ANLINED BED - WORKED EXAMPLE

WATER BALANCE ANALYSIS WORKSHOP SESSION

Calculation of evapotranspiration-absorption/seepage area size by the water balance method.

Using the following information using your Course Notes, calculate the minimum area and depth of an evapotranspiration-absorption/seepage area for a three bedroom / five person dwelling.

Bureau of Meteorology rainfall and pan evaporation data for the nearest station is provided below.

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
DAILY PAN EVAPORATION (mm)	6.3	5.4	4.4	3.3	2.1	1.8	2.0	3.1	4.3	5.4	5.9	7.0
MEAN MONTHLY RAINFALL (mm)	93.3	99.6	92.1	70.3	58.8	56.4	35.9	45.8	40.2	64.1	76.1	71.7

Three test pits excavated on the proposed disposal area indicate that the soils are 475 mm weakly structured clay loam overlying moderately structured light clay to a depth of 2000 mm. Use the recommended design loading rate derived from Table L1 of AS/NZS 1547:2012 (see the Field Workshop and Design Exercise section of these Course Notes).

Calculate the evapotranspiration-absorption/seepage area using the worksheets provided on the following two pages.

The evapotranspiration-absorption area is to be constructed of imported aggregate, is to have a maximum depth of 600 mm with a minimum of 50 mm freeboard (i.e. maximum depth of stored effluent is 550 mm).

UNLINED BED - WORKED EXAMPLE

Calculation of evapotranspiration-absorption area size by water balance method

Size of area for each month

(1) Month	(2) Pan evaporation E mm	(3) Evapo transpiration ET ET = 0.75E mm	(4) Rainfall R mm	(5) Retained rainfall R_r R_r = 0.75R mm	(6) DLR per month mm	(7) Disposal rate per month (3)-(5)+(6) mm	(8) Effluent applied per month L	(9) Size of area (8)/(7) m^2
Jan	195.3	146.5	93.3	70.0	155	231.5	18600	80.3
Feb	151.2	113.4	99.6	74.7	140	178.7	16800	94.0
Mar	136.4	102.3	92.1	69.1	155	188.2	18600	98.8
Apr	99.0	74.3	70.3	52.7	150	171.5	18000	104.9
May	65.1	48.8	58.8	44.1	155	159.7	18600	116.5
Jun	54.0	40.5	56.4	42.3	150	148.2	18000	121.5
Jul	62.0	46.5	35.9	26.9	155	174.6	18600	106.5
Aug	96.1	72.1	45.8	34.4	155	192.7	18600	96.5
Sep	129.0	96.8	40.2	30.2	150	216.6	18000	83.1
Oct	167.4	125.6	64.1	48.1	155	232.5	18600	80.0
Nov	177.0	132.8	76.1	57.1	150	225.7	18000	79.8
Dec	217.0	162.8	71.7	53.8	155	264.0	18600	70.5
						First trial area = average monthly area =		94.4 m^2

Depth of stored effluent (first trial)

(1) Month	(2) First trial area m^2	(3) Application rate (8)/(2) mm	(4) Disposal rate per month (7) mm	(5) (3) - (4) mm	(6) Increase in depth of stored effluent (5)/n mm	Depth of effluent for month (X - 1) mm	(7) Increase in depth of effluent + (6) mm	Computed depth of effluent month (X) mm
Dec	94.4	-	-	-	-	0		
Jan		197.1	231.5	-34.4	-114.7	0.0	-114.7	0.0
Feb		178.0	178.7	-0.7	-2.2	0.0	-2.2	0.0
Mar		197.1	188.2	8.9	29.6	0.0	29.6	29.6
Apr		190.7	171.5	19.2	64.1	29.6	64.1	93.6
May		197.1	159.7	37.4	124.6	93.6	124.6	218.2
Jun		190.7	148.2	42.5	141.8	218.2	141.8	360.0
Jul		197.1	174.6	22.5	75.1	360.0	75.1	435.1
Aug		197.1	192.7	4.4	14.6	435.1	14.6	449.7
Sep		190.7	216.6	-25.9	-86.2	449.7	-86.2	363.5
Oct		197.1	232.5	-35.4	-117.9	363.5	-117.9	245.6
Nov		190.7	225.7	-34.9	-116.4	245.6	-116.4	129.2
Dec		197.1	264.0	-66.9	-222.9	129.2	-222.9	0.0

n = effective void space factor. For imported durable aggregate, n = 0.3