

APPENDIX II: FORMS FOR FIELD MEASUREMENT

FIELD FORM: RILL

Site:

Date:

<i>Measurement</i>	<i>Width cm</i>	<i>Depth cm</i>
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Sum of all measurements		
Average*	WIDTH =	DEPTH =
Length of rill (m) =		
Contributing (catchment) area to rill (m ²) =		

Rem.: to get average divide the sum of all the measurements by the number of measurements made.

Calculations:

- (1) Convert the average width and depth of the rill to metres (by multiplying by 0.01).
- (2) Calculate the average cross-sectional area of the rill, using the formula for the appropriate cross-section: the formula for the area of a triangle (i.e. ½ horizontal width x depth); semi-circle (1.57 x width x depth); and rectangle (width x depth). Thus, assuming a triangular cross-section it is:

$$\boxed{\frac{1}{2}} \times \text{WIDTH (m)} \quad \boxed{} \times \text{DEPTH (m)} \quad \boxed{} = \text{CROSS-SEC AREA} \quad \boxed{} \text{ m}^2$$

- (3) Calculate the volume of soil lost from the rill.

$$\text{CROSS-SEC AREA (m}^2\text{)} \quad \boxed{} \times \text{LENGTH (m)} \quad \boxed{} = \text{VOLUME LOST} \quad \boxed{} \text{ m}^3$$

- (4) Convert the total volume lost to a volume per square metre of catchment.

$$\text{VOLUME LOST (m}^3\text{)} \quad \boxed{} \div \text{CATCHMENT AREA (m}^2\text{)} \quad \boxed{} = \text{SOIL LOSS (m}^3\text{/m}^2\text{)} \quad \boxed{}$$

- (5) Convert the volume per square metre to tonnes per hectare.

$$\text{SOIL LOSS (m}^3\text{/m}^2\text{)} \quad \boxed{} \times \text{BULK DENSITY (t/m}^3\text{)} \quad \boxed{} \times \boxed{} = \text{SOIL LOSS (t/ha)} \quad \boxed{}$$

FIELD FORM: GULLY

Site:

Date:

<i>Measurement</i>	<i>Width at lip (w₁) m</i>	<i>Width at base (w₂) m</i>	<i>Depth m</i>
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20			
Sum of all measurements			
Average*	WIDTH w ₁ =	WIDTH w ₂ =	DEPTH (d)=

* Rem.: to get average divide the sum of all the measurements by the number of measurements made.

Calculations:

- (1) Calculate the average cross-sectional area of the gully, using the formula $(w_1 + w_2) \div 2 \times d$.

$$\frac{1}{2} (\text{AV WIDTH } w_1 + \text{AV WIDTH } w_2) \times \text{DEPTH (m)} = \text{CROSS-SEC AREA } \text{m}^2$$

- (2) Calculate the volume of soil lost from the gully.

$$\text{CROSS-SEC AREA} \times \text{LENGTH (m)} = \text{VOLUME LOST } \text{m}^3$$

- (3) Convert the volume lost to a per metre equivalent, assuming a catchment area of 1 km², or 1,000,000 m².

$$\text{VOLUME LOST} \div \text{CATCHMENT AREA (m}^2\text{)} = \text{SOIL LOSS (m}^3\text{/m}^2\text{)}$$

- (4) Convert the volume lost to tonnes per hectare over the whole catchment area.

$$\text{SOIL LOSS (m}^3\text{/m}^2\text{)} \times \text{BULK DENSITY (t/m}^3\text{)} = \text{SOIL LOSS t/ha}$$

FIELD FORM: PEDESTALS

Site:

Date:

<i>Measurement Locality</i>	<i>Maximum Height of Pedestal in Locality (mm)</i>
1	
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Sum of all measurements	
Average*	AV PED HEIGHT =

* Rem.: to get average divide the sum of all the measurements by the number of measurements made.

Calculations:

- (1) Calculate t/ha equivalent of the net soil loss (represented by the average pedestal height).

AV PED HEIGHT (mm) x BULK DENSITY (t/ha) = t/ha

FIELD FORM: ARMOUR LAYER

Site:

Date:

<i>Measurement</i>	<i>Depth of Armour Layer (in mm)</i>	<i>Proportion of Coarse Material in Topsoil</i>
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20		
Sum of all measurements		
Average*	AL DEPTH (mm)=	COARSE % =

* Rem.: to get average divide the sum of all the measurements by the number of measurements made.

Calculations:

- (1) First, convert the measured soil loss to its equivalent in metres.

$$\text{AL DEPTH (mm)} \quad \boxed{} \times \boxed{0.001} = \text{AL DEPTH (m)} \quad \boxed{}$$

- (2) Calculate the depth of soil required to generate AL DEPTH (m).

$$\text{AL DEPTH (m)} \quad \boxed{} \times \text{COARSE \%} \quad \boxed{} = \text{TOTAL SOIL(m)} \quad \boxed{}$$

- (3) Calculate the soil lost

$$\text{TOTAL SOIL (m)} \quad \boxed{} - \text{AL DEPTH (m)} \quad \boxed{} = \text{NET SOIL LOSS (m)} \quad \boxed{}$$

- (4) Calculate t/ha equivalent of net soil loss.

$$\text{NET SOIL LOSS (m)} \quad \boxed{} \times \text{EQUIV VOLUME PER HECTARE (t/ha)} \quad \boxed{} = \boxed{} \text{ t/ha}$$

FIELD FORM: PLANT/TREE ROOT EXPOSURE

Site:

Date:

<i>Measurement</i> <i>A</i>	<i>Measured Difference in Soil Level mm B</i>	<i>Converted to Tonnes/Hectare B x 13* t/ha C</i>	<i>Age of Plant/Tree years D</i>	<i>Annual Change in Level t/ha/yr.</i>
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19				
20				
Sum of all measurements	-	-	-	
Average**	-	-	-	ANNUAL SL =

* Rem.: 1mm of soil loss is equivalent to 13 t/ha, where the bulk density is 1.3g/cm³.

** Rem.: to get average divide the sum of all the measurements by the number of measurements made.

FIELD FORM: TREE MOUND

Site:

Date:

<i>Measurement</i> A	<i>Measured Difference in Soil Level mm</i> B	<i>Converted to Tonnes/Hectare B x 13*</i> t/ha C	<i>Age of Plant/Tree</i> years D	<i>Annual Change in Level</i> t/ha/yr.
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16				
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20				
Sum of all measurements	-	-	-	
Average**	-	-	-	ANNUAL SL =

* Rem.: 1mm of soil loss is equivalent to 13 t/ha, where the bulk density is 1.3g/cm³.

** Rem.: to get average divide the sum of all the measurements by the number of measurements made.

FIELD FORM: BUILD-UP AGAINST BARRIER

Site:

Date:

<i>Measurement</i>	<i>Measured Depth cm</i>	<i>Measured Length cm</i>
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20		
<i>Total</i>		
<i>Average</i>		
Length of barrier:		(m) =
Contributing (catchment) area to barrier:		(m ²) =

* Rem.: to get average divide the sum of all the measurements by the number of measurements made.

Calculations:

(1) Convert the average depth and length of the accumulation against the barrier to metres (by multiplying by 0.01).

(2) Calculate the average cross-sectional area of the accumulation, using the formula for the area of a triangle.

$$\frac{1}{2} \times \text{DEPTH (m)} \times \text{LENGTH (m)} = \text{CROSS-SEC AREA (m}^2\text{)}$$

(3) Calculate the volume of soil accumulated behind the barrier.

$$\text{CROSS-SEC AREA (m}^2\text{)} \times \text{BARRIER (m)} = \text{VOL ACCUM'ED (m}^3\text{)}$$

(4) Convert the total volume accumulated to a volume per square metre of contributing area.

$$\frac{\text{VOLUME ACCUMULATED (m}^3\text{)}}{\text{CONTRIBUTING AREA (m}^2\text{)}} = \text{SOIL LOSS (m}^3\text{/m}^2\text{)}$$

(5) Convert the volume per square metre to tonnes per hectare.

$$\text{SOIL LOSS (m}^3\text{/m}^2\text{)} \times \text{BULK DENSITY (t/m}^3\text{)} \times 10,000 = \text{SOIL LOSS (t/ha)}$$

(6) Convert the total soil loss as represented by the soil accumulated behind the barrier into an annual equivalent.

$$\text{SOIL LOSS (t/ha)} \div \text{TIME (yr)} = \text{ANNUAL SOIL LOSS (t/ha/yr)}$$

FIELD FORM: SEDIMENT IN DRAIN

Site:

Date:

<i>Measurement</i>	<i>Depth of Sediment cm</i>	<i>Width of Drain cm</i>
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Sum of all measurements		
Average*	DEPTH =	WIDTH =
Length of drain:	(m) =	
Contributing (catchment) area to drain:	(m ²) =	

* Rem.: to get average divide the sum of all the measurements by the number of measurements made.

Calculations:

(1) Convert the average depth and width of the sediment in the drain to metres (by multiplying by 0.01).

(2) Calculate the average cross-sectional area of the sediment in the drain.

WIDTH (m) x DEPTH (m) = CROSS-SEC AREA m²

(3) Calculate the volume of soil deposited in the drain.

CROSS-SEC AREA (m²) x LENGTH (m) = VOLUME DEPOSITED m³

(3) Convert the total volume to a volume per square metre of catchment.

VOLUME DEPOSITED (m³) ÷ CONTRIBUTING AREA (m²) = SOIL LOSS (m³/m²)

(4) Convert the volume per square metre to tonnes per hectare.

SOIL LOSS (m³/m²) x BULK DENSITY (t/m³) x 10,000 = SOIL LOSS (t/ha)

FIELD FORM: ENRICHMENT RATIO

Site:

Date:

<i>Measurement</i>	<i>% of Fine Particles in Eroded Soil: i.e. soil remaining in-field</i>	<i>% of Fine Particles in Enriched Soil: i.e. soil caught downslope and deposited</i>
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Sum		
Average*	ERODED = %	ENRICHED = %

* Rem.: to get average divide the sum of all the measurements by the number of measurements made.

Calculations:

(1) Calculate the ratio of fine materials in the eroded soil to fine materials in the enriched soil.

ENRICHED % % ÷ ERODED % % = ENRICHMENT RATIO

FIELD FORM: FENCE POST EXPOSURE

Site:

Date:

<i>Measurement</i>	<i>Depth of erosion</i>	<i>Converted to Tonnes/Hectare B x 13*</i>	<i>Time Elapsed Since Structure Installed</i>	<i>Annual Change in Level</i>
<i>A</i>	<i>mm B</i>	<i>t/ha C</i>	<i>Years D</i>	<i>t/ha/yr.</i>
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16				
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18				
19				
20				
Sum of all measurements	-	-	-	
Average**	-	-	-	ANNUAL SL =

* Rem.: 1mm of soil loss is equivalent to 13 t/ha, where the bulk density is 1.3g/cm³.

** Rem.: to get average divide the sum of all the measurements by the number of measurements made.