THE RANCH PLAN PLANNED COMMUNITY

PLANNING AREAS 3 AND 4 RUNOFF MANAGEMENT PLAN



TECHNICAL APPENDIX M

Worksheet 3: Factor of Safety and Design Infiltration Rate and Worksheet

egory	Factor Description	Assigned Weight (w)	Factor Value (v)	Product (p) p = w x v
	Soil assessment methods	0.25	3	0.75
Cuitability	Predominant soil texture	0.25	2	0.5
Assessment	Site soil variability	0.25	2	0.5
	Depth to groundwater / impervious layer	0.25	1	0.25
	Suitability Assessment Safety Factor, $S_A = \Sigma$	р		2
	Tributary area size	0.25	3	0.75
	Level of pretreatment/ expected sediment loads	0.25	3	0.75
Design	Redundancy/contingency plan	0.25	3	0.75
	Compaction during construction	0.25	2	0.5
	Design Safety Factor, $S_B = \Sigma p$			2.75
Safety Factor, S _{Tr}	$_{\text{otal}} = S_A x S_B$			5.5
Infiltration Rate, in	nch/hr, K _{obs}			/
for test-specific bi	as)			4
tration Rate, in/hr	, K _{design} = K _{obs} / S _{Total}			0.73
cribe infiltration te esting has not be provided per conv	st and provide reference to test forms: en performed at this location yet. The observe ersation with the geotechnical engineer.	ed infiltration	rate used is	s an
	Suitability Assessment Design Safety Factor, S _T Infiltration Rate, in for test-specific bi tration Rate, in/hr cribe infiltration te esting has not be provided per conv	egoryFactor DescriptionSuitability AssessmentSoil assessment methods Predominant soil texture Site soil variability Depth to groundwater / impervious layer Suitability Assessment Safety Factor, S _A = Σ UpesignDesignTributary area size Level of pretreatment/ expected sediment loads Redundancy/contingency plan Compaction during construction Design Safety Factor, S _B = ΣpSafety Factor, S _{Total} = S _A x S _B Infiltration Rate, inch/hr, K _{obs} for test-specific bias) tration Rate, in/hr, K _{design} = K _{obs} / S _{Total} cribe infiltration test and provide reference to test forms: esting has not been performed at this location yet. The observe provided per conversation with the geotechnical engineer.	egoryFactor DescriptionAssigned Weight (w)SuitabilitySoil assessment methods0.25SuitabilitySite soil variability0.25AssessmentDepth to groundwater / impervious layer0.25Suitability Assessment Safety Factor, $S_A = \Sigma p$ Tributary area size0.25DesignTributary area size0.25Level of pretreatment/ expected sediment loads0.25Redundancy/contingency plan0.25Design Safety Factor, $S_B = \Sigma p$ Safety Factor, $S_Total = S_A \times S_B$ Infiltration Rate, inch/hr, Kobs for test-specific bias)Trotaltration Rate, in/hr, Kdesign = Kobs/ STotalStotal	agoryFactor DescriptionAssigned Weight (w)Factor Value (v)Suitability AssessmentSoil assessment methods0.253Predominant soil texture0.252Site soil variability0.252Depth to groundwater / impervious layer0.251Suitability Assessment Safety Factor, S _A = ΣpTributary area size0.253Level of pretreatment/ expected sediment0.253Level of pretreatment/ expected sediment0.253Compaction during construction0.253Compaction during construction0.252Design Safety Factor, S _B = ΣpSafety Factor, S _{Total} = S _A x S _B Infiltration Rate, inch/hr, K _{obs} Infiltration Rate, inch/hr, K _{design} = K _{obs} / S _{Total} Source of the set of

Worksheet 3: Factor of Safety and Design Infiltration Rate and Worksheet - 3A-3

egory	Factor Description	Assigned Weight (w)	Factor Value (v)	Product (p) p = w x v
	Soil assessment methods	0.25	3	0.75
Cuitability	Predominant soil texture	0.25	2	0.5
Assessment	Site soil variability	0.25	2	0.5
	Depth to groundwater / impervious layer	0.25	1	0.25
	Suitability Assessment Safety Factor, $S_A = \Sigma$	р		2
	Tributary area size	0.25	3	0.75
	Level of pretreatment/ expected sediment loads	0.25	3	0.75
Design	Redundancy/contingency plan	0.25	3	0.75
	Compaction during construction	0.25	2	0.5
	Design Safety Factor, $S_B = \Sigma p$			2.75
Safety Factor, S _{Tr}	$_{\text{otal}} = S_A x S_B$			5.5
Infiltration Rate, in	nch/hr, K _{obs}			/
for test-specific bi	as)			4
tration Rate, in/hr	, K _{design} = K _{obs} / S _{Total}			0.73
cribe infiltration te esting has not be provided per conv	st and provide reference to test forms: en performed at this location yet. The observe ersation with the geotechnical engineer.	ed infiltration	rate used is	s an
	Suitability Assessment Design Safety Factor, S _T Infiltration Rate, in for test-specific bi tration Rate, in/hr cribe infiltration te esting has not be provided per conv	egoryFactor DescriptionSuitability AssessmentSoil assessment methods Predominant soil texture Site soil variability Depth to groundwater / impervious layer Suitability Assessment Safety Factor, S _A = Σ UpesignDesignTributary area size Level of pretreatment/ expected sediment loads Redundancy/contingency plan Compaction during construction Design Safety Factor, S _B = ΣpSafety Factor, S _{Total} = S _A x S _B Infiltration Rate, inch/hr, K _{obs} for test-specific bias) tration Rate, in/hr, K _{design} = K _{obs} / S _{Total} cribe infiltration test and provide reference to test forms: esting has not been performed at this location yet. The observe provided per conversation with the geotechnical engineer.	egoryFactor DescriptionAssigned Weight (w)SuitabilitySoil assessment methods0.25SuitabilitySite soil variability0.25AssessmentDepth to groundwater / impervious layer0.25Suitability Assessment Safety Factor, $S_A = \Sigma p$ Tributary area size0.25DesignTributary area size0.25Level of pretreatment/ expected sediment loads0.25Redundancy/contingency plan0.25Design Safety Factor, $S_B = \Sigma p$ Safety Factor, $S_Total = S_A \times S_B$ Infiltration Rate, inch/hr, Kobs for test-specific bias)Trotaltration Rate, in/hr, Kdesign = Kobs/ STotalStotal	agoryFactor DescriptionAssigned Weight (w)Factor Value (v)Suitability AssessmentSoil assessment methods0.253Predominant soil texture0.252Site soil variability0.252Depth to groundwater / impervious layer0.251Suitability Assessment Safety Factor, S _A = ΣpTributary area size0.253Level of pretreatment/ expected sediment0.253Level of pretreatment/ expected sediment0.253Compaction during construction0.253Compaction during construction0.252Design Safety Factor, S _B = ΣpSafety Factor, S _{Total} = S _A x S _B Infiltration Rate, inch/hr, K _{obs} Infiltration Rate, inch/hr, K _{design} = K _{obs} / S _{Total} Source of the set of

Worksheet 3: Factor of Safety and Design Infiltration Rate and Worksheet - 3A-4

Factor Cate	egory	Factor Description	Assigned Weight (w)	Factor Value (v)	Product (p) p = w x v
		Soil assessment methods	0.25	1	0.25
	Cuitability	Predominant soil texture	0.25	2	0.5
А	Assessment	Site soil variability	0.25	2	0.5
	1000000110111	Depth to groundwater / impervious layer	0.25	1	0.25
		Suitability Assessment Safety Factor, $S_A = \Sigma$	ρ		1.5
		Tributary area size	0.25	3	0.75
		Level of pretreatment/ expected sediment loads	0.25	3	0.75
В	Design	Redundancy/contingency plan	0.25	3	0.75
		Compaction during construction	0.25	2	0.5
		Design Safety Factor, $S_B = \Sigma p$			2.75
Combined	Safety Factor, S _{To}	$_{\text{otal}} = S_A \times S_B$			4.125
Observed	Infiltration Rate, in	nch/hr, K _{obs}			22
(corrected	for test-specific bi	as)			
Design Infil	tration Rate, in/hr	$K_{design} = K_{obs} / S_{Total}$			0.53
Briefly describe infiltration test and provide reference to test forms: Observed infiltration rate was determined as the average rates of test pits DH-24 and DH-26. GMU conducted the testing using the Shallow Percolation Test Procedure. Test pit locations and rates can be found in the September 18, 2018 geotechnical report included in Appendix N.					

Worksheet 3: Factor of Safety and Design Infiltration Rate and Worksheet - 3B-5

Factor Category		Factor Description	Assigned Weight (w)	Factor Value (v)	Product (p) p = w x v
		Soil assessment methods	0.25	2	0.5
	Cuitability	Predominant soil texture	0.25	2	0.5
А	Assessment	Site soil variability	0.25	2	0.5
	10000011011	Depth to groundwater / impervious layer	0.25	1	0.25
		Suitability Assessment Safety Factor, $S_A = \Sigma_A$	р		1.75
		Tributary area size	0.25	3	0.75
		Level of pretreatment/ expected sediment loads	0.25	2	0.5
В	Design	Redundancy/contingency plan	0.25	3	0.75
		Compaction during construction	0.25	2	0.5
		Design Safety Factor, $S_B = \Sigma p$			2.5
Combined	Safety Factor, S _{To}	$_{\text{otal}} = S_A \times S_B$			4.375
Observed	Infiltration Rate, in	nch/hr, K _{obs}			17.5
(corrected t	for test-specific bi	as)			11.0
Design Infil	tration Rate, in/hr	$K_{design} = K_{obs} / S_{Total}$			3.99
Briefly describe infiltration test and provide reference to test forms: Observed infiltration rate was determined as the average rates of test pits TP-02, TP-49, TP-50, TP-51, and TP-54. GMU conducted the testing using the Shallow Percolation Test Procedure. Test pit locations and rates can be found in the September 18, 2018 geotechnical report included in Appendix N.					

Worksheet 3: Factor of Safety and Design Infiltration Rate and Worksheet - 3C-2

Factor Category		Factor Description	Assigned Weight (w)	Factor Value (v)	Product (p) p = w x v
		Soil assessment methods	0.25	3	0.75
		Predominant soil texture	0.25	2	0.5
А		Site soil variability	0.25	2	0.5
	Assessment	Depth to groundwater / impervious layer	0.25	1	0.25
	l	Suitability Assessment Safety Factor, $S_A = \Sigma$	p		2
		Tributary area size	0.25	3	0.75
		Level of pretreatment/ expected sediment loads	0.25	3	0.75
В	Design	Redundancy/contingency plan	0.25	3	0.75
	1	Compaction during construction	0.25	2	0.5
	l	Design Safety Factor, $S_B = \Sigma p$			2.75
Combined	Safety Factor, S _T	otal= S _A x S _B			5.5
Observed (corrected	Infiltration Rate, in for test-specific bi	nch/hr, K _{obs} las)			9.6
Design Infil	Itration Rate, in/hr	, K _{design} = K _{obs} / S _{Total}			1.75
Briefly describe infiltration test and provide reference to test forms: Observed infiltration rate was determined by of test pit TP-14. GMU conducted the testing using the Shallow Percolation Test Procedure. Test pit location and rate can be found in the September 14, 2017 geotechnical report included in Appendix N.					

Worksheet 3: Factor of Safety and Design Infiltration Rate and Worksheet - 3D-5

Note: The minimum combined adjustment factor shall not be less than 2.0 and the maximum combined adjustment factor shall not exceed 9.0.

Factor Category		Factor Description	Assigned Weight (w)	Factor Value (v)	Product (p) p = w x v
		Soil assessment methods	0.25	3	0.75
	Quitability	Predominant soil texture	0.25	2	0.5
А	Suitability	Site soil variability	0.25	2	0.5
	Assessment	Depth to groundwater / impervious layer	0.25	1	0.25
		Suitability Assessment Safety Factor, $S_A = \Sigma$	р		2
		Tributary area size	0.25	3	0.75
_	Design	Level of pretreatment/ expected sediment loads	0.25	3	0.75
В		Redundancy/contingency plan	0.25	3	0.75
		Compaction during construction	0.25	2	0.5
		Design Safety Factor, $S_B = \Sigma p$			2.75
Combined	Safety Factor, S _T	- _{otal} = S _A x S _B			5.5
Observed	Infiltration Rate, i	nch/hr, K _{obs}			10.2
(corrected for test-specific bias)				19.2	
Design Infiltration Rate, in/hr, K _{design} = K _{obs} / S _{Total}			3.49		
Briefly describe infiltration test and provide reference to test forms:					

Worksheet 3: Factor of Safety and Design Infiltration Rate and Worksheet - 3G-1a

Observed infiltration rate was determined by of test pit TP-04. GMU conducted the testing using the Shallow Percolation Test Procedure. Test pit location and rate can be found in the August 6, 2014 geotechnical report included in Appendix N.

Factor Cate	egory	Factor Description	Assigned Weight (w)	Factor Value (v)	Product (p) p = w x v	
		Soil assessment methods	0.25	3	0.75	
	0	Predominant soil texture	0.25	2	0.5	
А	Assessment	Site soil variability	0.25	2	0.5	
	10000011011	Depth to groundwater / impervious layer	0.25	1	0.25	
		Suitability Assessment Safety Factor, $S_A = \Sigma$	р		2	
		Tributary area size	0.25	3	0.75	
		Level of pretreatment/ expected sediment loads	0.25	3	0.75	
В	Design	Redundancy/contingency plan	0.25	3	0.75	
		Compaction during construction	0.25	2	0.5	
		Design Safety Factor, $S_B = \Sigma p$			2.75	
Combined Safety Factor, S _{Total} = S _A x S _B					5.5	
Observed Infiltration Rate, inch/hr, K _{obs}					1.9	
Design Infil	Itration Rate, in/hr	; K _{desian} = K _{obs} / S _{Total}			0.35	
Design Infiltration Rate, in/hr, K _{design} = K _{obs} / S _{Total} 0.35 Briefly describe infiltration test and provide reference to test forms: Infiltration testing has not been performed at this location yet. The observed infiltration rate used is an estimated rate based on TP-01 located on the opposite side of San Juan Creek which GMU conducted the testing using the Shallow Percolation Test Procedure. Test pit location and rate can be found in the August 6, 2014 geotechnical report included in Appendix N.						

Worksheet 3: Factor of Safety and Design Infiltration Rate and Worksheet - 4E-2

Factor Cate	egory	Factor Description	Assigned Weight (w)	Factor Value (v)	Product (p) p = w x v
		Soil assessment methods	0.25	3	0.75
		Predominant soil texture	0.25	2	0.5
А	Assessment	Site soil variability	0.25	2	0.5
	1000001110111	Depth to groundwater / impervious layer	0.25	1	0.25
		Suitability Assessment Safety Factor, $S_A = \Sigma$	р		2
		Tributary area size	0.25	3	0.75
		Level of pretreatment/ expected sediment loads	0.25	3	0.75
В	Design	Redundancy/contingency plan	0.25	3	0.75
		Compaction during construction	0.25	2	0.5
		Design Safety Factor, $S_B = \Sigma p$			2.75
Combined Safety Factor, S _{Total} = S _A x S _B					5.5
Observed	Infiltration Rate, in	nch/hr, K _{obs}			19
(corrected f	for test-specific bi	as)			
Design Infil	tration Rate, in/hr	, K _{design} = K _{obs} / S _{Total}			0.35
Briefly describe infiltration test and provide reference to test forms: Infiltration testing has not been performed at this location yet. The observed infiltration rate used is an estimated rate based on TP-01 located on the opposite side of San Juan Creek which GMU conducted the testing using the Shallow Percolation Test Procedure. Test pit location and rate can be found in the August 6, 2014 geotechnical report included in Appendix N.					

Worksheet 3: Factor of Safety and Design Infiltration Rate and Worksheet - 4F-2