



Republic of Rwanda
Ministry of Education



RTB | RWANDA
TVET BOARD

SURFACE IRRIGATION SYSTEM MAINTENANCE

WIRSM301

Maintain surface irrigation system

Competence

RQF Level:

3

Learning Hours



Credits:

4

Sector:

Agriculture and food processing

Trade:

Water and Irrigation

Module Type:

Specific

Curriculum:

AFPWIR3002- TVET Certificate III in water and irrigation

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Issue Date: May, 2022

Purpose statement	This module describes the skills, knowledge and attitude required to apply surface irrigation maintenance. At the end of this module, learners will be able to Prepare for surface irrigation maintenance activities, carry out surface irrigation maintenance activities, and monitor the surface irrigation infrastructures. Qualified learners deemed competent to this competency may work alone or with others on routine tasks in marshland, hillside, small scale irrigation, garden, greenhouses, agricultural land, rain water harvesting, In situ rain water harvesting and ground water harvesting related activities under minimum supervision.					
Delivery modality	Training delivery		100%	Assessment		Total 100%
	Theoretical content		30%	Formative assessment	30%	50%
	Practical work:		70%		70%	
	• Group project and presentation	20%				
	• Individual project /Work	50%				
			Summative Assessment		50%	

Elements of Competency and Performance Criteria

Elements of competency	Performance criteria
1. Prepare for surface irrigation maintenance activities	1.1.Surface irrigation system is regularly inspected in accordance with site conditions
	1.2.Requirements in irrigation maintenance are appropriately established in terms of labour needs, materials and equipment.
	1.3.Maintenance frequency and schedule are accurately determined according to the scope of maintenance needs
	1.4.Maintenance budget is precisely set up in terms of required labour, materials and equipment
	1.5.Maintenance checklist for irrigation components is accurately set up

	1.6. Negative impacts of maintenance activities are conveniently reduced on the environment
	1.7 The development of reported system for maintenance activities is appropriately established
2. Carry out surface irrigation maintenance activities	2.1. Damage and blockage caused by pests and/or animals are suitably recorded according to damage type, location and the section of the system affected
	2.2. Silt, weeds and any solid wastes from irrigation canals, drains, embankments and other irrigation structures are efficiently removed.
	2.3. End of season maintenance procedures is adequately implemented in accordance with irrigation maintenance program
	2.4. Damaged or faulty pumps, valves, electrical components are methodically recorded and take action for effective repairs
	2.5 Routine maintenance procedures is completely implemented in accordance with irrigation maintenance program
3. Monitor the surface irrigation infrastructures	3.1. Surface irrigation infrastructure status is regularly inspected according to the established checklist
	3.2. Remedial action and repairs is adequately identified and undertook to restore system to full effectiveness
	3.3. The achievement of surface irrigation maintenance program is regularly assessed
	3.4. Any malfunctioning of the irrigation system is reported to the supervisor

Course content

Learning outcomes	At the end of the module the learner will be able to: <ol style="list-style-type: none"> 1. Prepare for surface irrigation maintenance activities 2. Carry out surface irrigation maintenance activities 3. Monitor the surface irrigation infrastructures
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Learning outcome 1: Prepare for surface irrigation maintenance activities	Learning hours: 15
Indicative content	
<ul style="list-style-type: none"> • Inspection of surface irrigation system ✓ Surface irrigation methods ✓ Surface irrigation structures <ul style="list-style-type: none"> ✚ Diversion structures, conveyance structure, distribution structures, management structures, field distribution structures • Establishment of irrigation maintenance requirements in terms of labor needs, materials and equipment <ul style="list-style-type: none"> ✓ Objectives of surface irrigation maintenance ✓ Surface irrigation maintenance activities ✓ Types of surface irrigation maintenance: • Determination of maintenance frequency and schedule <ul style="list-style-type: none"> ✓ Maintenance frequency ✓ Criteria for determination of maintenance activity frequency and schedule ✓ Maintenance labor need determination factors • Setting up maintenance budget in terms of required labor, materials and equipment <ul style="list-style-type: none"> ✓ Maintenance frequency ✓ Criteria for determination of maintenance activity frequency and schedule 	
Resources required for the learning outcome	
Equipment	flow meter, propeller meter
Materials	Flip chart, Markers, DVD ,Internet connection, Books, Irrigation

	scheme, Crops
Tools	hoe, shovel,
Facilitation techniques	<ul style="list-style-type: none"> • Demonstration and simulation • Individual and • group work • Practical exercise • Individualized • Trainer guided • Group discussion
Formative assessment methods	<ul style="list-style-type: none"> • Written assessment • Oral presentation • Performance assessment • Project based assessment

Learning outcome 2: Carry out surface irrigation maintenance activities		Learning hours: 15
Indicative content		
<ul style="list-style-type: none"> • Recording the damage and blockage caused by pests and/or animals <ul style="list-style-type: none"> ✓ Types of damages caused by pests and/or animals • Removal of silt, weeds and any solid wastes from irrigation canals, drains, embankments and other irrigation structures <ul style="list-style-type: none"> ✓ Disilting /dregging technique and weeding technique • Implementation of off season maintenance procedures 		
Resources required for the indicative content		
Equipment	wheel barrow	
Materials	Flip chart,Markers, DVD , Internet connection, Books, Irrigation scheme, Crops	
Tools	hoe,tape measure	
Facilitation techniques	<ul style="list-style-type: none"> • Demonstration and simulation • Individual and group work • Practical exercise • Individualized • Trainer guided 	

	<ul style="list-style-type: none"> • Group discussion
Formative assessment methods	<ul style="list-style-type: none"> • Written assessment • Oral presentation • Performance assessment • Project based assessment

Learning outcome 3: Monitoring surface irrigation infrastructures		Learning hours: 10
Indicative content		
<ul style="list-style-type: none"> • Inspection of surface irrigation infrastructure status ✓ Shapes of surface irrigation infrastructure ✓ Dimension of irrigation infrastructure <ul style="list-style-type: none"> • Identification and undertake remedial action and repairs to restore system to full effectiveness ✓ Remedial action and repair of surface irrigation infrastructure <ul style="list-style-type: none"> • Assessment of surface irrigation maintenance achievement program ✓ Remedial action and repair of surface irrigation infrastructure <ul style="list-style-type: none"> • Reporting any malfunctioning of the irrigation system to the supervisor ✓ Report template filling instructions according to the supervisor 		
Resources required for the indicative content		
Equipment	Propeller meter,	
Materials	Flip chart, Markers, DVD , Internet connection, Books, Irrigation scheme, Crops	
Tools	hoe, shovel	
Facilitation techniques	<ul style="list-style-type: none"> • Demonstration and simulation • Individual and • Group work • Practical exercise • Individualized • Trainer guided • Group discussion 	

Formative assessment methods	<ul style="list-style-type: none"> • Written assessment • Oral presentation • Performance assessment • Project based assessment
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Integrated/Summative assessment

Integrated situation

CAPRORE –INTAMBWE is a model cooperative in GATSIBO District, REMERA Sector, BUGARAMA Cell, and Village. It grows maize under 123 Hectares in KANYONYOMBA II marshland.

The cooperative production is often 4.5 Tons per Hectare; however, it has reduced to 3 Tons per hectare due to the poor maintenance of irrigation canals. This has consequently affected the quantity to be supplied to the client.

Currently, the cooperative is no longer getting solution to the maintenance of irrigation canals; yet, it would like to recruit a technician to assist in maintenance activities of the marshland. The task should meet the following specification.

The task should meet the following specification

- Prepare for surface irrigation maintenance activities
- Carry out surface irrigation **maintenance activities**
- Monitoring of surface irrigation infrastructures

Task must be completed within 6.5 hours

Resources

Tools	shovel, hoes, machete
Equipment	wheelbarrow
Materials/ Consumables	

		boots, scheme			
Assessable outcomes	Assessment criteria (Based on performance criteria)	Indicator	Observation		Marks allocation
			Yes	No	
1. Learning outcome 1: Prepare for surface irrigation maintenance activities (30%)	1.1 Surface irrigation system is regularly inspected in accordance with site conditions	Ind.1 Surface irrigation methods			2
		Ind.2 Surface irrigation structures used			2
		Ind.3 identify defaults in earth canals and lined canals			2
		Ind.4 required labor, materials, equipment			2
		Ind.5 Establish maintenance calendar			2
	1.2 Requirements irrigation maintenance is Suitably established in terms of labor needs, materials and equipment.	Ind.1 labor requirement,			2
		Ind.2 Materials requirement			2
		Ind.3 Equipment requirement,			2
	1.3 Maintenance frequency and schedule are accurately determined according to the scope of maintenance needs	Ind.1 Daily calendar			2
		Ind.2 Monthly calendar			2
Ind.3 Removing sediments				2	
Ind.4 Repair the banks				2	

	1.4 Maintenance budget is precisely set up in terms of required labor, materials and equipment	Ind.1 Labor budget			2
		Ind.2 Materials budget			2
		Ind.3 Equipment budget			2
Learning outcome 2: Carry out surface irrigation maintenance activities (40%)	2.1. Recording the damage and blockage caused by pests and/or animals	Ind.1 List of breakdown irrigation and drainage infrastructure			2
		Ind.2 cleaned channel			2
		Ind.3 cleaned infrastructures			3
		Ind.4 Record format			3
	2.2. Removal of silt, weeds and any solid wastes from irrigation canals, drains, embankments and other irrigation structures	Ind.1 Cleaning			3
		Ind.2 De-silting			3
		Ind.3 Vegetation removing			3
		Ind.4 Vegetation removing			3
		Ind.5 Repair side slope and banks			3
	2.3 Implementation of off season maintenance procedures	Ind.1 Water source			3
		Ind.2 Shape and size of irrigation and drainage canals			3
		Ind.3 Water in irrigation plots			3
		Ind.4 Cleanliness of tools, and equipment used			3

Learning outcome 3: Monitor the surface irrigation infrastructures (30%)	3.1.Surface irrigation infrastructure status is regularly inspected according to the established checklist	Ind.1 Discharge at the required command area			2
		Ind.2 Water flow from river into the canal			2
		Ind.3 Conveyance of water from a distribution canal into the farm/plot			2
		Ind.4 Lubrication of gates			1
	3.2. Identification and undertake remedial action and repairs to restore system to full effectiveness	Ind.1 Replacement of damaged parts			2
		Ind.2 Operational of repaired parts			2
		Ind.3 Operational of maintained			1
	3.3 The achievement of surface irrigation maintenance program is regularly assessed	Ind1: Water reaches the downstream end of plot(basin, furrow, border)			1
		Ind2: Delivery of water bills			1
		Ind3: Preparation of the daily forms for the water delivery			1
		Ind4: Erosion control			1
	3.4 Any malfunctioning of the irrigation system is reported to the	Ind1 Water source			1
		Ind2 Tapping of water used			1

	supervisor	Ind3Conveyance system			1
		Ind4Distribution network			1
		Ind5 Application System			1
		Ind6 Drainage system			1
		Ind7 Access network			1
		Ind8 Infield structures			2
		Ind9 surface irrigation is well maintained			5
Total marks					100
Percentage Weightage					100%
Minimum Passing line % (Aggregate): 70%					

References

1. FAO, 2002 surface irrigation, planning, design, operation and maintenance, Food and Agriculture Organization of the United Nations Irrigation Manual Volume I Module 1–7 Harare- Zimbabwe
2. Renner, J. (n.d.): Global irrigated area at record levels, but expansion slowing, Worldwatch Institute, November 2012 – assessment based on FAO data 2009