	Calculation Sheet	Job No 1	Sheet No. 1	Rev.
	-SEDIMENT YIELD ESTIMATION - Existing Condition			
		Member/Location :		
		Drg. Ref. :		
Job Title :	SEDIMENT YIELD	Made by NAS	Date 13.11.2018	Remark

SEDIMENT YIELD ESTIMATION

The Modified Universal Soil Loss Equation (MUSLE) is used to determine the sediment yield for Floodway at Block 1(b)

The design of all sediment control BMP's required the quantity of the sediment to be trapped.

The design rainfall as per requirement of MASMA is set to be 50 mm to the catchment under consideration — Table 1.3, CH 1

Slope

a) Design Storm

Design Storm	=	50	mm	
Catchment Area, A	=	44.00	ha	
Table 2.1 — Time of Concentration,tc	=	24	minutes	

$$t_c = \frac{107\, n\, L^{0.333}}{S^{0.2}}$$

L = 100.00 m

S = 5

n = 0.06 (From Table 2.2 MSMA 2 for Existing (Densely Grassed)

t_o = 21.6 minutes — Adopt tc = 24 minutes

Duration of storm,D	= 60	minutes (Assume 1 hrs)
Intensity of design storm, I	= 50	mm/h

Eqn. 2.3 — b) Calculate Peak Discharge, Qp using Rational Method

Table 2.5 — Run Off Coefficient, C = 0.30 (Forest Cover)

$$Q_p = \frac{C \cdot I \cdot A}{360} = 1.83 \ m^3/s$$

Sec 2.3.2 — c) Calculate Runoff Volume, V using Rational Method Hydrograph Method (Type 1)

D>tc : Type 1

V= 0.5 x (2 x D) x (Qp) — $V = 0.5 \times (2 \times D) \times (Qp) =$ 6600 m^3

D<tc : Type 2 — Where, tc is in seconds

V= 0.5 x (2 x tc) x (Qp)

	Calculation Sheet -SEDIMENT YIELD ESTIMATION	Job No 1	Sheet No. 2	Rev.
		0		
		Member/Location :		
		Drg. Ref. :		
Job Title :		Made by NAS	Date 13.11.2018	Remark

2) Calculation of Sediment Yield

Eqn. 12.4 $Y = 89.6(VQ_p)^{0.56}(K.LS.C.P)$

where,

Y	=	Sediment yield per storm event (tonnes)
V	=	Runofff Volume in m^3
Q_p	=	Peak Discharge in m^3/s
K	=	Soil erodibility factor
LS	=	Slope Length and Slope Steepness Factor — USLE Factor
C	=	Cover Management Factor
P	=	Support Practice Factor

Soil Erodibility Factor

Eqn. 12.3 K = [10^-4 x (12 - % OM)*M^1.14 + 4.5 (S - 3) + 8(P - 2)]/100,

K = 0.049 (Value from DID Guidelines,2010) for Telemong Series)

Slope Length and Sloipe Steepness Factor, LS

LS = 0.973

Cover management and Support Practice

C = 0.010 Considered Nothing done for Soil Yield Calculation

P = 1.0

As Such, Total Sediment Yield to Load the Sediment Basin per Storm Event

Y = 8.260 Tonnes

	Calculation Sheet -SEDIMENT YIELD ESTIMATION - With Conservation Practice	Job No 1	Sheet No. 3	Rev.
		Member/Location :		
		Drg. Ref. :		
Job Title :	SEDIMENT YIELD	Made by NAS	Date 13.11.2018	Remark

SEDIMENT YIELD ESTIMATION

The Modified Universal Soil Loss Equation (MUSLE) is used to determine the sediment yield for Floodway at Block 1(b)

The design of all sediment control BMP's required the quantity of the sediment to be trapped.

The design rainfall as per requirement of MASMA is set to be 50mm to the catchment under consideration — Table 1.3, CH 1

1) Determination of Runoff Parameters

a) Design Storm

Design Storm	=	50	mm	
Catchment Area, A	=	44.00	ha	
Table 2.1 — Time of Concentration,tc	=	15	minutes	

$$t_c = \frac{107\, n\, L^{0.333}}{S^{0.2}}$$

L = 100.00 m

S = 5.0

n = 0.035 (From Table 2.2 MSMA 2 for Construction (Poorly Grassed)

t_o = 12.6 minutes — Adopt tc = 15 minutes

Duration of storm,D	=	60	minutes (Assume 1 hrs)
Intensity of design storm, I	=	50	mm/h

Eqn. 2.3 — b) Calculate Peak Discharge, Qp using Rational Method

Table 2.5 — Run Off Coefficient, C = 0.35 (Bush Cover)

$$Q_p = \frac{C \cdot I \cdot A}{360} = 2.14 \text{ m}^3/\text{s}$$

Sec 2.3.2 — c) Calculate Runoff Volume, V using Rational Method Hydrograph Method (Type 1)

D>tc : Type 1

V= 0.5 x (2 x D) x (Qp) — V = 0.5 x (2 x D) x (Qp) = 7700 m^3

D<tc : Type 2 — Where, D is in seconds

V= 0.5 x (2 x tc) x (Qp)

	Calculation Sheet -SEDIMENT YIELD ESTIMATION	Job No 1	Sheet No. 4	Rev.
		0		
		Member/Location :		
		Drg. Ref. :		
Job Title :		Made by NAS	Date 13.11.2018	Remark

2) Calculation of Sediment Yield

Eqn. 12.4

$$Y = 89.6(VQ_p)^{0.56}(K.LS.C.P)$$

where,

Y	=	Sediment yield per storm event (tonnes)
V	=	Runofff Volume in m^3
Q_p	=	Peak Discharge in m^3/s
K	=	Soil erodibility factor
LS	=	Slope Length and Slope Steepness Factor — USLE Factor
C	=	Cover Management Factor
P	=	Support Practice Factor

Soil Erodibility Factor

Eqn. 12.3

K = [10^-4 x (12 - % OM)*M^1.14 + 4.5 (S - 3) + 8(P - 2)]/100,

K = 0.050 (Value from DID Guidelines,2010) for Telemong Series)

Slope Length and Sloipe Steepness Factor, LS

LS = 0.973

Cover management and Support Practice

C = 0.05 Considered Nothing done for Soil Yield Calculation

P = 0.22

As Such, Total Sediment Yield to Load the Sediment Basin per Storm Event

Y = 11.019 Tonnes

	Calculation Sheet -SEDIMENT YIELD ESTIMATION - Worst Case Scenario	Job No. 1	Sheet No. 5	Rev.
		Member/Location :		
		Drg. Ref. :		
Job Title :	SEDIMENT YIELD	Made by NAS	Date 13.11.2018	Remark

SEDIMENT YIELD ESTIMATION

The Modified Universal Soil Loss Equation (MUSLE) is used to determine the sediment yield for Floodway at Block 1(b)

The design of all sediment control BMP's required the quantity of the sediment to be trapped.

The design rainfall as per requirement of MASMA is set to be 50 mm to the catchment under consideration. — Table 1.3, CH 1

1) Determination of Runoff Parameters

a) Design Storm

Design Storm	=	50	mm	
Catchment Area, A	=	44.00	ha	
Table 2.1 — Time of Concentration,tc	=	12	minutes	

$$t_c = \frac{107\, n\, L^{0.333}}{S^{0.2}}$$

L = 100 m

S = 5.0

n = 0.0275 (From Table 2.2 for Worst Case (Bare Soil)

t_o = 9.9 minutes — Adopt tc = 12 minutes

Duration of storm,D	=	60	minutes (Assume 1 hrs)
Intensity of design storm, I	=	50	mm/h

Eqn. 2.3 — b) Calculate Peak Discharge, Qp using Rational Method

Table 2.5 — Run Off Coefficient, C = 0.5 (Bare soil (No Cover))

$$Q_p = \frac{C \cdot I \cdot A}{360} = 3.06 \text{ m}^3/\text{s}$$

Sec 2.3.2 — c) Calculate Runoff Volume, V using Rational Method Hydrograph Method (Type 1)

D>tc : Type 1

V= 0.5 x (2 x D) x (Qp) — V = 0.5 x (2 xD) x (Qp) = 11000 m^3

D<tc : Type 2 — Where, tc is in seconds

V= 0.5 x (2 x tc) x (Qp)

	Calculation Sheet -SEDIMENT YIELD ESTIMATION	Job No. 1	Sheet No. 6	Rev.
		0		
		Member/Location :		
		Drg. Ref. :		
Job Title :		Made by NAS	Date 13.11.2018	Remark

2) Calculation of Sediment Yield

Eqn. 12.4 $Y = 89.6(VQ_p)^{0.56}(K.LS.C.P)$

where,

Y	=	Sediment yield per storm event (tonnes)
V	=	Runofff Volume in m^3
Q_p	=	Peak Discharge in m^3/s
K	=	Soil erodibility factor
LS	=	Slope Length and Slope Steepness Factor — USLE Factor
C	=	Cover Management Factor
P	=	Support Practice Factor

Soil Erodibility Factor

Eqn. 12.3 $K = [10^{-4} \times (12 - \%OM) * M^{1.14} + 4.5 (S - 3) + 8(P - 2)]/100,$

$K = 0.050$ (Value from DID Guidelines,2010) for Telemong Series)

Slope Length and Sloipe Steepness Factor, LS

$LS = 0.973$

Cover management and Support Practice

C	=	1	Considered Nothing done for Soil Yield Calculation
P	=	1	

As Such, Total Sediment Yield to Load the Sediment Basin per Storm Event

Y = 1493.6 Tonnes