C BLANK WORKSHEETS

The table below lists which worksheets are used for sprinkler systems and which ones are for trickle systems. The blank versions of these worksheets are provided in this appendix.

Worksheet	Sprinkler	Trickle	Example
1(a) Information from Farm Plan – **Sprinkler**	✓		Page 16
1(b) Information from Farm Plan – **Trickle**		✓	Page 19
2(a) Irrigation System Audit – **Sprinkler**	✓		Page 22
2(b) Irrigation System Audit – **Trickle**		✓	Page 22
3(a) Total Irrigated Area Using System Information	✓		Page 26
3(b) Total Irrigated Area Using Field Dimension	✓	✓	Page 27
4(a) Irrigation System Peak Flow Rate Check – **Sprinkler**	✓		Page 31
4(b) Irrigation System Peak Flow Rate Check – **Trickle**		✓	Page 32
5(a) Annual Water Use Check – **Sprinkler**	✓		Page 39
5(b) Annual Water Use Check – **Trickle**		✓	Page 41
6 Water Diversion and Conveyance Loss Checks	✓	✓	Page 47
7 Intake Screen Area Check	✓	✓	Page 52
8 Irrigation Water Quality Check	✓	✓	Page 56
9 Irrigation System Uniformity Check	✓	✓	Page 60
10 Sprinkler Irrigation Scheduling Using Water Budget Method	✓		Page 73
11 Trickle Irrigation Scheduling Using Plant Water Requirement Method		✓	Page 75
12 Trickle Irrigation Scheduling Using Water Budget Method		✓	Page 76

Worksheet 1(a) Information from Farm Plan – *SPRINKLER*

INFORMATION	Value and Box No.	Unit	Source
Worksheet 3(a) Total Irrigated Area Using System Information			
Irrigation interval per pass	1	days/pass	Farm info
Irrigation sets per day	2	sets	Farm info
Sprinkler spacing	3	ft	Farm info
Number of sprinklers	4	sprinklers	Farm info
Distance moved per set	5	ft	Farm info
Worksheet 3(b) Total Irrigated Area Using Field Dimension			
Field width	1	ft	Farm info
Field length	2	ft	Farm info
Worksheet 4(a) Irrigation System Peak Flow Rate Check			
Calculated Irrigation System Peak Flow Rate			
Peak flow rate on water licence or provided by irrigation district or water purveyor	2	US gpm	Water licence or purveyor
Peak evapotranspiration (ET) in [ ]	–	in/d	Table 2.1
Estimated peak flow rate requirement per acre	3	US gpm/acre	Table 2.2 or 2.3
Actual Irrigation System Flow Rate			
Flow rate metered or provided by district	5	US gpm	Meter or district
Pump Specifications:			
Model number	–		Field check
Impellor size	–	in Dia.	Pump name plate
Revolution per minute (rpm)	–	rpm	
Flow rate	6	US gpm	Pump curve
Nozzle Specifications:			
Size	–	in x in	Field check
Operating pressure	–	psi	Field check
Flow rate	7	US gpm	Farm plan
Number of nozzles	8	nozzles	Farm plan
Worksheet 5(a) Annual Water Use Check			
Calculated Annual Water Use Requirement			
Annual water withdrawal stated on water licence	2	ac-ft	Water licence
Estimated annual crop water requirement	3	in	Table 2.4
Application efficiency of irrigation system	4	%	Table 3.2
Meter Information			
Meter reading at start of year	6	US gal	Water purveyor
Meter reading at end of year	7	US gal	

Pump Specifications

Pump horsepower	9	hp	Pump name plate
Energy consumption for entire year	10	KWh	Hydro bill

Refer to Worksheet 4(a) for the rest of the information regarding pump

Irrigation Specifications

Irrigation interval	16	days	Farm plan
Number of irrigations per year	17		Farm plan

Worksheet 6 Water Diversion and Conveyance Loss Checks

Conveyance channel flow rate at/near diversion	1	US gpm	Site
Overflow in channel	2	US gpm	Site
Number of operating days per season	3	days	Site
Amount of water licensed	4	ac-ft	Water licence
Conveyance channel flow rate at/near intake	5	US gpm	Site

Worksheet 7 Intake Screen Area Check

Screen mesh size	2	mesh	Site
Percent open area of mesh size	3	%	Table 3.4

For flat screen,

Number of screened surfaces	5	ft	Site
Length of screen	6	ft	Site
Width of screen	7	ft	Site

For cylindrical screen,

Diameter of screen	9	ft	Site
Length of screen	10	ft	Site

Worksheet 8 Irrigation Water Quality Check

Sodium adsorption ratio (SAR)	1		Laboratory
Electrical conductivity (EC) of water	3	dS/m	Table 3.5
E. coli count	5	cfu/100 ml	Laboratory
Fecal coliform count	6	cfu/100 ml	Laboratory

Worksheet 1(b) Information from Farm Plan – *TRICKLE*

INFORMATION	Value and Box No.	Unit	Source
Worksheet 3(b) Total Irrigated Area			
Field width	1	ft	Farm info.
Field length	2	ft	Farm info.
Worksheet 4(b) Irrigation System Peak Flow Rate Check			
Calculated Irrigation System Peak Flow Rate			
Peak flow rate on water licence or provided by irrigation district or water purveyor	2	US gpm	Water licence or purveyor
Peak evapotranspiration (ET) in [ ]	–	in/d	Table 2.1
Estimated peak flow rate requirement per acre	3	US gpm/acre	Table 2.2 or 2.3
Actual Irrigation System Flow Rate			
Flow rate metered or provided by district	5	US gpm	Meter or district
Pump Specifications:			
Model number	–		Field check
Impellor size	–		Pump name plate
Revolution per minute (rpm)	–	rpm	
Flow rate	6	US gpm	Pump curve
Emitter Specifications:			
Size	–	in I.D.	Field check
Operating pressure	–	psi	Field check
Flow rate (zone 4)	7	gph	Farm plan
Number of emitters (zone 4)	8	emitters	Farm plan
Worksheet 5(b) Annual Water Use Check			
Calculated Annual Water Use Requirement			
Water withdrawal amount on water licence	2	ac-ft	Water licence
Estimated annual crop water requirement	3	in	Table 2.4
Crop adjustment factor	4		Table 3.3
Application efficiency of irrigation system	5	%	Table 3.2
Meter Information			
Meter reading at start of year	6	US gal	Water purveyor
Meter reading at end of year	7	US gal	
Pump Specifications			
Pump horsepower	10	hp	Pump name plate
Energy consumption for entire year	11	KWh	Hydro bill
Refer to Worksheet 4(b) for the rest of the information regarding pump			

Irrigation Specifications (based on emitter specifications)

Number of zones		17	zones	Farm plan
Operating hours per zone per day		18	hr/zone/d	Farm plan
Number of operating days per year		19	days	Farm plan

Worksheet 6 Water Diversion and Conveyance Loss Checks

Conveyance channel flow rate at/near diversion		1	US gpm	Site
Overflow in channel		2	US gpm	Site
Number of operating days per season		3	days	Site
Amount of water licensed		4	ac-ft	Water licence
Conveyance channel flow rate at/near intake		5	US gpm	Site

Worksheet 7 Intake Screen Area Check

Screen mesh size		2	mesh	Site
Percent open area of mesh size		3	%	Table 3.4

For flat screen,

Number of screened surfaces		5	ft	Site
Length of screen		6	ft	Site
Width of screen		7	ft	Site

For cylindrical screen,

Diameter of screen		9	ft	Site
Length of screen		10	ft	Site

Worksheet 8 Irrigation Water Quality Check

Adjusted sodium adsorption ratio (SAR_{adj})		2		Laboratory
Electrical conductivity (EC) of water		3	dS/m	Table 3.5
E. coli count		5	cfu/100 ml	Laboratory
Fecal coliform count		6	cfu/100 ml	Laboratory

Worksheet 2(a) Irrigation System Audit – *SPRINKLER*

Checklist:

	Yes	No
1. Are all sprinklers of the same model?	☐	☐
2. Are all nozzles of the same size?	☐	☐
3. Are all sprinkler and lateral spacing uniform (50 – 60% wetted diameter)?	☐	☐
4. Is the operating pressure in the best range?	☐	☐
5. Is pressure differential minimal?	☐	☐

Answer:

Do the system conditions meet all the minimum standards?

☐ **Yes** - OK

☐ **No** - See action items.

Worksheet 2(b) Irrigation System Audit – *TRICKLE*

Checklist:

	Yes	No
For each zone,		
1. Are all emitters of the same model throughout the zone?	☐	☐
2. Are all emitters of the same size throughout the zone?	☐	☐
3. Are all emitter spacing uniform throughout the zone?	☐	☐
4. Is pressure differential minimal?	☐	☐
5. Is the same crop or same plant size grown in the zone?	☐	☐
6. Is the soil type uniform throughout the zone?	☐	☐

Answer:

Do the system conditions meet all the minimum standards?

☐ **Yes** - OK

☐ **No** - See action items.

Worksheet 3(a) Total Irrigated Area Using System Information

Information:

Irrigation interval per pass	1	days/pass
Irrigation sets per day	2	sets
Sprinkler spacing	3	ft
Number of sprinklers	4	sprinklers
Distance moved per set	5	ft

Calculation:

Step 1. Calculate the number of sets per pass

No. of Sets per Pass = Irrigation Interval per pass x Irrigation Sets per Day

= 1 days x 2

= 6 sets

Step 2. Calculate the field width

Field Width = Sprinkler Spacing x No. of Sprinklers

= 3 ft x 6

= 7 ft

Step 3. Calculate the field length

Field Length = Distance Moved per Set x No. of Sets

= 5 ft x 6

= 8 ft

Step 4. Determine the field area

Equation 3.1(a)

$$\text{Total Irrigated Area} = \frac{\text{Field Width x Field Length}}{43{,}560}$$

$$= \frac{7 \text{ ft} \times 8 \text{ ft}}{43{,}560}$$

= 9 acres

Repeat the same step for irregular shaped field.

Answer:

Total Irrigated Area = Sum of All Field Areas

= (9 + 9 + 9) acres

= 10 acres

Worksheet 3(b) Total Irrigated Area Using Field Dimension

(can be used for both sprinkler and trickle systems)

Information:

Field width [1] ft
Field length [2] ft

Calculation:

Determine the field area

Equation 3.1(a)

$$\text{Total Irrigated Area} = \frac{\text{Field Width x Field Length}}{43{,}560}$$

$$= \frac{[\ 1\ ]\ \text{ft} \times [\ 2\ ]\ \text{ft}}{43{,}560}$$

$$= [\ 3\ ]\ \text{acres}$$

Repeat the same step for irregular shaped field

Answer:

Total Irrigated Area = Sum of All Field Areas

= ([3] + [3] + [3]) acres

= [4] acres

Worksheet 4(a) System Peak Flow Rate Check - *SPRINKLER*

Information:

Irrigated area (Box 10 of Worksheet 3(a))	1	acres
EITHER peak flow rate on water licence (if stated)	2	US gpm
OR peak flow rate requirement per acre (Table 2.3)	3	US gpm/acre

Calculation:

Step 1. Determine calculated peak flow rate.

Equation 3.2

Calculated Peak Flow Rate = **Estimated Peak Flow Rate Requirement per Acre** x **Irrigated Area**

= 3 US gpm/acre x 1 acres

= 4 US gpm

Step 2. Determine actual irrigation system flow rate using one or more of the following methods:

Method 1. Water purveyor restriction or measured flow rate using a meter

Flow rate measured using a meter or provided by district 5 US gpm

Method 2. Pump peak flow rate

Irrigation pump peak flow from pump curve 6 US gpm

Method 3. Determine flow rate using sprinkler nozzles

Nozzle flow rate from supplier's tables 7 US gpm

No. of nozzles 8 nozzles

Equation 3.3

Sprinkler System Output Flow Rate = **Nozzle Flow Rate** x **No. of Nozzles**

= 7 US gpm x 8 nozzles

= 9 US gpm

Note: *Either one of the two values (850 US gpm pump flow rate or 856 US gpm sprinkler flow rate) can be used. In this case, the higher one is used.*

Answer:

Step 3. Calculate percent difference of peak flow rate.

Equation 3.5

$$\text{Percent Difference} = \frac{\text{Irrigation System Flow Rate}}{\text{Calculated Peak Flow Rate}} \times 100\%$$

$$= \frac{\text{Maximum of 5, 6 or 9 US gpm}}{\text{2 or 4 US gpm}} \times 100\%$$

= 10 %

Is 10 % less than or equal to 100%

Yes Flow rate is not exceeded

No Refer to action items

Worksheet 4(b) System Peak Flow Rate Check - *TRICKLE*

Information:

Irrigated area (Box 10 of Worksheet 3(b))	1	acres
EITHER peak flow rate on water licence (if stated)	2	US gpm
OR peak flow rate requirement per acre (Table 2.3)	3	US gpm/acre

Calculation:

Step 1. Determine calculated peak flow rate.

Equation 3.2

Calculated Peak Flow Rate = **Estimated Peak Flow Rate Requirement per Acre** x **Irrigated Area**

= 3 US gpm/acre x 1 acres

= 4 US gpm

Step 2. Determine actual irrigation system flow rate using one or more of the following methods:

Method 1. Water purveyor restriction or measured flow rate using a meter

Flow rate measured using a meter or provided by district 5 US gpm

Method 2. Pump peak flow rate

Irrigation pump peak flow from pump curve 6 US gpm

Method 3. Determine flow rate using trickle emitters

Emitter flow rate from supplier's tables 7 gph

Number of emitters operating at one time 8 emitters

Equation 3.4

Trickle System Output Flow Rate = **Emitter Flow Rate** x **No. of Emitters** x **0.0167**

= 7 gph x 8 emitters x 0.0167

= 9 US gpm

Answer:

Step 3. Calculate percent difference of peak flow rate.

Equation 3.5

$$\text{Percent Difference} = \frac{\text{Irrigation System Flow Rate}}{\text{Calculated Peak Flow Rate}} \times 100\%$$

$$= \frac{\text{Maximum of 5, 6 or 9 US gpm}}{\text{2 or 4 US gpm}} \times 100\%$$

= 10 %

Is 10 % less than or equal to 100%

Yes Flow rate is not exceeded

No Refer to action items

Worksheet 5(a) Annual Water Use Check - *SPRINKLER*

Information:

Irrigated area (Box 10 of Worksheet 3)	1	acres
Water withdrawal amount on water licence (if applicable)	2	ac-ft
Estimated annual crop water requirement from Table 2.4	3	in
Application efficiency from Table 3.2	4	%

Calculation:

Step 1. Determine calculated annual water requirement.

Equation 3.6

$$\text{Calculated Annual Water Requirement} = \frac{\text{Estimated Annual Crop Water Requirement}}{\text{Application Efficiency}} \times 100\%$$

$$= \frac{3 \text{ in}}{4 \%} \times 100\%$$

$$= 5 \text{ in}$$

Step 2. Determine actual annual water use using one or more of the following methods:

Method 1. Metered water use

Meter reading at start of year	6	US gal
Meter reading at end of year	7	US gal

Equation 3.8

$$\text{Annual Water Use} = \frac{\text{Meter Reading at End of Year} - \text{Meter Reading at Start of Year}}{27027 \times \text{Irrigated Area}}$$

$$= \frac{7 \text{ US gal} - 6 \text{ US gal}}{27027 \times 1 \text{ acres}}$$

$$= 8 \text{ in}$$

Method 2. Pump water use

Pump horsepower from supplier's table	9	hp
Energy consumption for entire year from hydro bill	10	KWh
Pump flow rate from pump curve	11	US gpm

Equation 3.9(a)

$$\text{Pump Power} = \text{Pump Horsepower} \times 0.746 \text{ KW/hp}$$

$$= 9 \text{ hp} \times 0.746 \text{ KW/hp}$$

$$= 12 \text{ KW}$$

Equation 3.9(b)

$$\text{Pump Operating Hours} = \frac{\text{KWh for Entire Year}}{\text{Pump Power}}$$

$$= \frac{10 \text{ KWh}}{12 \text{ KW}}$$

$$= 13 \text{ hr}$$

Equation 3.9(c)

Annual Water Use = **Pump Operating Hours x Pump Flow Rate x 0.0022 / Irrigated Area**

= (13 hr x 11 US gpm x 0.0022) / 1 acres

= 14 in

Method 3. Sprinkler system annual water use

Sprinkler system output flow rate from Box 5, 6 or 9 of Worksheet 4(a): 15 US gpm

Irrigation interval: 16 days

Number of irrigations per year: 17

Equation 3.10

Annual Water Use = **System Flow Rate x Irrigation Interval x No. of Irrigations x 0.053 / Irrigated Area**

= (15 US gpm x 16 days x 17 x 0.053) / 1 acres

= 18 in

Answer:

If there is a water licence, go to Step 3(a), and do Step 3(b) to double-check.
If groundwater is used or water is supplied by a purveyor (no water licence), follow Step 3(b) only.

Step 3(a). Calculate the annual water use and compare it with the water licence withdrawal.

Equation 3.12

Annual Water Use [ac-ft] = **Annual Water Use [in] x Irrigated Area [acres] / 12 [in/ft]**

= (8, 14 or 18 in x 1 acres) / 12 in/ft

= 19 ac-ft

Is 19 ac-ft less than 2 ac-ft?

Yes — Water withdrawal not exceeded

No — Refer to Section 3.5

Step 3(b). Calculate percent difference of annual water use. Use the metered water use if available because it is the most accurate method.

Equation 3.5

Percent Difference = **Actual Annual Water Use / Calculated Annual Water Requirement** **x 100%**

= (8,14 or 18 in / 5 in) x 100%

= 10 %

Is 10 % less than 110%

Yes — annual water use not exceeded by more than 10%

No — Refer to action items

Worksheet 5(b) Annual Water Use Check - *TRICKLE*

Information:

Irrigated area (Box 10 of Worksheet 3(b))	1	acres
Water withdrawal amount on water licence (if applicable)	2	ac-ft
Estimated annual crop water requirement from Table 2.4	3	in
Crop adjustment factor from Table 3.3	4	
Application efficiency from Table 3.2	5	%

Calculation:

Step 1. Determine calculated annual water requirement.

Equation 3.7

Calculated Annual Water Requirement = (Estimated Annual Crop Water Requirement x Crop Adjustment Factor) / Application Efficiency x 100%

= (3 in x 4) / 5 % x 100%

= 6 in

Step 2. Determine actual annual water use using one or more of the following methods:

Method 1. Metered water use

Meter reading at start of year	7	US gal
Meter reading at end of year	8	US gal

Equation 3.8

Annual Water Use = Meter Reading at End of Year – Meter Reading at Start of Year / 27027 x Irrigated Area

= (8 US gal – 7 US gal) / 27027 x 1 acres

= 9 in

Method 2. Pump water use

Pump horsepower from supplier's table	10	hp
Energy consumption for entire year from hydro bill	11	KWh
Pump flow rate from pump curve	12	US gpm

Equation 3.9(a)

Pump Power = Pump Horsepower x 0.746 KW/hp

= 10 hp x 0.746 KW/hp

= 13 KW

Equation 3.9(b)

Pump Operating Hours = KWh for Entire Year / Pump Power

= 11 KWh / 13 KW

= 14 hr

Equation 3.9(c)

Annual Water Use = **Pump Operating Hours x Pump Flow Rate x 0.0022 / Irrigated Area**

= (14 hr x 12 US gpm x 0.0022) / 1 acres

= 15 in

Method 3. Sprinkler system annual water use

Trickle system output flow rate from Box 5, 6 or 9 of Worksheet 4(b)	16	US gpm
Number of zones	17	zones
Operating hours per zone per day	18	hr/zone/d
Number of operating days per year	19	d

Equation 3.11(a)

Annual Water Use = **Zone Flow Rate x No. of Zones x Operating Hours x No. of Days x 0.0022 / Irrigated Area**

= (16 US gpm x 17 zones x 18 hr/zone/d x 19 d x 0.0022) / 1 acres

= 20 in

Answer:

If there is a water licence, go to Step 3(a), and do Step 3(b) to double-check.
If groundwater is used or water is supplied by a purveyor (no water licence), follow Step 3(b) only.

Step 3(a). Calculate the annual water use and compare it with the water licence withdrawal.

Equation 3.12

Annual Water Use [ac-ft] = **Annual Water Use [in] x Irrigated Area [acres] / 12 [in/ft]**

= (9, 15 or 20 in x 1 acres) / 12 in/ft

= 19 ac-ft

Is 19 ac-ft less than 2 ac-ft?

- Yes — Water withdrawal not exceeded
- No — Refer to Section 3.5

Step 3(b). Calculate percent difference of annual water use. Use the metered water use if available because it is the most accurate method.

Equation 3.5

$$\text{Percent Difference} = \frac{\text{Actual Annual Water Use}}{\text{Calculated Annual Water Requirement}} \times 100\%$$

$$= \frac{9,\ 15 \text{ or } 20 \text{ in}}{6 \text{ in}} \times 100\%$$

$$= 21\ \%$$

Is 21 % less than 110% — Yes — annual water use not exceeded by more than 10%

No — Refer to action items

Worksheet 6 Water Diversion and Conveyance Loss Check

(can be used for both sprinkler and trickle systems)

Question: A farmer in Williams Lake has a water licence which allows a water withdrawal of 300 acre-feet from a stream. A diversion channel of 2 km delivers water from the creek to the irrigation system intake. The channel flow rate at the diversion is 1,000 US gpm, and near the intake is 820 US gpm. The overflow channel flow rate is 50 US gpm. The irrigation system operates for 80 days per season. Is the amount of water diverted within the licensed water amount? Are the conveyance losses acceptable?

Information:

Conveyance channel flow rate at point of stream diversion	1	US gpm
Overflow in channel	2	US gpm
Number of operating days per season	3	days
Amount of water licensed	4	ac-ft
Conveyance channel flow rate near intake	5	US gpm

Water Diversion Check

Calculation:

Step 1. Determine Annual Water Diverted.

Equation 3.12

$$\text{Annual Water Diverted} = \frac{\text{(Channel Flow Rate – Overflow) x No. of Operating Days}}{226.3}$$

$$= \frac{(\ [1]\ -\ [2]\ )\ \text{US gpm x}\ [3]\ \text{days}}{226.3}$$

$$= [6]\ \text{ac-ft}$$

Answer:

Step 2. Water Diversion Check

Is [6] ac-ft less than [1] ac-ft?

- [Yes] - OK
- [No] - The licensed amount of water is exceeded.
  - Reduce conveyance losses

Conveyance Loss Check

Calculation:

Step 3. Calculate conveyance losses

Equation 3.14(a)

$$\text{Reduction in Channel Flow Rate} = \text{Flow Rate at Diversion} - \text{Flow Rate at Irrigation}$$

$$= [1]\ \text{US gpm} - [5]\ \text{US gpm}$$

$$= [7]\ \text{US gpm}$$

Equation 3.14(b)

$$\text{Conveyance Losses} = \frac{\text{Reduction in Channel Flow Rate x No. of Operating Days}}{226.3}$$

$$= \frac{[7]\ \text{US gpm x}\ [3]\ \text{days}}{226.3}$$

$$= [8]\ \text{ac-ft}$$

Answer:

Step 4. Assess Conveyance Losses

Recommended Maximum Conveyance Losses = **Water Licensed Amount x 25%**

= 1 ac-ft x 25%

= 9 ac-ft

Is 8 ac-ft equal to or less than 9 ac-ft?

Yes - OK

No - see action items.

Worksheet 7 Intake Screen Area Check

(can be used for both sprinkler and trickle systems)

Information:

Irrigation system flow rate from Worksheet 4(a) or 4(b)	1	US gpm
Screen mesh size used	2	mesh
Percent screen open area of mesh size from Table 3.4	3	%
Number of screened surface (for flat screens only)	4	
Screen length (for both flat and cylindrical screens)	5	ft
Screen width (for flat screens only)	6	ft
Screen breadth (for flat screens only if end area is screened)	7	ft
Screen diameter (for cylindrical screens only)	8	ft

Calculation:

Step 1. Calculate required screen surface area.

Equation 3.15

Suggested Screen Surface Area = **Flow Rate** / **0.448 x % Open Area**

= [1] US gpm / 0.448 x [3] %

= [9] ft^2

Step 2. Calculate actual screen area.

Equation 3.16(a) Flat Screen

Total Flat Surface Area = **No. of Flat Screened Surface x Length x Width (+ end area if screened)**

= [4] x [5] ft x [6] ft

(+ [6] ft x [7] ft)

= [10] ft^2

Note: *End area is not screened.*

Equation 3.16(b) Cylindrical Screen

Total Cylindrical Surface Area = **3.14 x Diameter x Length (+ end area if screened)**

= 3.14 x Diameter x Length + [$\frac{3.14 \times (\text{Diameter})^2}{4}$]

= 3.14 x [8] ft x [5] ft + [$\frac{3.14 \times (\text{[8] ft})^2}{4}$]

= [11] ft^2

Answer:

Step 3. Is [9] ft^2 less than [10 or 11] ft^2?

[Yes] - OK

[No] - Screen area is too small. Refer to action items.

Worksheet 8 Irrigation Water Quality Check

(can be used for both sprinkler and trickle systems)

Calculation:

Step 1. SAR or SAR_{adj} Check

SAR for sprinkler systems	1	
SAR_{adj} for trickle systems	2	
Electrical conductivity (EC) (Table 3.5)	3	dS/m
Restriction on water use from Table 3.5 or 3.6	4	

If the answer in Box 4 is slight to moderate or severe, water use from this source may need to be restricted.

Step 2. Pathogen Check

E.Coli	5	cfu/100 ml
Fecal coliform	6	cfu/100 ml

Answer: Use Table 3.5 to determine if the values are within acceptable parameters.

Worksheet 9 Irrigation System Uniformity Check

(can be used for both sprinkler and trickle systems)

Information/ Calculation:

Total number of catch cans [1]

Number of cans in the lowest 25% = [1] x 25%

= [2]

Water Depth [mm]	Ranking	Lowest Quartile [mm]
Total [3]		[4]

LQ = [4] mm / [2]

= [5] mm

Average Catch Overall = [3] mm / [1]

= [6] mm

Equation 3.17

DU = **LQ x 100 / Average Catch Overall**

= [5] mm x 100 / [6] mm

= [7] %

Answer:

Is [7] % more than or equal to 80% (for sprinkler systems) or 90% (for trickle systems)

[Yes] Ok.

[No] See action items.

Worksheet 10 Sprinkler Irrigation Scheduling Using Water Budget Method

Information:

Maximum soil water storage (SWS) capacity		mm
Maximum soil water deficit (MSWD)		mm
Crop coefficient (K_c)		

Analysis:

Nomenclature:

PSWS	=	Previous Soil Water Storage
EP	=	Effective Precipitation
IRR	=	Net Depth of Irrigation Water Applied
ET_o	=	Reference Evapotranspiration
K_c	=	Crop Coefficient
CSWS	=	Current Soil Water Storage

All units are in millimetres (mm) except for Date and K_c.

Date	PSWS	+	EP	+	IRR	–	ET_o	x	K_c	=	CSWS
		+		+		–		x		=	
		+		+		–		x		=	
		+		+		–		x		=	
		+		+		–		x		=	
		+		+		–		x		=	
		+		+		–		x		=	
		+		+		–		x		=	
		+		+		–		x		=	
		+		+		–		x		=	
		+		+		–		x		=	
		+		+		–		x		=	

[1] Even though the total water storage would be 113 mm, the maximum soil water storage can only be 110 mm. The rest of the water is therefore assumed to be lost due to deep percolation and/or runoff.

[2] The maximum depletion of 55 mm is reached, so irrigation should start.

Worksheet 11 Trickle Irrigation Scheduling Using *Plant Water Requirement Method*

Information:

Maximum zone operating time		1	hr/day
Peak ET		2	mm

Analysis:

Date	Daily ET_o [mm]	x	K_c	=	ET_c [mm]		Operating Time [hr/day]	
		x		=		3		4
		x		=		3		4
		x		=		3		4
		x		=		3		4
		x		=		3		4
		x		=		3		4
		x		=		3		4
Weekly Total								
Average								

Sample Calculations (July 20):

Equation 4.4

$$\text{Zone Operating Time} = \text{Maximum Zone Operating Time} \times \frac{ET_c}{\text{Peak ET}}$$

$$= \underset{1}{\square}\ \text{hr/day} \times \frac{\underset{3}{\square}\ \text{mm}}{\underset{2}{\square}\ \text{mm}}$$

$$= \underset{4}{\square}\ \text{hr/day}$$

Answer:

Worksheet 12 Trickle Irrigation Scheduling Using *Water Budget Method*

Information:

Emitter spacing (S_1)	1	m
Row spacing (S_2)	2	m
Maximum soil water storage (SWS) capacity	3	mm
Emitter Flow Rate (Q)	4	L/hr
Application efficiency (AE)	5	%

Calculation:

(a) The maximum soil water deficit (MSWD) for trickle systems is 25% of the SWS; therefore,

MSWD = 3 **mm x 25%**

= 6 mm

= **Net Depth of Irrigation Water Applied (IRR)**

(b) **Irrigation should start when the balance reaches:**

= 3 mm – 6 mm

= 7 mm

(c) **Determine operating time**

Equation 4.5

$$T = \frac{S_1 \times S_2 \times IRR \times 100\%}{Q \times AE}$$

$$= \frac{1 \text{ m} \times 2 \text{ m} \times 4 \text{ mm} \times 100\%}{4 \text{ L/hr} \times 5 \%}$$

= 8 hr

(d)

Nomenclature:

PSWS	=	Previous Soil Water Storage
EP	=	Effective Precipitation
IRR	=	Net Depth of Irrigation Water Applied
ET_o	=	Reference Evapotranspiration
K_c	=	Crop Coefficient
CSWS	=	Current Soil Water Storage

All units are in millimetres (mm) except for Date and K_c.

Date	PSWS	+	EP	+	IRR	–	ET_o	x	K_c	=	CSWS
		+		+		–		x		=	
		+		+		–		x		=	
		+		+		–		x		=	
		+		+		–		x		=	
		+		+		–		x		=	
		+		+		–		x		=	
		+		+		–		x		=	
		+		+		–		x		=	
		+		+		–		x		=	
		+		+		–		x		=	
		+		+		–		x		=	
		+		+		–		x		=	