Model Parameter	Units	Symbol	Source	Value
Design Wastewater Load	L/day	Q	Wastewater generation	
Design Loading Rate (DLR) / Design Irrigation Rate (DIR)	mm/day	DLR / DIR	AS/NZS 1547:2012 and SSE	
Void Space Ratio	-	V	1 (soil/ no storage), 0.3 (gravel media) 0.45 (sand media), 0.5 (arch)[1]	
Retained Rainfall Coefficient	-	RrC	0.7 (>30% slope), 0.8 (10-30% slope), 0.9 (0-10% slope), 1.0 (flat ground)	
Nominated EAA	m^2	EAA_N	Nominated area by user	

KEY			
	User input		Calculated value

Notes

1. Patterson (2006)

Monthly Parameters	Units	Symbol		Jan	Feb	Mar	Apr	May	June	July	Aug	Sep	Oct	Nov	Dec	Annual
Days in month	days	D	-	31	28	31	30	31	30	31	31	30	31	30	31	365
Precipiation	mm/month	P	Median monthly data (BoM or SILO)													
Daily evaporation	mm/day	E_d	Mean daily data (BoM or SILO)													
Evaporation	mm/month	E	E_d x D													
Crop Factor	-	Cf	0.4-0.9[1] (varies with crop type and season)													
Model Inputs																
Retained rainfall	mm/month	Rr	P x RrC													
Applied Effluent	mm/month	W	(Q*D) ÷ EAA_N													
Inputs	mm/month	I	(Rr + W)													
Model Outputs																
Evapotranspiration	mm/month	Et	E x Cf													
Percolation	mm/month	B	DLR/DIR x D													
Outputs	mm/month	O	(Et + B)													
Model Storage																
Monthly storage	mm/month	S_M	(I - O) ÷ V													
Cumulative storage	mm/month	S_C	S_M + (S_M for month prior)													
Area required for no storage	m^2/month	EAA_S	(Q x D) ÷ (ET-Rr+B)													
Model Results																
Limiting storage	mm/month	S_L	Maximum monthly S_c value													
EAA Required (no storage)	m^2	EAA	Maximum monthly EAA_S value													

Model Parameter	Units	Symbol	Source	Value													
Design Wastewater Load	L/day	Q	Wastewater generation	1080	3-bedroom + 2-bedroom houses (on-site tank supply)												
Design Loading Rate (DLR) / Design Irrigation Rate (DIR)	mm/day	DLR / DIR	AS/NZS 1547:2012 and SSE	5	Table 6-4 NSW Guidelines (2025) for massive sand subsoil												
Void Space Ratio	-	V	1 (soil/ no storage), 0.3 (gravel media) 0.45 (sand media), 0.5 (arch)[1]	1	Subsurface irrigation EAA proposed												
Retained Rainfall Coefficient	-	RrC	0.7 (>30% slope), 0.8 (10-30% slope), 0.9 (0-10% slope), 1.0 (flat ground)	0.9	2-5% slope in proposed EAA												
Nominated EAA	m^2	EAA_N	Nominated area by user	340													
Monthly Parameters					**Jan**	**Feb**	**Mar**	**Apr**	**May**	**June**	**July**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**	**Annual**
Days in month	days	D	-		31	28	31	30	31	30	31	31	30	31	30	31	365
Precipiation	mm/month	P	SILO Data Drill (-30 150) - Median		101.9	133.1	143.4	76.9	79.2	98.3	49.0	34.4	35.3	59.3	97.4	76.6	984.5
Daily evaporation	mm/day	E_d	SILO Data Drill (-30 150) - Avg		5.6	4.9	3.9	3.0	2.2	1.9	2.1	2.9	4.0	4.7	5.0	5.5	3.8
Evaporation	mm/month	E	E_d x D		174.0	136.1	120.4	90.7	69.5	56.6	64.3	90.3	118.9	144.5	150.4	171.1	1386.7
Crop Factor	-	Cf	0.4-0.9[1] (varies with crop type and season)		0.8	0.8	0.8	0.7	0.7	0.6	0.6	0.6	0.7	0.8	0.8	0.8	
Model Inputs																	
Retained rainfall	mm/month	Rr	P x RrC		91.71	119.79	129.015	69.165	71.28	88.425	44.1	30.915	31.725	53.325	87.615	68.94	
Applied Effluent	mm/month	W	(Q x D) ÷ EAA_N		98.5	88.9	98.5	95.3	98.5	95.3	98.5	98.5	95.3	98.5	95.3	98.5	
Inputs	mm/month	I	(Rr + W)		190.2	208.7	227.5	164.5	169.8	183.7	142.6	129.4	127.0	151.8	182.9	167.4	
Model Outputs																	
Evapotranspiration	mm/month	Et	E x Cf		139.2	108.8	96.3	63.5	48.6	34.0	38.6	54.2	83.2	115.6	120.3	136.9	
Percolation	mm/month	B	DLR/DIR x D		155.0	140.0	155.0	150.0	155.0	150.0	155.0	155.0	150.0	155.0	150.0	155.0	
Outputs	mm/month	O	(Et + B)		294.2	248.8	251.3	213.5	203.6	184.0	193.6	209.2	233.2	270.6	270.3	291.9	
Model Storage																	
Monthly storage	mm/month	S_M	(I - O) ÷ V		-104.0	-40.1	-23.8	-49.0	-33.9	-0.3	-51.0	-79.8	-106.2	-118.8	-87.4	-124.5	
Cumulative storage	mm/month	S_C	S_M + (S_M for month prior)		0	0	0	0	0	0	0	0	0	0	0	0	
Area required for no storage	m^2/month	EAA_S	(Q x D) ÷ (ET-Rr+B)		165	234	274	225	253	339	224	188	161	154	177	150	
Model Results																	
Limiting storage depth	mm/month	S_L	Maximum monthly S_c value	**0**													
EAA Required (no storage)	m^2	EAA	Maximum monthly EAA_S value	**339**													

KEY

	User input		Calculated value

Notes

1. Patterson (2006)

Model Parameter	Units	Symbol	Source	Value													
Design Wastewater Load	L/day	Q	Wastewater generation	1080	3-bedroom + 2-bedroom houses (on-site tank supply)												
Design Loading Rate (DLR) / Design Irrigation Rate (DIR)	mm/day	DLR / DIR	AS/NZS 1547:2012 and SSE	50	Table 6-4 NSW Guidelines (2025) for massive sand subsoil												
Void Space Ratio	-	V	1 (soil/ no storage), 0.3 (gravel media) 0.45 (sand media), 0.5 (arch)[1]	0.3	Piped gravel trench EAA proposed												
Retained Rainfall Coefficient	-	RrC	0.7 (>30% slope), 0.8 (10-30% slope), 0.9 (0-10% slope), 1.0 (flat ground)	0.9	2-5% slope in proposed EAA												
Nominated EAA	m^2	EAA_N	Nominated area by user	23													
Monthly Parameters					**Jan**	**Feb**	**Mar**	**Apr**	**May**	**June**	**July**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**	**Annual**
Days in month	days	D	-		31	28	31	30	31	30	31	31	30	31	30	31	365
Precipiation	mm/month	P	SILO Data Drill (-30 150) - Median		101.9	133.1	143.4	76.9	79.2	98.3	49.0	34.4	35.3	59.3	97.4	76.6	984.5
Daily evaporation	mm/day	E_d	SILO Data Drill (-30 150) - Avg		5.6	4.9	3.9	3.0	2.2	1.9	2.1	2.9	4.0	4.7	5.0	5.5	3.8
Evaporation	mm/month	E	E_d x D		174.0	136.1	120.4	90.7	69.5	56.6	64.3	90.3	118.9	144.5	150.4	171.1	1386.7
Crop Factor	-	Cf	0.4-0.9[1] (varies with crop type and season)		0.8	0.8	0.8	0.7	0.7	0.6	0.6	0.6	0.7	0.8	0.8	0.8	
Model Inputs																	
Retained rainfall	mm/month	Rr	P x RrC		91.71	119.79	129.015	69.165	71.28	88.425	44.1	30.915	31.725	53.325	87.615	68.94	
Applied Effluent	mm/month	W	$(Q \times D) \div EAA_N$		1455.7	1314.8	1455.7	1408.7	1455.7	1408.7	1455.7	1455.7	1408.7	1455.7	1408.7	1455.7	
Inputs	mm/month	I	(Rr + W)		1547.4	1434.6	1584.7	1477.9	1526.9	1497.1	1499.8	1486.6	1440.4	1509.0	1496.3	1524.6	
Model Outputs																	
Evapotranspiration	mm/month	Et	E x Cf		139.2	108.8	96.3	63.5	48.6	34.0	38.6	54.2	83.2	115.6	120.3	136.9	
Percolation	mm/month	B	DLR/DIR x D		1550.0	1400.0	1550.0	1500.0	1550.0	1500.0	1550.0	1550.0	1500.0	1550.0	1500.0	1550.0	
Outputs	mm/month	O	(Et + B)		1689.2	1508.8	1646.3	1563.5	1598.6	1534.0	1588.6	1604.2	1583.2	1665.6	1620.3	1686.9	
Model Storage																	
Monthly storage	mm/month	S_M	(I - O) ÷ V		-472.9	-247.6	-205.5	-285.4	-239.0	-122.8	-296.1	-392.0	-476.0	-522.1	-413.3	-541.0	
Cumulative storage	mm/month	S_C	S_M + (S_M for month prior)		0	0	0	0	0	0	0	0	0	0	0	0	
Area required for no storage	m^2/month	EAA_S	$(Q \times D) \div (ET-Rr+B)$		21	22	22	22	22	22	22	21	21	21	21	21	
Model Results																	
Limiting storage depth	mm/month	S_L	Maximum monthly S_c value	**0**													
EAA Required (no storage)	m^2	EAA	Maximum monthly EAA_S value	**22**													

KEY			
	User input		Calculated value

Notes

1. Patterson (2006)

Model Parameter	Units	Symbol	Source	Value
Design Wastewater Load	L/day	Q	Wastewater generation	
Total nitrogen in effluent	mg/L	TN	Table 5-2 of the Guideline or site-specifc effluent quality data[1]	
Total phosphorus in effluent	mg/L	TP	Table 5-2 of the Guideline or site-specific effluent quality data[1]	
Design life of system	years	L	Reasonable service life of 50 years	
P-sorption soil capacity	mg/kg	P_{sorp}	Site-specific/ soil landscape-specific laboratory data or Table 4-7 of the Guideline	
P-sorption soil capacity field coefficient	%	$P_{sorp}C$	Capacity of a soil to sorb phosphorus in the field is 25-75% less than in measured lab conditions[2]	
Soil depth for P-sorption	m	D	Soil depth from base of EAA to limiting layer and/or depth of excavation based on SSE	
Bulk density of soil	g/cm^3	B	1.8 (sandy loam), 1.7 (fine sandy loam), 1.6 (loams and clay loams), 1.4 (clays)[3]	
Nitrogen plant uptake	kg/m^2/year	NPU	90 (good quality woodland), 65 (poor quality woodland), 240 (managed lawn), 120 (unmanaged lawn), 280 (improved pasture), 99 (perennial pasture), 150 (managed shrubs and some trees), 75 (unmanaged shrubs and some trees)[4]	
Phosphorus plant uptake	kg/m^2/year	PPU	25 (good quality woodland), 20 (poor quality woodland), 30 (managed lawn), 12 (unmanaged lawn), 24 (improved pasture), 11 (perennial pasture), 16 (managed shrubs and some trees), 8 (unmanaged shrubs and some trees)[4]	
Model Inputs				
Appiled total nitrogen	kg/year	TN_A	*(Q x TN x 365) ÷ 1,000,000*	
Applied total phosphorus	kg/year	TP_A	*(Q x TP x 365) ÷ 1,000,000*	
Model Outputs				
Subsoil nitrogen cycle losses[5]	kg/year	NL	*TN_A x 20%*	
Phosphorus sorption by soil	kg/m^2	PS	*[(P_{sorp} ÷ 1,000,000) x (B x 1,000)] x D x $P_{sorp}C$*	
Phosphorus plant uptake over design life	kg/m^2	PPU_L	*(PPU ÷ 10,000) x L*	
Model Results				
Minimum area required for nitrogen uptake	m^2	NUA_N	*[(TN_A -NL) ÷ NPU] x 10,000*	
Minimum area required for phosphorus uptake	m^2	NUA_P	*(TP_A x L) ÷ (PS+PPU_L)*	
Minimum area for nutrient uptake	m^2	NUA	*Maximum value from NUA_N and NUA_P*	

KEY			
	User input		Calculated value

Notes

1. Data only should be considered where NATA accredited laboratory results can be supplied to support the nutrient (effluent) quality peformance of a specific treatment system.

2. Patterson (2001)

3. Hazelton & Murphy (2016)

4. WaterNSW (2023a)

5. Geary and Gardener (1996)

Model Parameter	Units	Symbol	Source	Value
Design Wastewater Load	L/day	Q	Wastewater generation	1080
Total nitrogen in effluent	mg/L	TN	Table 5-2 of the Guideline or site-specifc effluent quality data[1]	13
Total phosphorus in effluent	mg/L	TP	Table 5-2 of the Guideline or site-specific effluent quality data[1]	6
Design life of system	years	L	Reasonable service life of 50 years	50
P-sorption soil capacity	mg/kg	P_{sorp}	Site-specific/ soil landscape-specific laboratory data or Table 4-7 of the Guideline	44
P-sorption soil capacity field coefficient	%	$P_{sorp}C$	Capacity of a soil to sorb phosphorus in the field is 25-75% less than in measured lab conditions[2]	0.5
Soil depth for P-sorption	m	D	Soil depth from base of EAA to limiting layer and/or depth of excavation based on SSE	1
Bulk density of soil	g/cm^3	B	1.8 (sandy loam), 1.7 (fine sandy loam), 1.6 (loams and clay loams), 1.4 (clays)[3]	1.8
Nitrogen plant uptake	kg/m^2/year	NPU	90 (good quality woodland), 65 (poor quality woodland), 240 (managed lawn), 120 (unmanaged lawn), 280 (improved pasture), 99 (perennial pasture), 150 (managed shrubs and some trees), 75 (unmanaged shrubs and some trees)[4]	240
Phosphorus plant uptake	kg/m^2/year	PPU	25 (good quality woodland), 20 (poor quality woodland), 30 (managed lawn), 12 (unmanaged lawn), 24 (improved pasture), 11 (perennial pasture), 16 (managed shrubs and some trees), 8 (unmanaged shrubs and some trees)[4]	30
Model Inputs				
Appiled total nitrogen	kg/year	TN_A	*(Q x TN x 365) ÷ 1,000,000*	5.1
Applied total phosphorus	kg/year	TP_A	*(Q x TP x 365) ÷ 1,000,000*	2.4
Model Outputs				
Subsoil nitrogen cycle losses[5]	kg/year	NL	*TN_A x 20%*	1.0
Phosphorus sorption by soil	kg/m^2	PS	*[(P_{sorp} ÷ 1,000,000) x (B x 1,000)] x D x $P_{sorp}C$*	0.0
Phosphorus plant uptake over design life	kg/m^2	PPU_L	*(PPU ÷ 10,000) x L*	0.2
Model Results				
Minimum area required for nitrogen uptake	m^2	NUA_N	*[(TN_A-NL) ÷ NPU] x 10,000*	170.8
Minimum area required for phosphorus uptake	m^2	NUA_P	*(TP_A x L) ÷ (PS+PPU_L)*	623.7
Minimum area for nutrient uptake	m^2	NUA	*Maximum value from NUA_N and NUA_P*	**623.7**

KEY

	User input		Calculated value

Ozzi Kleen RP10A+ AWTS (STS-AWTS061) 82% reduction

Ozzi Kleen RP10A+ AWTS (STS-AWTS061) 48% reduction

Taylex Poly PABSNR-2000 Advanced AWTS (STS-AWTS070) N=32 54.7%

Taylex Poly PABSNR-2000 Advanced AWTS (STS-AWTS070) P = 9 (24.4%

935m2 for P

A P reduction tertiary process is required to reduce P

Notes

1. Data only should be considered where NATA accredited laboratory results can be supplied to support the nutrient (effluent) quality peformance of a specific treatment system.

2. Patterson (2001)

3. Hazelton & Murphy (2016)

4. WaterNSW (2023a)

5. Geary and Gardener (1996)