	0.49
11	118	0.17	2.59	0.19	1	22	0.68
12	118	0.17	2.01	0.18	0.97	16.1	0.85
13	118	0.17	0.3	0.21	1	0.7	0.02
Total	**118**	**0.21**	**3.99**	**0.128**	**0.99**	**-**	**28.75**

Table 3. Soil loss of hillslope 3

(a) ACED method

Land facet	No. of rills	Av. Length (m)	Av. Width (cm)	Av. Depth (cm)	Field Size (m^2)	Soil Loss (m^3)	Soil Loss (m^3)	Area of Actual Damage (m^2)	Area of Actual Damage (m^2)	Area of Actual Damage as % of Field Size	Soil Loss/ha (m^3/ha)	Soil Loss per Area of Actual Damage/ha (m^3/ha)	[1]Soil Loss (t/ha)	[2]Soil Loss (t/ha)
1	0	0	0	0	506	0	0	0	0	0	0	0	0	0
2	8	2.5	60	20	946	2.4	2.4	12	12	1.3	25.4	2,000	25.4	25.4
3	24	9	43	18	840	16.7	16.7	92.9	92.9	11.1	199	1,800	199	199
4	6	5	30	15	1,296	1.4	1.4	9	9	0.7	10.4	1,500	13	13
5	19	11	46	20	1,920	19.2		96.1					-	-
5***	1	5	300	42	1,920	6.3	25.5	15	111.1	5.8	133	2,296.9	166.2	166.2
6	29	14	45	47	3,496	85.9		182.7						
6**	1	11	70	90	3,496	6.9	92.8	7.7	190.4	5.4	265.4		331.8	331.8
6	2	13.5	130	185	3,496	64.9	157.7	35.1	225.5	6.5	451.2	6,994.9	564	-
7	19	13	38	27	2,584	25.3		93.9						-
7***	2	8	265	80	2,584	33.9	59.3	42.4	136.3	5.3	229.3	4,349.2	286.7	286.7
8	4	0.9	26	4	4,704	0.04	0.04	0.9	0.9	0.02	0.1	400	0.1	0.1
9	5	0.6	10	3	3,888	0.01	0.01	0.3	0.3	0.01	0.02	300	0.03	0.03
10	9	0.45	8	3	4,896	0.01	0.01	0.3	0.3	0.01	0.02	300	0.03	0.03
11	7	0.5	9	4	4,368	0.01	0.01	0.3	0.3	0.01	0.03	400	0.04	0.04
12	2	0.4	11	3	4,452	0.003	0.003	0.1	0.1	0.002	0.01	300	0.01	0.01
13	6	0.6	9	5	3,648	0.02	0.02	0.3	0.3	0.01	0.04	500	0.07	0.07
14	6	0.4	13	4	4,464	0.01	0.01	0.3	0.3	0.01	0.03	400	0.04	0.04
Total	**150**	**95.85**	**1,113**	**570**	**42,008**	**263.093**	**355.892**	**589.379**	**779.779**	**36.04**	**1,313.974**	**6,949.2**	**1,586.4**	1,022.4

Land facets 5 – 7 are represented twice to differentiate the various sizes of the erosion features as indicated in Table 5.

(b) SLEMSA model

Land facet	Soil family	F_b/F_m	#E (E x 10^3 joules/m^2/annum)	K (t/ha/yr)	C*	X	Z (t/ha/yr)	Z* (t/ha/yr)	Erodibility rating
1	Ms10	6	11,577.54	4.6	0.05	2.952	0.7	0.01	M
2	Ms10	6	11,577.54	4.6	0.05	11.666	2.7	0.1	M
3	Ms10	6	11,577.54	4.6	0.057	21.115	5.5	0.1	M
4	Gs16	6.5	11,577.54	2.8	0.05	37.426	5.2	0.2	M
5	Ms10	6	11,577.54	4.6	0.057	22.161	5.8	0.3	M
6	Sd10	7	11,577.54	1.8	0.057	34.159	3.5	0.3	L
7	Sd10	7	11,577.54	1.8	0.057	17.370	1.8	0.1	L
8	Cv16	7.5	11,577.54	0.8	0.549	17.012	7.5	0.8	M
9	Cv16	5	11,577.54	12.4	0.053	7.645	5	0.5	M
10	Cv16	5	11,577.54	12.4	0.053	11.696	7.7	0.9	M
11	Cv13	3	11,577.54	80.9	0.053	9.061	38.9	4	H
12	Cv13	3	11,577.54	80.9	0.05	8.581	34.7	3.7	H
13	Cv13	3	11,577.54	80.9	0.057	9.561	44.1	3.8	H
14	Av13	2.5	11,577.54	130	0.057	14.912	110.5	11.7	H
Total		**5.3**	**11,577.54**	**30.2**	**0.089**	**16.094**	**-**	**26.5**	

M = Medium, L= low, H = High & V.H = Very High

(c) RUSLE model

Land facet	R	K	LS	C	P	A (t/ha/yr)	Z* (t/ha/yr)
1	118	0.17	0.78	0.1	1	0.2	0.00
2	118	0.16	3.7	0.1	1	0.1	0.00
3	118	0.16	5.27	0.02	1	4.4	0.09
4	118	0.26	6.83	0.11	1	4.8	0.15
5	118	0.26	2.28	0.78	1	28.6	1.31
6	118	0.12	6.66	0.97	1	20.5	1.71
7	118	0.12	4.35	0.1	1	14.1	0.87
8	118	0.13	3.89	0.15	1	20.9	2.34
9	118	0.16	2.06	0.17	1	15.0	1.39
10	118	0.22	2.79	0.16	0.46	11.9	1.39
11	118	0.31	2.2	0.16	0.46	13.2	1.37
12	118	0.31	0.197	0.16	0.53	13.9	1.47
13	118	0.3	1.84	0.2	0.41	11.7	1.02
14	118	0.28	1.58	0.16	0.35	6.4	0.68
Total	**118**	**0.21**	**3.17**	**0.24**	**0.80**	**-**	**13.78**

Table 4. Soil loss of hillslope 4

(a) ACED method

Land facet	No. of rills	Av. Length (m)	Av. Width (cm)	Av. Depth (cm)	Field Size (m^2)	Soil Loss (m^3)	Soil Loss (m^3)	Area of Actual Damage (m^2)	Area of Actual Damage (m^2)	Area of Actual Damage as % of Field Size	Soil Loss/ha (m^3/ha)	Soil Loss per Area of Actual Damage/ha (m^3/ha)	[1]Soil Loss (t/ha)
1	5	0.5	10	2	12,740	0.005	0.005	0.25	0.25	0.002	0.004	200	0.01
2	28	20	24	2	5,440	2.7		134.4					
2* **	2	11	700	26	5,440	40	42.7	154	288.4	5.3	78.5	1,481.6	109.9
3	4	0.8	20	10	5,904	0.1		0.64					
3* **	1	35	3,100	10	5,904	108.5	108.6	1,085	1,085.6	18.4	183.9	1,000	257.4
4	72	11	35	15	3,200	41.6		277.2					
4* **	3	10.6	700	19.67	3,200	43.8	85.4	222.6	499.8	15.6	266.8	1,708	373.5
5	147	46	33	20	5,040	446.3		2,231.5					
5* **	1	30	11,000	55	5,040	1815	2261.3	3,300	5,531.5	109.8	4,486.7	4,088.1	6,281.4
6	117	43	39	30	5,760	588.6		1,962.1					
6* **	1	33	11,000	50	5,760	1815	2403.6	3,630	5,592.1	97.1	4,173	4,298.3	5,842.2
7	8	12	31	12	6,136	3.6		29.8					
7* **	1	24	1,200	8	6,136	23	26.6	288	317.8	5.2	43.4	837.5	60.7
8	38	23	45	45	4,104	177	177	393.3	393.3	9.6	431.3	4,500	603.8
9	2	13	90	5	8,892	1.2		23.4					
9* **	2	19	1,100	12	8,892	50.2	51.3	418	441.4	5	57.7	1,162.9	80.8
Total	**432**	**331.9**	**29,127**	**321.7**	**57,216**	**5,157**	**5,156.5**	**14,150**	**14,150**	**265.9**	**9,721.2**	**19,276.2**	**13,609.7**

Land facets 2 – 9 are represented twice to differentiate the various sizes of the erosion features as indicated in Table 5.

(b) SLEMSA model

Land facet	Soil family	F_b/F_m	#E (E x 10^3 joules/m^2/annum)	K (t/ha/yr)	C*	X	Z (t/ha/yr)	Z* (t/ha/yr)	Erodibility rating
1	Ms10	6	11,577.54	4.6	0.05	53.092	12.2	2.7	M
2	Ms10	6	11,577.54	4.6	0.05	27.102	6.2	0.6	M
3	Ms10	6	11,577.54	4.6	0.05	17.785	4.1	0.4	M
4	Cv10	2.5	11,577.54	130.4	0.057	5.936	44.1	0.4	H
5	Cv10	2.5	11,577.54	130.4	0.057	12.748	94.8	8.3	H
6	Gf11	4.5	11,577.54	19.3	0.057	14.487	15.9	1.6	L
7	Gf11	7.5	11,577.54	1.1	0.045	12.150	0.6	0.1	L
8	Gf11	7.5	11,577.54	1.1	0.05	12.097	0.7	0.04	L
9	Gf11	7.5	11,577.54	1.1	0.05	29.295	1.6	0.3	L
Total		**5.8**	**11,577.54**	**20.7**	**0.05**	**20.521**	**-**	**14.4**	

M = Medium, L= low, H = High & V.H = Very High

(c) RUSLE model

Land facet	R	K	LS	C	P	A (t/ha/yr)	Z* (t/ha/yr)
1	118	0.16	0.97	0.03	1	1.364	0.30
2	118	0.23	4.68	0.05	1	15.620	1.49
3	118	0.23	1.23	0.05	1	3.960	0.41
4	118	0.23	1.42	0.06	1	5.720	0.32
5	118	0.1	3.59	0.11	1	10.120	0.89
6	118	0.12	3.83	0.11	1	13.420	1.35
7	118	0.12	2.27	0.02	0.8	1.760	0.19
8	118	0.12	2.07	0.03	1	2.024	0.15
9	118	0.12	1.94	0.03	1	1.892	0.29
Total	**118**	**0.2**	**2.4**	**0.05**	**0.97**	**-**	**5.39**

[1] Soil loss calculated using respective bulk densities of 1.3 and 1.4 g/cm^3 for clay and sandy clay loam and sandy loam soils

[2] Soil loss without gullies

[3] Soil family according to Soil Classification – A Binomial System for South Africa (1977)

** Deep-wide rills

*** Wide rills

~ Gullies

#E - calculated kinetic energy, E, value based on Hudson (1987) and Schulze (1979) approach.

*C - refers to canopy cover only.

*Z – soil loss based on the area size of the land facets and hillslope.

$F_m = F_b + 2$

M = Medium, L= low, H = High & V.H = Very High

Table 5. Classification of rills and gullies (Herweg, 1996)

CLASSES	WIDTH (CM)	DEPTH (CM)
Shallow rills	<25	<15
Shallow-Wide rills	25-200	<15
Deep rills	<50	15-100
Deep-Wide rills	50-200	15-100
Wide rills	>200	<100
Gullies	any	>100