



Ministry of Labor and Skill

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INTRODUCTION

Ethiopia has embarked on a process of reforming its Technical and Vocational Education and Training (TVET) System. Within the policies and strategies of the Ethiopian Government, technology transformation by using current international standards and international best practices as the basis, and, adopting, adapting and verifying them in the Ethiopian context – is a pivotal element. TVET is given an important role with regard to technology transfer. The new paradigm in the outcome-based TVET system is the orientation at the current and anticipated future demand of the economy and the labor market.

The Ethiopian Occupational Standard (EOS) is the core element of the Ethiopian National TVET Strategy and an important factor within the context of the National TVET Qualification Framework (NTQF). They are national Ethiopian standards, which define the current and future occupational requirements and expected outcome related to a specific occupation using distinct Unit of Competences without taking TVET delivery into account.

The whole Package EOS document for an occupation is an integrated set of nationally endorsed core generic Unit of Competences organized in to different qualification levels built one upon the other below or side wise to make full occupational profile.

This document details the mandatory format, sequencing, wording and layout for the Ethiopia Occupational Standard which comprised of Units of Competence.

A Unit of Competence describes a distinct work activity. It is documented in a standard format that comprises:

- Occupational title and NTQF level
- Unit title
- Unit code
- Unit descriptor
- Elements and Performance criteria
- Range and Variables
- Evidence guides

Together all the parts of a Unit of Competence guide the assessor/curriculum developer in determining the candidate training and assessment.

The ensuing sections of this EOS document comprise a description of the occupation with all the key components of a Unit of Competence:

- Chart with an overview of all Units of Competence with their Unit Codes and Titles
- Detail contents of each Unit of Competence
- Occupational map providing the TVET providers with information and important requirements to consider when designing training programs using this standard and show a career path.

Occupational Standard: Irrigation and Drainage**Occupational Code: AGR IRD1***NTQF Level I*

<p><u>AGR IRD1 01 0322</u> Perform Basic Irrigation and Drainage Works</p>	<p><u>AGR IRD1 02 0322</u> Identify Basic Machinery and Equipment</p>	<p><u>AGR IRD1 03 0322</u> Identify Irrigation Water Source and basic water harvesting techniques</p>
<p><u>AGR IRD1 04 0322</u> Identify and Determine Basic Properties of Soil</p>	<p><u>AGR IRD1 05 0322</u> Carry out Nursery for Irrigation Work</p>	<p><u>AGR IRD1 06 0322</u> Observe and Report on Weather</p>
<p><u>AGR IRD1 07 0322</u> Identify and handle Basic Irrigation Design and Surveying Tools</p>	<p><u>AGR IRD1 08 0322</u> Perform Basic Measurements and Calculations</p>	<p><u>AGR IRD1 09 0322</u> Read and Prepare Technical Drawing</p>
<p><u>AGR IRD1 10 0322</u> Identify Basic Soil Water Plant Relationships</p>	<p><u>AGR IRD1 11 0322</u> Identify Irrigation Structure Works</p>	<p><u>AGR IRD1 12 0322</u> Perform manual Excavation</p>
<p><u>AGR IRD1 13 0322</u> Apply Agricultural Extension Service</p>	<p><u>AGR IRD1 14 0322</u> Implement Agribusiness Marketing</p>	<p><u>AGR IRD1 15 0322</u> Apply Basics of Human Nutrition Practices</p>
<p><u>AGR IRD1 16 0322</u> Apply 5S Procedures</p>		

NTQF Level II

<p><u>AGR IRD2 01 0322</u> Identify and Select Irrigation Methods</p>	<p><u>AGR IRD2 02 0322</u> Perform Irrigated crops and Pasture Production</p>	<p><u>AGR IRD2 03 0322</u> Apply Basics of Estimating Crop Water Requirements</p>
<p><u>AGR IRD2 04 0322</u> Operate and maintain basic Surface Irrigation System</p>	<p><u>AGR IRD2 05 0322</u> Lay Micro Irrigation Systems</p>	<p><u>AGR IRD2 06 0322</u> Operate and Maintain Irrigation Pumps</p>
<p><u>AGR IRD2 07 0322</u> Prepare Technical Drawings and Specifications</p>	<p><u>AGR IRD2 08 0322</u> Construct Irrigation and Drainage Structures</p>	<p><u>AGR IRD2 09 0322</u> Apply Basic Techniques of Water Harvesting Structures</p>
<p><u>AGR IRD2 10 0322</u> Apply Erosion and Sediment Control Activities</p>	<p><u>AGR IRD2 11 0322</u> Apply Agricultural Extension service for Rural development</p>	<p><u>AGR IRD2 12 0322</u> Prevent and Eliminate MUDA</p>

Occupational Standard: Irrigation and Drainage**Occupational Code: AGR IRD1*****NTQF Level III***

<u>AGR IRD3 01 0322</u> Determine Crop Water Requirement	<u>AGR IRD3 02 0322</u> Measure Water Flow In-pipes and Open Channels	<u>AGR IRD3 03 0322</u> Schedule Irrigation Water Deliveries
<u>AGR IRD3 04 0322</u> Measure and Apply Irrigation Water	<u>AGR IRD3 05 0322</u> Operate and manage Surface Irrigation Systems	<u>AGR IRD3 06 0322</u> Install and commission Pressurized Irrigation Svstems
<u>AGR IRD3 07 0322</u> Operate and maintain Pressurized Irrigation Svstems	<u>AGR IRD3 08 0322</u> Operate and Process Fertigation Equipment	<u>AGR IRD3 09 0322</u> Troubleshoot Irrigation and Drainage Systems
<u>AGR IRD3 10 0322</u> Carry out Irrigation Drainage Systems Development	<u>AGR IRD3 11 0322</u> Measure Irrigation and Drainage System Performance	<u>AGR IRD3 12 0322</u> Carry out Surveying and Leveling
<u>AGR IRD3 13 0322</u> Apply computer Aided Drafting tool (CAD)	<u>AGR IRD3 14 0322</u> Estimate Cost of Irrigation Work	<u>AGR IRD3 15 0322</u> Design and Construct Water Harvesting Structures
<u>AGR IRD3 16 0322</u> Apply Watershed Management Principles	<u>AGR IRD3 17 0322</u> Apply Digital Technology in Agriculture	

Occupational Standard: Small Scale Irrigation Development Level IV**Occupational Code: AGR SSI IV****NTQF IV**

<u>AGR IRD4 01 0322</u> Assess and design alternative Potential Water sources for irrigation	<u>AGR IRD4 02 0322</u> Plan and Organize Irrigation and Drainage Works	<u>AGR IRD4 03 0322</u> Supervise Irrigation and Drainage Works
<u>AGR IRD4 04 0322</u> Audit Irrigation System	<u>AGR IRD4 05 0322</u> Manage & Improve Irrigation Practices & Develop Value	<u>AGR IRD4 06 0322</u> Implement on Site Irrigation Installation Work
<u>AGR IRD4 07 0322</u> Manage Salinity of Irrigated Land	<u>AGR IRD4 08 0322</u> Apply Geographic Information System tools	<u>AGR IRD4 09 0322</u> Prepare Bill of Quantity and Specification of Irrigation Project
<u>AGR IRD4 10 0322</u> Coordinate Work Site Activities	<u>AGR IRD4 11 0322</u> Manage Construction of Irrigation Schemes	<u>AGR IRD4 12 0322</u> Rehabilitate Irrigation and Drainage Infrastructures
<u>AGR IRD4 13 0322</u> Monitor and Control Irrigation Drainage Systems	<u>AGR IRD4 14 0322</u> Monitor Hydrometric Stream Discharge Gauging	<u>AGR IRD4 15 0322</u> Monitor Environmental Policies implementation
<u>AGR IRD4 16 0322</u> Develop value chain analysis		

Level I

Occupational Standard: Irrigation and Drainage Level I	
Unit of competence	Perform Basic Irrigation and Drainage Works
Unit Code	AGR IRD1 01 0322
Unit Descriptor	This unit covers the knowledge, skills and attitude required to prepare materials, tools and equipment, undertake basic irrigation and drainage work, handle materials and equipment, clean up on completion of irrigation and drainage activities.

Elements	Performance Criteria
1. Prepare materials, tools and equipment for irrigation and drainage work	<p>1.1. The required <i>materials, tools and equipment</i> are identified according to lists provided and/or supervisor's <i>instructions</i>.</p> <p>1.2. Checks are conducted on all materials, tools and equipment with insufficient or faulty items reported to the supervisor.</p> <p>1.3. Techniques are used when loading and unloading materials demonstrate correct manual handling and minimize damage to the load and the vehicle.</p> <p>1.4. Suitable <i>Personal Protective Equipment (PPE)</i> is selected and checked prior to use.</p> <p>1.5. Irrigation and drainage support is provided according to <i>Occupational Health and Safety hazards (OHS) requirements, gender policy</i> and according to <i>workplace information</i>.</p> <p>1.6. <i>OHS hazards</i> are identified and reported to the supervisor.</p>
2. Undertake irrigation and drainage work as directed	<p>2.1. Instructions and directions provided by supervisor are followed, and clarification sought when necessary.</p> <p>2.2. Irrigation and drainage work is undertaken in a safe and environmentally appropriate manner according to the organization guidelines.</p> <p>2.3. Interactions with other staff and customers are carried out in a positive and professional manner.</p> <p>2.4. The role of gender in interaction with staff and customer is understood.</p> <p>2.5. Organization policy and procedures along with gender policy and guideline in relation to workplace practices, handling and disposal of materials is observed.</p> <p>2.6. Problems or difficulties in completing work to required standards or timelines are reported to supervisor.</p>
3. Handle materials and equipment	<p>3.1. <i>Waste material</i> and debris produced during irrigation and drainage work is stored in a designated area according to supervisor's instructions.</p> <p>3.2. Materials, equipment and machinery are handled and transported according to supervisor's instructions and</p>

	<p>organization guidelines.</p> <p>3.3 A clean and safe work site is maintained while undertaking irrigation activities.</p>
4. Clean up on completion of irrigation and drainage activities	<p>4.1. Materials are returned to store or disposed of according to supervisor's instructions.</p> <p>4.2. Tools and equipment are cleaned, maintained and stored according to manufacturer's specifications and supervisor's instructions.</p> <p>4.3. Site is <i>made good</i> according to supervisor's instructions and good environmental practices.</p> <p>4.4. Work outcomes are reported to the supervisor.</p>

Variable	Range
Materials, Tools and equipment	<p>May include but not limited to:</p> <ul style="list-style-type: none"> Leveling equipment, wheelbarrow, string lines, tape measures, marking gauges, spades, shovels, crow bars, rakes, brooms, sanding blocks and hacksaws.
Instructions	<p>May include but not limited to:</p> <ul style="list-style-type: none"> Standard Operating Procedures (SOPs) Organization policy and procedures Specifications Work notes Gender policy and guidelines Material Safety Data Sheets (MSDSs) Manufacturer's instructions Verbal directions from manager or supervisor.
Personal protective equipment	<p>May include but not limited to:</p> <ul style="list-style-type: none"> Steel capped boots/shoes, overalls, gloves, sun hat, sunscreen lotion, safety goggles, face mask and ear protectors.
OHS Hazards	<p>May include but not limited to:</p> <ul style="list-style-type: none"> solar radiation, dust, noise, air- and soil-borne micro-organisms, chemicals and hazardous substances, sharp hand tools and equipment, manual handling, holes, and slippery and uneven surfaces.
Gender policy	<p>May include but not limited to:</p> <ul style="list-style-type: none"> It is the main approach of the federation how to address, design, implement, monitor and evaluate gender issue in an enterprise or organization.
Workplace information	<p>May include but not limited to:</p> <ul style="list-style-type: none"> Procedures for disposing of waste materials aware about gender

	<ul style="list-style-type: none"> • work instructions or verbal instructions from the supervisor.
Waste materials	<p>May include but not limited to:</p> <ul style="list-style-type: none"> • Plant debris, litter and broken components, mulches, plastic, metal, and paper-based materials. These may be recycled, re-used, returned to the manufacturer, or disposed of according to organization work procedures.
made good	<p>May include but not limited to:</p> <ul style="list-style-type: none"> • Paths are swept and cleaned, work area is left in a good state, disturbed areas are repaired, all materials, debris, tools and equipment are removed from site, and other signs of disturbance or damage are corrected.

Evidence Guide	
Critical Aspects of Competence	<p>Must demonstrate skills and knowledge to:</p> <ul style="list-style-type: none"> • apply basic construction techniques • demonstrate safe work practices • perform basic repair and maintenance of irrigation and drainage components and systems • collect, analyze and organize information
The required knowledge and attitude	<p>Demonstrates knowledge of:</p> <ul style="list-style-type: none"> • safe work practices • basic gender concepts • preparing for irrigation work and cleaning up on completion • basic construction techniques • irrigation tools and equipment • maintenance practices for planted areas • basic repair and maintenance of irrigation components and systems • work values and Ethics • accountable to work • loyalty and honest to the work he/she being doing ▪ Respect and follow rules and regulations of the organization ▪ Commitment/ Dedication ▪ Free from gender biasness

The required skills	<p>Skills include the ability to:</p> <ul style="list-style-type: none"> • identify and prepare materials, tools and equipment for irrigation and drainage work • undertake irrigation and drainage work as directed • handle materials and equipment • clean up on completion of work • collect, analyze and organize information • plan and organize activities in order to complete tasks efficiently in a logical sequence and in a timely manner • communicate and co-operate with other staff in completing irrigation tasks • use mathematical ideas and techniques in counting, tallying and estimation are required when handling materials, tools and equipment • use technology in the use of irrigation and drainage tools and equipment
Resources Implication	Access is required to real or appropriately simulated situations, including work areas, materials and equipment, and to information on workplace practices and OHS practices.
Methods of Assessment	<p>Competence may be assessed through:</p> <ul style="list-style-type: none"> • Interview/Written Test • Observation/Demonstration with Oral Questioning
Context of Assessment	Competence may be assessed in the work place or in a simulated work place setting.

Occupational Standard: Irrigation and Drainage Level I	
Unit Title	Identify Basic Machinery and Equipment
Unit Code	<u>AGR IRD 02 0322</u>
Unit Descriptor	This unit covers the knowledge, skill and attitude required to identify, prepare, check, clean and store basic machinery and equipment for irrigation and drainage.

Elements	Performance Criteria
1. Identify basic machinery and equipment	<p>1.1. Suitable <i>personal protective clothing and equipment</i> is selected, used, maintained and stored in accordance with OHS requirements</p> <p>1.2. <i>Machinery and equipment</i> are identified.</p> <p>1.3. Machinery and equipment parts are identified.</p>
2. Prepare basic machinery and equipment for use	<p>2.1. Identified machinery and equipment are ready for use</p> <p>2.2. Unsafe or faulty machinery and equipment are identified and segregated for repair or replacement in line with organization requirements</p> <p>2.3. <i>OHS hazards</i> in the workplace are identified and reported to the supervisor</p>
3. Check, clean and store basic machinery and equipment	<p>3.1. Machinery and equipment use is detailed and recorded in accordance with organization requirements</p> <p>3.2. Machinery and equipment are cleaned, secured and stored to manufacturers specifications and supervisor's instructions</p> <p>3.3. Malfunctions, faults, wear or damage to machinery and equipment are identified and reported in line with organization requirements</p> <p>3.4. Workplace areas are cleaned and maintained in line with Occupational Health and Safety and organization requirements</p>

Variable	Range
personal protective clothing and equipment	<p>May include but not limited to:</p> <ul style="list-style-type: none"> • boots • hat/hard hat • overalls • gloves • protective eyewear • hearing protection • safety harness • respirator or face mask • sun protection, e.g., sun hat, sunscreen

Machinery and equipment	<p>May include but not limited to:</p> <ul style="list-style-type: none"> • Machinery such as <ul style="list-style-type: none"> ➤ air compressors ➤ generators ➤ Farm machinery • Equipment such as <ul style="list-style-type: none"> ➤ wheelbarrows ➤ spades ➤ shovels and forks ➤ water measuring device • Other material like <ul style="list-style-type: none"> ➤ Pipes, sprinkler head, tripod/riser height, dripper, siphon, flexible gated pipe, triple pump, rope and washer pump, solar pump, wind mill pump, dynamo or electric pump, bucket, tensiometer, infiltrometer, etc.
Organization requirements	<p>May include but not limited to:</p> <ul style="list-style-type: none"> • Standard Operating Procedures (SOPs) • industry standards • production schedules • Material Safety Data Sheets (MSDSs) • work notes • product labels • manufacturers specifications • operator’s manuals • Organization policies and procedures (including waste disposal, recycling and re-use guidelines) • Occupational Health and Safety procedures • supervisors oral or written instructions • work and routine maintenance plans
Occupational Health and Safety hazards	<p>May include but not limited to:</p> <ul style="list-style-type: none"> • exposure to loud noise and fumes, solar radiation, dust • ergonomic hazards associated with posture and vibration • hazardous substances (fuels, oils, fertilizer), oil and grease spills • the presence of bystanders, livestock and wildlife • uneven and varying terrain gradients, potholes, ditches, gullies, embankments, obstacles • rocks • logs • fences • debris • buildings

	<ul style="list-style-type: none"> • extreme weather conditions, electricity, overhead hazards such as: <ul style="list-style-type: none"> ➤ power lines mechanical malfunctions ➤ exposed moving parts ➤ other machinery including hydraulics
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Evidence Guide	
Critical Aspects of Competence	<p>Must demonstrate skills and knowledge to:</p> <ul style="list-style-type: none"> • Identify basic machinery and equipment • Make ready designated work • Identify basic parts of machinery and equipment • recognize and report equipment faults and workplace hazards • interpret and follow instructions • clean, secure and store equipment after use • demonstrate a safe workplace and environmentally responsible practices
The required Knowledge and Attitude	<p>Demonstrates knowledge of:</p> <ul style="list-style-type: none"> • Hazards associated with the operation of basic machinery and equipment • Identifying principles and methods for basic machinery and equipment • Procedures for cleaning, securing and storing basic machinery and equipment • Risks associated with the identification of machinery and equipment in different weather and difficult terrain conditions • Relevant regulations and Codes of Practice with regard to workplace Occupational Health and Safety requirements, and the use and control of hazardous substances • Organizational policies with regard to machinery and equipment use, recording and reporting routines • work values and Ethics • accountable to work • loyalty and honest to the work he/she being doing • Respect and follow rules and regulations of the organization • Commitment/ Dedication
The required skills	<p>Demonstrates skills to:</p> <ul style="list-style-type: none"> • use Personal protective clothing and equipment and when and how it should be used, maintained and stored • Communicate ideas and information with regard to basic machinery and equipment identification, safety procedures and their application

	<ul style="list-style-type: none"> • Collect, analyze and organize information regard to the identification of machinery and equipment, identified faults, and Occupational Health and Safety concerns may be reported for repair and organized by records • Working with others and in teams in methods and procedures to complete maintenance and job functions to achieve work plan requirements • Using basic mathematical ideas and techniques in the calculation and measurement of volumes, weights and consumption, particularly in relation to pre-operational checks • Use technology to communicate, measure and record information with regard to machinery and equipment maintenance, usage and performance
Resources Implication	Access is required to real or appropriately simulated situations, including work areas, materials and equipment, and to information on workplace practices and OHS practices.
Methods of Assessment	Competence may be assessed through: <ul style="list-style-type: none"> • Interview/Written Test • Observation/Demonstration with Oral Questioning
Context of Assessment	Competence may be assessed in the work place or in a simulated work place setting.

Occupational Standard: Irrigation and Drainage Level I	
Unit Title	Identify Irrigation Water Source and basic water harvesting techniques
Unit Code	<u>AGR IRD1 03 0322</u>
Unit Descriptor	This unit covers the knowledge, skills and attitudes required for the process of identification of potential irrigation water source and identify basic water harvesting techniques under direct supervision. It requires the ability to identify potential irrigation water sources, water harvesting techniques and the ability of catchment area identification.

Element	Performance criteria
1. Identify potential Irrigation Water sources	1.1 Potential areas are identified using standard technique 1.2 Water contributors are identified using standard technique 1.3 Potential water ways are identified 1.4 Soil moisture status & level of ground water are checked using standard technique 1.5 Appropriate practices to identify ground water area and recharge underground water table are checked. 1.6 Appropriate type and species of trees for afforestation purpose of degraded land are identified to improve soil intake characteristics.
2. Identify water harvesting techniques	2.1. Proper site for water harvesting is identified using standard technique 2.2. Different water harvesting techniques are identified. 2.3. Appropriate water harvesting technique is chosen/identified based on applicability & adaptability 2.4. Appropriate shade & lining materials are selected to reduce evaporation & seepage loss respectively
3. Identify catchment areas	3.1. Catchment area is identified and characterized for climatic variables 3.2. potential irrigation water source for implementation to project stage are identified as directed by community need assessment 3.3. OHS hazards in the working area are identified

Variable	Range
Water harvesting techniques	May include but not limited to: <ul style="list-style-type: none"> • Pits, trenches, Dug wells, recharged wells
climatic variables	May include but not limited to: <ul style="list-style-type: none"> • Temperature • Precipitation

OHS hazards	<p>May include but not limited to:</p> <ul style="list-style-type: none"> Dust, noise, air and soil-borne micro-organisms, snake, spider and Insect bites, sharp hand tools and equipment, holes, and slippery and uneven surfaces, moving machinery and vehicles, solar radiation and dust.
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Evidence Guide	
Critical Aspects of competence	<p>Must demonstrate skills and knowledge to:</p> <ul style="list-style-type: none"> identify river, spring, spate, shallow well and micro dam water source Identify proper site for water harvesting Choose appropriate water harvesting technique based on applicability & adaptability Identify type of construction materials and equipment considering criteria: such as availability, cost and applicability Select appropriate shade & lining materials to reduce evaporation & seepage loss respectively
The required Knowledge and Attitude	<p>Demonstrates knowledge of:</p> <ul style="list-style-type: none"> Surface and ground water hydrology, Water harvesting principles, Identified proper site for water harvesting Catchment area identification, Environmental issues, guidelines and legislation work values and Ethics accountable to work loyalty and honest to the work he/she being doing Respect and follow rules and regulations the organization Commitment/ Dedication
The required skills	<p>Demonstrate skills to:</p> <ul style="list-style-type: none"> Identify proper site for water harvesting Identify catchments areas Identify water harvesting techniques Identify potential Irrigation surface Water sources Interpret environmental issues, guidelines and legislation
Resources Implication	<p>Access is required to real or appropriately simulated situations, including work areas, materials and equipment, and to information on workplace practices and OHS practices.</p>
Methods of Assessment	<p>Competence may be assessed through:</p> <ul style="list-style-type: none"> Interview/Written Test Observation/Demonstration with Oral Questioning
Context of Assessment	<p>Competence may be assessed in the work place or in a simulated work place setting.</p>

Occupational Standard: Irrigation and Drainage Level II	
Unit of competence	Identify and Determine Basic Properties of Soil
Unit Code	AGR IRD1 04 0322
Unit Descriptor	This unit covers the knowledge, skills and attitude required to collect soil samples and perform basic tests.

Element of competence	Performance Criteria
1 Collect soil samples for testing	<p>1.1 Tools and materials for collecting soil samples are prepared.</p> <p>1.2 Area from which soil samples are to be collected is identified from workplace records or supervisors' instructions.</p> <p>1.3 Soil sample is located using site plans (Services) and in consultation with the supervisor.</p> <p>1.4 OHS hazards are identified, risks assessed and controls implemented and reported to the supervisor.</p> <p>1.5 Suitable safety equipment and personal protective equipment (PPE) are selected, used, and maintained.</p> <p>1.6 Samples are taken from the designated area according to recognized sampling techniques and are prepared for on site or off site analysis</p> <p>1.7 Samples are labeled and recorded.</p>
2. Perform basic soil tests	<p>2.1 Soil profile is determined, where appropriate.</p> <p>2.2 Soils are tested or inspected for physical properties.</p> <p>2.3 Soils are tested for chemical properties.</p> <p>2.4 Results are recorded.</p>

Variable	Range
Tools and materials	<p>May include but not limited to:</p> <ul style="list-style-type: none"> Spades, augers, core sampler soil sample storing and recording materials, field test kits, and interpreting charts.
Services	<p>May include but not limited to:</p> <ul style="list-style-type: none"> water supply, electricity, telecommunications, irrigation, storm water and drainage
OHS hazards	<p>May include but not limited to:</p> <ul style="list-style-type: none"> disturbance or interruption of services, solar radiation, dust, noise, soil- and water-borne micro-organisms, chemicals and hazardous substances, sharp hand tools and equipment, manual handling, moving machinery and machinery parts, falling objects, and uneven surfaces.
PPE	<p>May include but not limited to:</p> <ul style="list-style-type: none"> Hat, boots, overalls, gloves, goggles, respirator, or face mask,

	face guard, hearing protection, sunscreen lotion and hard hat.
sampling techniques	May include but not limited to: <ul style="list-style-type: none"> Collecting, preparing, packaging and labeling soil samples for off-site testing and/or on-site testing and analysis.
Soil testing	May include but not limited to: <ul style="list-style-type: none"> depth, color, texture, structure, compaction, air-filled porosity, pH, salinity and nutrients.

Evidence Guide	
Critical Aspects of Competence	Must demonstrate skills and Knowledge to : <ul style="list-style-type: none"> Describe sample and sampling techniques collect and test soil samples Identify and describe recording techniques have been successfully and appropriately carried out.
The required Knowledge	Demonstrates knowledge of: <ul style="list-style-type: none"> soil sampling techniques soil physical properties soil chemical properties soil plant relationships basic soil field tests Techniques to ameliorate soil properties.
The required skills	Demonstrate skills to: <ul style="list-style-type: none"> collect soil samples perform basic soil tests Record and store information. Communicate ideas and information through reporting results of soil tests to supervisor or others orally or in writing. Collect and organize soil information through recording and filing results. Plan and organize activities according to workplace procedures work in team with other to achieve an outcome. Apply problem-solving skills through identifying and resolving problems with the sampling process. Use of technology through the use of standard soil testing equipment.
Resources Implication	Access is required to real or appropriately simulated situations, including work areas, materials and equipment, and to information on workplace practices and OHS practices.
Methods of Assessment	Competence may be assessed through: <ul style="list-style-type: none"> Interview/Written Test

	<ul style="list-style-type: none"> • Observation/Demonstration with Oral Questioning
Context of Assessment	Competence may be assessed in the work place or in a simulated work place setting.

Occupational Standard: Irrigation and Drainage Level I	
Unit Title	Carry out Nursery for Irrigation Work
Unit Code	<u>AGR IRD1 05 0322</u>
Unit Descriptor	This unit covers the required knowledge, skills and attitude to prepare materials, tools and equipment for irrigated nursery work, undertake nursery work activities, store and stockpile materials, and clean up on completion of work.

Elements	Performance Criteria
1. Prepare materials, tools and equipment for nursery work	<p>1.1. The required materials, <i>tools and equipment</i> are identified according to lists provided and/or supervisor's <i>instructions</i>.</p> <p>1.2. Checks are conducted on all materials, tools and equipment, with insufficient or faulty items reported to the supervisor.</p> <p>1.3. Techniques are used when loading and unloading materials to demonstrate correct manual handling, and minimize damage to the load and the vehicle.</p> <p>1.4. Suitable <i>personal protective equipment (PPE)</i> is selected and checked prior to use.</p> <p>1.5. Nursery support for irrigation work is provided according to <i>OHS requirements</i> and <i>workplace information</i>.</p> <p>1.6. <i>OHS hazards</i> are identified and reported to the supervisor.</p>
2. Undertake nursery work	<p>2.1. Instructions and directions provided by supervisor are followed, and clarification sought when necessary.</p> <p>2.2. <i>Nursery for irrigation work</i> is undertaken in a safe and environmentally appropriate manner according to nursery guidelines.</p> <p>2.3. Interactions with other staff and customers are carried out in a positive and professional manner.</p> <p>2.4. Nursery guideline, procedures are followed and OHS requirements in relation to workplace <i>hygiene practices</i>, handling and disposal of materials are implemented based on <i>environmental waste disposal considerations</i>.</p> <p>2.5. Problems or difficulties in completing work to required standards or timelines are reported to supervisor.</p>
3. Store and stockpile materials	<p>3.1. Plant debris and waste material produced during nursery activities are stored according to supervisor's instructions.</p> <p>3.2. Plant debris and waste materials are prepared and processed in an appropriate and safe manner according to supervisor's instructions.</p> <p>3.3. Surplus materials are stockpiled for removal according to supervisor's instructions.</p> <p>3.4. A clean and safe work site is maintained while completing</p>

	nursery activities.
4. Clean up on completion of nursery work	<p>4.1. Plants and materials are stored according to supervisor's instructions and OHS requirements.</p> <p>4.2. Tools and equipment are cleaned, maintained and stored according to manufacturers' specifications and supervisor's instructions.</p> <p>4.3. Work outcomes are reported to the supervisor.</p>

Variable	Range
Tools and equipment	<p>May include but not limited to:</p> <ul style="list-style-type: none"> • manual or electronic ticketing/labeling equipment, wheelbarrows, trolleys, motorized trolleys, different scissors, cleaning equipment, secateur, knives, media trays, water spray container, dibblers, and rubbish bins, chemical sprayer's
Instructions	<p>May include but not limited to:</p> <ul style="list-style-type: none"> • Standard Operating Procedures (SOPs), Organization policy and procedures in regard to product merchandising and displays, specifications, work notes, Material Safety Data Sheets (MSDSs), manufacturer's instructions, product labels, or verbal directions from manager, supervisor, or senior operator
Personal Protective Equipment (PPE)	<p>May include but not limited to:</p> <ul style="list-style-type: none"> • steel capped boots/shoes, overalls, gloves, sun hat, sunscreen lotion, safety goggles, face mask and ear protectors
Workplace information	<p>May include but not limited to:</p> <ul style="list-style-type: none"> • procedures for disposing of waste materials, work instructions or verbal instructions from the supervisor, OHS legislative requirements and relevant Codes of Practice
OHS hazards	<p>May include but not limited to:</p> <ul style="list-style-type: none"> • slippery or uneven surfaces, moving machinery and vehicles, solar radiation, and potential dangers from handling potting media, fertilizers, fungicide and pesticides chemical, watering systems, and spider and insect bites.
Hygiene practices	<p>May include but not limited to:</p> <ul style="list-style-type: none"> • disinfestations and storage of planting media, disinfestations of contaminated plants and materials, hand washing, footbaths, sanitizing/sterilizing tools, equipment and benching, access restrictions, and handling practices which minimize cross contamination.

Environmental waste disposal considerations	<p>May include but not limited to:</p> <ul style="list-style-type: none"> • prompt removal and/or disinfestations of organic waste, use of mixing site, neutralizing pits for disposal of chemicals and cleaning products, recycling seed trays, poly trays, bags, and recycling waste water or disposing using approved discharge system
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Evidence Guide	
Critical Aspects of Competence	<p>Must demonstrate skills and knowledge to:</p> <ul style="list-style-type: none"> • Identify water source, site selection for nursery, clearing, leveling, preparing lay out. • provide nursery plant care including watering, weeding, removing dead materials, staking, trimming, and potting of plants • support propagation activities including aIRDsting with preparing planting media, collecting propagating materials, and blocking up plants in correct patterns and spacing
The required Knowledge and Attitudes	<p>Demonstrates knowledge of:</p> <ul style="list-style-type: none"> • Environmentally safe nursery work practices • nursery guidelines. • nursery hygiene and quality control • nursery plant maintenance activities • basic stock control procedures • propagation techniques • OHS legislative requirements and codes of practice
The required skills	<p>Demonstrates skills to:</p> <ul style="list-style-type: none"> • prepare materials, tools and equipment for nursery work • demonstrate correct manual handling • handle and dispose materials • store plant debris and waste material produced during nursery activities • undertake nursery work as directed • store and stockpile materials • clean up on completion of nursery work
Resources Implication	<p>Access is required to real or appropriately simulated situations, including work areas, materials and equipment, and to information on workplace practices and OHS practices.</p>

Methods of Assessment	Competence may be assessed through: <ul style="list-style-type: none"> • Interview / Written Test • Observation / Demonstration with Oral Questioning
Context of Assessment	Competence may be assessed in the work place or in a simulated work place setting

Occupational Standard: Irrigation and Drainage Level I	
Unit of competence	Observe and report on weather
Unit Code	AGR IRD1 06 0322
Unit Descriptor	This unit covers the knowledge, skill and attitude required to gather and check weather and climate information, carry out preventative action and monitor weather and climate conditions with limited supervision, according to organization guidelines.

Element of competence	Performance Criteria
1. Gather and Check weather and climate information.	<p>1.1 Weather and climate information is gathered and checked to determine likely conditions related to irrigation and drainage works.</p> <p>1.2 Changed weather and climate situations are familiarized from different sources</p> <p>1.3 Likely impact of changes and warnings in weather and climate are anticipated in respect to irrigation and drainage tasks.</p> <p>1.4 Report is made to supervisor of anticipated impact of weather and climate.</p>
2. Carry out preventative action.	<p>2.1 Information and advice is promptly disseminated to relevant personnel.</p> <p>2.2 Preventative actions are determined according to the known effects on work tasks.</p> <p>2.3 Preventive actions to minimize loss and damage are implemented.</p> <p>2.4 Irrigated crop management program or over all irrigation schedule of work tasks are adjusted and revised according to weather and climatic changes.</p>
3. Monitor weather and climate.	<p>3.1 Regular updates are accessed to familiarized ongoing suitability of current programs.</p> <p>3.2 Irrigated crop and pasture management practices are reviewed to ensure suitability within meteorological conditions.</p> <p>3.3. Relevant information is documented and recorded according to organizational requirements.</p>

Variable	Range statement
Weather and climate information	<p>May include but not limited to:</p> <ul style="list-style-type: none"> • Reports • Warnings

	<ul style="list-style-type: none"> • data collected properly from weather station and • glazier alerts.
Familiarized sources	<p>May include but not limited to:</p> <ul style="list-style-type: none"> • Radio • T.V. • Internet • Email • Fax • Telephone • Newspapers • word of mouth • weather station on property and • Interpretive tools.
Warnings	<p>May include but not limited to:</p> <ul style="list-style-type: none"> • Fire • Flood • Wind • Rain • Hail • Storm • heat waves • snow • dust • frost • gale • glazier alerts, and • rapid changes in temperature or weather conditions.
Relevant personnel	<p>May include but not limited to:</p> <ul style="list-style-type: none"> • Other staff and colleagues • Community members • owners and managers, and • neighbors.
Preventative actions	<p>May include but not limited to:</p> <ul style="list-style-type: none"> • Provision of shelter • covering and moving fodder • firefighting equipment • auxiliary power • supplies • moving stock • securing equipment and buildings • preparing fire breaks and assured water supply

	<ul style="list-style-type: none"> • rescheduling • Work tasks • operating sprinklers in order to cool animals in extreme heat.
loss and damage	<p>May include but not limited to:</p> <ul style="list-style-type: none"> • staff • Livestock • Crops and fodder • Produce • buildings sheds • Irrigation structures, and • Other physical resources.

Evidence Guide	
Critical Aspects of Competence	<p>Must demonstrate skills and knowledge to:</p> <ul style="list-style-type: none"> • describe relevant legislative health and OHS requirements, • Describe effects of weather condition on irrigation. • monitor physical signs in the context of available information • relate forecasts to impact on current operations and activities
The required knowledge and attitude	<p>Demonstrates knowledge of:</p> <ul style="list-style-type: none"> • effects of weather condition on irrigation • relevant legislative health and OHS requirements, especially as they relate to weather and climate monitoring and preparations for hazardous weather • weather and climate conditions and its impact upon farming and crop and pasture production activities • working knowledge of climate and weather • Effects of prolonged dry periods on irrigation. • Record data from weather and climate stations.
The required skills	<p>Demonstrate Skills the ability to:</p> <ul style="list-style-type: none"> • Communicate information. • monitor physical signs in the context of available information • Use technology to access a range of information resources and record information. • plan and organize activities and resources to minimize impact of adverse weather and climate
Resources Implication	<p>Access is required to real or appropriately simulated situations, including work areas, materials and equipment, and to information on workplace practices and OHS practices.</p>

Methods of Assessment	Competence may be assessed through: <ul style="list-style-type: none"> • Interview/Written Test • Observation/Demonstration with Oral Questioning
Context of Assessment	Competence may be assessed in the work place or in a simulated work place setting.

Occupational Standard: Irrigation and Drainage Level I	
Unit Title	Identify and handle Basic Irrigation Design and Surveying Tools
Unit Code	AGR IRD1 07 0322
Unit Descriptor	This unit covers the knowledge, skill and attitude required to identify, prepare, care and handling of irrigation design and surveying tools, instruments and equipment according to supervisor and organization guidelines.

Elements	Performance Criteria
1. Identify irrigation design and surveying tools	<p>1.1. Elementary surveying <i>equipment and tools</i> are identified</p> <p>1.2. The principal irrigation design and surveying instruments, accessories and their primary use are identified.</p> <p>1.3. Electronic and Self-Leveling Surveying Equipment are identified and installed</p>
2. Prepare materials, tools and equipment for irrigation design and surveying work	<p>2.1. The required materials, tools and equipment are prepared according to lists provided and/or supervisor's <i>instructions</i>.</p> <p>2.2. Checks are conducted on all materials, tools and equipment with insufficient or faulty items reported to the supervisor.</p> <p>2.3. Suitable <i>Personal Protective Equipment (PPE)</i> is selected and checked prior to use.</p> <p>2.4. Irrigation design and surveying support is provided according to OHS requirements, gender policy and according to <i>workplace information</i>.</p> <p>2.5. <i>OHS hazards</i> related with irrigation design and surveying instrument identification, use and working with it are identified and reported to the supervisor.</p>
3. Care and Handling of Surveying Instruments	<p>3.1. Tapes and Chains are <i>Maintained</i></p> <p>3.2. Surveying Instruments and Accessories are properly transported</p> <p>3.3. Mounting Instruments on Tripod is performed</p> <p>3.4. Cleaning and Storing Equipment is being conducted</p> <p>3.5. Checking and Adjusting Instruments is done prior to work</p>

Variable	Range
Tools and equipment	<p>May include but not limited to:</p> <ul style="list-style-type: none"> • Tapes • Levels • Clinometers • Engineer's Transit • Electronic Surveying Systems • The electronic theodolite

	<ul style="list-style-type: none"> • Electronic Distance-Measuring Equipment • Field Books and Special Forms • GPS • different software • Topo Map
Instructions	<p>May include but not limited to:</p> <ul style="list-style-type: none"> • Standard Operating Procedures (SOPs), • company policy and procedures in regard to product merchandising and displays • specifications • work notes • Material Safety Data Sheets (MSDSs) • manufacturer’s instructions • product labels or verbal directions from manager and supervisor or senior operator
Personal protective equipment	<p>May include but not limited to:</p> <ul style="list-style-type: none"> • steel capped boots/shoes • overalls • gloves • sun hat • sunscreen lotion • safety goggles • face mask and • ear protectors
Workplace information	<p>May include but not limited to:</p> <ul style="list-style-type: none"> • procedures for disposing of waste materials • work instructions or verbal instructions from the supervisor • OHS legislative requirements and relevant Codes of Practice
OHS hazard	<p>May include but not limited to:</p> <ul style="list-style-type: none"> • heavy materials and equipment • slippery or uneven surfaces • moving machinery and vehicles • solar radiation, and potential dangers from handling potting media • watering systems, and • spider and insect bites.

Evidence Guide	
Critical Aspects of Competence	<p>Must demonstrate skills and knowledge to:</p> <ul style="list-style-type: none"> • carry out identification of basic irrigation design and surveying tools

	<ul style="list-style-type: none"> • prepare the identified design and surveying equipment and tools made ready for use • Handle design and surveying equipment and tools
The Required Knowledge and Attitudes	<p>Demonstrates knowledge of:</p> <ul style="list-style-type: none"> • safe work practices • Surveying tools and equipment identification • Simple activities of surveying and design equipment for irrigation • basic stock control procedures • OHS legislative requirements and codes of practice
The required skills	<p>Include Skills the ability to:</p> <ul style="list-style-type: none"> • prepare materials, tools and equipment for basic irrigation design and survey work • undertake irrigation design and survey tools and equipment identification • clean up on completion of basic surveying and design work for irrigation tools and equipment • store and stockpile materials
Resources Implication	<p>Access is required to real or appropriately simulated situations, including work areas, materials and equipment, and to information on workplace practices and OHS practices.</p>
Methods of Assessment	<p>Competence may be assessed through:</p> <ul style="list-style-type: none"> • Interview / Written Test • Observation / Demonstration with Oral Questioning
Context of Assessment	<p>Competence may be assessed in the work place or in a simulated work place setting</p>

Occupational Standard: Irrigation and Drainage Level I	
Unit Title	Perform Basic Measurement and Calculations
Unit Code	AGR IRD 08 0322
Unit Descriptor	This unit covers the knowledge, skills, and attitudes required to perform simple measurement and calculation techniques, prepare materials, tools and equipment for measurements, and working with handheld GPS

Elements	Performance Criteria
1. Identify and Prepare materials, tools and equipment for measurements	1.1. Suitable <i>Personal Protective Equipment (PPE)</i> is selected and checked prior to use. 1.2. The required materials, tools and equipment are identified according to their relevance to measurements 1.3. Checks are conducted on all materials, tools and equipment, with failure to operate correctly and accurately. 1.4. Techniques are used when performing installation, reading and taking measurement 1.5. <i>OHS hazards</i> are identified and reported to the supervisor.
2. Perform simple measurement techniques	2.1. Checks are conducted on all materials, <i>tools and equipment</i> , with failure to operate correctly and accurately. 2.2. Techniques are used when performing installation, reading and taking simple measurement 2.3. The required calculation on distance, area, volume and discharges are performed. 2.4. Measurement errors are corrected and minimized to the acceptance level according to <i>instructions</i>
3. Working with handheld GPS	3.1. Checks and setting of GPS are conducted to operate and locate the point correctly and accurately. 3.2. Track line and track point are taken by using GPS's 3.3. Saving the reading and measurement data are performed. 3.4. Loading data to the computer which has GIS software

• Variable	Range
Instructions	May include but not limited to: <ul style="list-style-type: none"> • Standard Operating Procedures (SOPs) • Specifications • work notes • Material Safety Data Sheets (MSDSs)

	<ul style="list-style-type: none"> • manufacturer’s instructions, or verbal directions from manager • supervisor, or senior field operators.
Tools and equipment	<p>May include but not limited to:</p> <ul style="list-style-type: none"> • Measuring tape • Theodolite • Clinometer • Compass • ranging pole • string • pegs/pins • water level • GPS
Personal protective clothing and equipment	<p>May include but not limited to:</p> <ul style="list-style-type: none"> • Steel-capped boots/shoes • Overalls • Gloves • sun hat • sunscreen lotion • safety goggles • face mask and • ear protectors.
OHS Hazards	<p>May include but not limited to:</p> <ul style="list-style-type: none"> • Heavy materials and equipment • slippery or uneven surfaces • moving machinery and vehicles • snake • spider and insect bites • solar radiation and • dust.

Evidence Guide	
Critical Aspects of Competence	<p>Must demonstrate skills and knowledge to:</p> <ul style="list-style-type: none"> • Prepare materials, tools and equipment for measurement work. • Undertake simple measurement work. • Handling materials and equipment appropriately after measurements. • Checking up on correct performance of measurement tools, equipment and materials. • collect, analyze and organize information using handheld GPS with further clarification

	<ul style="list-style-type: none"> • plan and organize activities in a logical sequence and in a timely manner • Apply mathematical ideas and skills in counting, tallying and estimation when handling and measuring materials.
The required knowledge and Attitudes	<p>Demonstrate knowledge of:</p> <ul style="list-style-type: none"> • Preparing materials, tools and equipment for Perform Basic Measurement and Calculation work • Checking, setting and simple calibration work on measuring tools • Undertaking measurement activities. • Performing of simple calculation • Repair and maintenance of equipment during failure to correct reading, measurement and working with it. • Using mathematical ideas and skills in counting, tallying and estimation • Teamwork and following instructions. • Personal protective equipment. • Safe work practices • Undertaking work as directed • Handling materials and equipment
The required skills	<p>Include Skills the ability to:</p> <ul style="list-style-type: none"> • Prepare materials, tools and equipment for Perform Basic Measurement and Calculation work. • Undertake measurement and mathematical calculation work as directed. • store, handle and stockpile materials and equipment • communicate ideas and information about the job, tasks and problems • collect, analyze and organize information with further clarification • plan and organize activities with the supervisor and other team members • Plan and organize activities in a logical sequence and in a timely manner. • work with others and in teams • Apply and use of tools, equipment and communication systems.
Resources Implication	<p>The following resources MUST be provided: Access is required to real or appropriately simulated situations, including work areas, materials and equipment, and to information on workplace practices and OHS practices.</p>
Methods of Assessment	<p>Competence may be assessed through:</p> <ul style="list-style-type: none"> • Interview / Written Test • Observation / Demonstration with Oral Questioning
Context of Assessment	<p>Competence may be assessed in the work place or in a simulated work place setting.</p>

Occupational Title: Irrigation and Drainage Level II	
Unit of Competency:	Read and Prepare Technical Drawing
Unit Code	<u>AGR IRD1 09 0322</u>
Unit Descriptor	This unit covers knowledge, skills and attitudes required to identify and select drawing instruments, sketching and lettering, prepare geometry related to technical drawing, and determine axonometric projection drawings.

Elements	Performance criteria
1. Identify and Select Drawing instruments	1.1 Tables and straight edges are selected appropriately 1.2 <i>Drawing materials and measuring tools</i> are made available to fulfill the requirements
2. Sketching and Lettering	2.1 Lines and angles are sketched using standard technique 2.2 Circular/elliptical objects are sketched using standard technique 2.3 Measuring devices are Graduated 2.4 Letters are sketched using standard technique
3. Prepare Geometry of technical drawing	3.1 Points and lines are roughly sketched 3.2 Angles, quadrilaterals and polygons are sketched using standard technique 3.3 Circles and arcs are sketched using standard technique 3.4 Bisecting and dividing are sketched using standard technique 3.5 Perpendiculars and tangents are sketched using standard technique
4. Overview of Multi view drawing and Sectioning	4.1 Line types are identified appropriately 4.2 Orientation of views are identified 4.3 sketched the Auxiliary views using standard technique 4.4 Multi view drawing are Dimensioned 4.5 Full sections are sketched using standard technique 4.6 Half sections sketched using standard technique 4.7 Revolved sections sketched using standard technique
5. Determine Axonometric projection drawing	5.1 Isometric projections are assessed and determined 5.2 Di metric projection are assessed and determined 5.3 Trimetric projection are assessed and determined

Range of variable	Range
Drawing Materials and Measuring Tools	May include but not limited: <ul style="list-style-type: none"> Ruler, pencil, fixer, protractor, set square, drawing table, raiser, drawing paper

Evidence Guide	
Critical Aspects of competence	Must demonstrate skills and knowledge to: <ul style="list-style-type: none"> Identify and select drawing materials and measuring tools

	<ul style="list-style-type: none"> • Overview multi-view and sectioning • Prepare Geometry technical drawing • Determine Axonometric projection drawing
Required Knowledge and Attitudes	<p>Demonstrate knowledge of:</p> <ul style="list-style-type: none"> • Use and preparing of geometry related to technical drawing and actual production objects. • Practice of orthographic projection drawing (multi-view) as related to practical applications. • Use of proper dimensioning and sectioning practices. • Practice of axonometric projection drawings as related to practical applications. • Careers related to technical drawing.
Required skill	<p>Demonstrate skills to:</p> <ul style="list-style-type: none"> • Select drawing instruments • Sketch lines and angles • Sketch circular/elliptical objects • Sketch bisecting, dividing, perpendicular and tangents • Draw and section multi view • Determine axonometric projection drawing
Resources Implication	<p>The following resources MUST be provided: Access is required to real or appropriately simulated situations, including work areas, materials and equipment, and to information on workplace practices and OHS practices.</p>
Methods of Assessment	<p>Competence may be assessed through:</p> <ul style="list-style-type: none"> • Interview / Written Test • Observation / Demonstration with Oral Questioning
Context of Assessment	<p>Competence may be assessed in the work place or in a simulated work place setting.</p>

Occupational Standard: Irrigation and Drainage Level I	
Unit Title	Identify Basic Soil Water Plant Relationships
Unit Code	AGR IRD1 10 0322
Unit Descriptor	This unit covers the knowledge skills and attitudes required to investigate Soil's Physical characteristics, identify and determine how soil characteristics affect plant growth and also identify development and soil and water relationship.

Elements	Performance Criteria
1. Investigate Soil's Physical Characteristics	1.1. <i>Soil types</i> are identified using <i>tools and equipment</i> according to OHS producer. 1.2. <i>Soil characteristics</i> are sorted based on their properties.
2. Identify and determine soil characteristics affecting plant growth and development	2.1. <i>Soil condition</i> is identified according to OHS producer. 2.2. <i>Effect of soil structure</i> on plants is determined according to OHS producer.
3. Identify Soil and Water relationship	3.1. <i>Soil Water Content</i> is identified as directed by supervisor. 3.2. Soil Water Tension is identified based on characteristics. 3.3. Use of Water by Plants is identified according to the work procedure. 3.4. <i>Soil and Water Quality</i> is identified according to work procedure.

Variable	Range
Soil types	May includes but not limited to: <ul style="list-style-type: none"> • Clay soil • Loamy soil • Silt soil • Sandy soil
Tools and equipment	May include but not limited to: <ul style="list-style-type: none"> • Hand or mechanical augers • Soil textural classification triangle.
Soil characteristics	May includes but not limited to: <ul style="list-style-type: none"> • Soil Composition

	<ul style="list-style-type: none"> • Soil Texture • Soil Structure • Soil Bulk Density • Porosity
Soil condition	<p>May include but not limited to:</p> <ul style="list-style-type: none"> • Stability • Availability of nutrients and water • Effects of organic and inorganic fertilizer application • pH • Organic matter
Effect of soil structure	<p>May include but not limited to:</p> <ul style="list-style-type: none"> • Rooting depth • Availability of plant nutrients • Drainage • Water logging
Soil water content	<p>May include but not limited to:</p> <ul style="list-style-type: none"> • Saturation • Field capacity • Wilting point • Available and readily available water • Oven dried
Soil and water quality	<p>May include but not limited to:</p> <ul style="list-style-type: none"> • Aeration • Soluble salt

Evidence Guide	
Critical aspects of Competence	<p>Must demonstrate skills and knowledge to:</p> <ul style="list-style-type: none"> • Identify soil types and characteristics • Identify and determine soil water plant relationship
The required Knowledge and Attitudes	<p>Demonstrate knowledge of:</p> <ul style="list-style-type: none"> • Soil types • Soil characteristics • Soil condition is identified according to OHS producer. • Effect of soil structure on plants • Soil Water Content • Soil Water Tension • Use of Water by Plants • Soil and Water Quality

The required Skills	<p>Demonstrate skills to:</p> <ul style="list-style-type: none"> • Investigate soil's physical characteristics • Identify and determine how soil characteristics affect plant growth and development • Identify Soil and Water relationship
Resources Implication	<p>The following resources MUST be provided: Access is required to real or appropriately simulated situations, including work areas, materials and equipment, and to information on workplace practices and OHS practices.</p>
Methods of Assessment	<p>Competence may be assessed through:</p> <ul style="list-style-type: none"> • Interview / Written Test • Observation / Demonstration with Oral Questioning
Context of Assessment	<p>Competence may be assessed in the work place or in a simulated work place setting.</p>

Occupational Standard: Irrigation and Drainage Level I	
Unit Title	Identify Irrigation Structure Works
Unit Code	AGR IRD1 11 0322
Unit Descriptor	This unit covers the knowledge, skills and attitudes required to identify and prepare material, irrigation structure work, maintain, clean up and store worksite and equipment on irrigation systems.

Elements	Performance Criteria
1. Identify and prepare material for irrigation structure work	<p>1.1 Equipment and tools are selected and checked to meet safety and work requirements of task and site.</p> <p>1.2 Tools and equipment selected to carry out tasks are consistent with the requirements of the job.</p> <p>1.3 Techniques are used when loading and unloading materials to demonstrate correct manual handling, and minimize damage to the load and the vehicle.</p> <p>1.4 Suitable Personal Protective Equipment (PPE) is selected and checked prior to use.</p> <p>1.5 Irrigation structure work is provided according to OHS requirements and workplace information.</p>
2. Identify irrigation structures	<p>2.1 Diversion structures works are identified</p> <p>2.2 Conveyance, distribution and management structures are identified</p> <p>2.3 Field distribution systems are identified</p>
3. Maintain, clean up and store worksite and equipment	<p>3.1 Equipment, tools and materials are checked, maintained and stored according to manufacturer guidelines and organizational procedures.</p> <p>3.2 Work site and environmental improvements or controls are restored to complete work according to plans and organizational requirements.</p>

Variable	Range
Tools and equipment	<p>May include but not limited to:</p> <ul style="list-style-type: none"> • Water mains, Services, Valves, Meters • Pipes (Ultraviolet Polyvinyl chloride (UPVC), HDPE, GRP, Cast iron, Flexible gated pipe with accessories) • Fittings (Jointing systems for pipe types, e.g. J-bolt,

	<p>Bolted flanges, butterfly valve)</p> <ul style="list-style-type: none"> • Others construction materials (cement, sand, aggregate, reinforcement bar, timber, eucalyptus poles, nails, black wire, bitumen, construction joints, water stops...)
Personal Protective Equipment (PPE)	<p>May include but not limited to:</p> <ul style="list-style-type: none"> • Gloves, Hard hat, Safety shoe, Goggles, Ear muff, Mouth clamp
Workplace information	<p>May include but not limited to:</p> <ul style="list-style-type: none"> • heavy materials and equipment • slippery or uneven surfaces • moving machinery and vehicles • solar radiation • Potential dangers from handling potting media, watering systems, and spider and insect bites.
Diversion structures	<p>May include but not limited to:</p> <ul style="list-style-type: none"> • Weir and barrage
Conveyance, distribution and management structures	<p>May include but not limited to:</p> <ul style="list-style-type: none"> • Water control gates • Stop logs • Settling basin • Trash rack • Drop structure • Crossing culverts • Flumes • Division boxes • Night storage • Regulators • Aqueduct • Field off takes • Siphons, pipes and spiles

Evidence Guide

Critical Aspects of Competence	<p>Must demonstrate skills and knowledge to:</p> <ul style="list-style-type: none"> • Identify material for irrigation structure work • Identify irrigation structures • Clear the work site and equipment
The required Knowledge and Attitudes	<p>Demonstrates knowledge of:</p> <ul style="list-style-type: none"> • OHS procedures, personal work site safety procedures • Equipment operation, capacity and limitations • Effects of weather and conditions on operation of site • Environmental aspects of irrigation structure work
The required skills	<p>Demonstrates skills to:</p> <ul style="list-style-type: none"> • Identification of material • Identify and respond to operational problems • Use safety and personal protective equipment
Resources Implication	<p>Access is required to real or appropriately simulated situations, including work areas, materials and equipment, and to information on workplace practices and OHS practices.</p>
Methods of Assessment	<p>Competency may be assessed through:</p> <ul style="list-style-type: none"> • Interview / Written test / oral questioning • Observation / demonstration
Context of Assessment	<p>Competency may be assessed in the work place or in a simulated workplace setting</p>

Occupational Standard: Irrigation and Drainage Level II	
Unit Title	Perform manual excavation
Unit Code	EIS IRD 12 0621
Unit Descriptor	This unit covers the knowledge, skills and attitudes required to plan and prepare for work, prepare work sites, perform small excavations by hand, complete and isolate the excavation and clean up prior to work and restore them on completion of work.

Elements	Performance Criteria
1. Plan and prepare for work.	<p>1.1. Personal protective equipment are selected, fitted and used.</p> <p>1.2. Work site equipment, tools and materials are selected and checked as appropriate to meet task and safety specifications.</p> <p>1.3. Site preparation requirements are determined from specifications, instructions and pre-work inspections.</p> <p>1.4. Potential risks are identified and reported to public and environment.</p> <p>1.5. A site check is performed according to legislative and organisational requirements to identify risks and prevent damage to other utilities.</p>
2. Prepare work site	<p>2.1. Safety equipment and materials are positioned as required to prevent potential risks to public and environment.</p> <p>2.2. Equipment and materials are stored and secured as necessary.</p> <p>2.3. Work site tools, equipment, and materials are used according to regulatory and legislative requirements.</p> <p>2.4. Manual or mechanical excavation equipment are used as per required specifications.</p> <p>2.5. Appropriate drainage and diversion of site inflows from work site are used without damage to environment.</p> <p>2.6. Compliance documentation relevant to the work activity is accessed, interpreted and applied</p> <p>2.7. Signage requirements are identified, obtained and implemented from the project traffic management plan</p> <p>2.8. Equipment, tools and materials are selected to carry out tasks consistent with the requirements of the job, checked for serviceability</p>

		and any faults rectified or reported
		2.9. Environmental protection requirements are identified from the project environmental management plan, and confirmed and applied to the allotted task
3. Perform small excavations by hand		<p>3.1. The location and specifications of the intended excavation on the ground are confirmed before commencing work</p> <p>3.2. Service markers or taped areas are identified</p> <p>3.3. Location of underground services is determined or confirmed to avoid damage or interference</p> <p>3.4. Hand tools are used correctly to dig post holes, small pits and trenches safely and to the required dimensions</p> <p>3.5. Trench collapse prevention procedures are undertaken, where excavation is in unstable ground</p> <p>3.6. Barricades are placed around the excavation</p>
4. Complete and isolate the excavation and clean up		<p>4.1. Loose material out of excavation is cleaned using hand tools</p> <p>4.2. Excavation is checked for confirmation with the specification or work instruction</p> <p>4.3. Loose material is cleared away from the edge of excavation</p> <p>4.4. Work area is cleared and materials are disposed of or recycled in accordance with project environmental management plan</p> <p>4.5. Tools and equipment are cleaned, checked, maintained and stored</p>
5. Restore work site.		<p>5.1. Equipment, tools and materials are used according to regulatory and legislative requirements.</p> <p>5.2. Excavations are backfilled and compacted according to specifications.</p> <p>5.3. Excess soil, debris and unwanted materials are removed from site.</p> <p>5.4. Work site is restored to meet environmental and organisational requirements.</p>
6. Review, record and report activities.		<p>6.1. Equipment, tools and materials are checked, maintained and stored according to manufacturer guidelines and organisational procedures.</p> <p>6.2. Workplace records are maintained as required.</p> <p>6.3. Completed work is reported.</p>

Variable		Range	
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Equipment, tools and materials	<p>May include but not limited to:</p> <ul style="list-style-type: none"> • Hand and power tools • Lifting and winching equipment • Mechanical excavation equipment • Communication equipment • Personal protective equipment
Site preparation	<p>May include, but not limited to:</p> <ul style="list-style-type: none"> • Interpreting plans • Locating public utilities • Setting out • Site Clearing • Battering • Shoring • Scaffolding • Excavating • Directing traffic and the public
Legislative and organisational requirements	<p>May include, but not limited to:</p> <ul style="list-style-type: none"> • Relevant federal and state or territory legislation and regulations • Codes of practice, associated standards and guidance material • Documented organisational policies, manuals and induction programs • Relevant community planning and development agreements, such as land care agreements
Safety equipment and materials	<p>May include, but not limited to:</p> <ul style="list-style-type: none"> • Positioning signs • Erecting barricades • Controlling access
Storing and securing equipment	<p>May include, but not limited to:</p> <ul style="list-style-type: none"> • Stacking and securing pipes safely • Placing equipment in locked storage during absence from site
Damage to environment	<p>May include, but not limited to:</p> <ul style="list-style-type: none"> • Sediment control devices • Erosion prevention • Diversion and collection structures
compliance documentation	<p>May include, but not limited to:</p> <ul style="list-style-type: none"> • Legislative, organisational and site requirements and procedures • Manufacturer's guidelines and specifications • Employment and workplace relations legislation <p>Equal Employment Opportunity and Disability Discrimination legislation</p>
Signage	<p>May include, but not limited to:</p> <ul style="list-style-type: none"> • Escort vehicle

	<ul style="list-style-type: none"> • Highway traffic signs • Site safety signage • Temporary signage for the benefit of motorists and pedestrians • Traffic conditions signage
Traffic	<p>May include, but not limited to:</p> <ul style="list-style-type: none"> • Congested urban environments • Low traffic rural areas • Off-road un-trafficked areas • Buildings • Parking sites • Pedestrian areas
Tools and equipment	<p>May include, but not limited to:</p> <ul style="list-style-type: none"> • Picks • Crow-bars • Shovels • Hand augers • String lines • Pegs • Levels • Tape measures • Jack hammers and Scrabbles
Environmental protection requirements	<p>May include, but not limited to:</p> <ul style="list-style-type: none"> • Organisational/project environmental management plan • Waste management • Water quality protection • Noise • Vibration • Dust and clean-up management
Underground services	<p>May include, but not limited to:</p> <ul style="list-style-type: none"> • Power • Water • Gas • Telephone and Sewerage
Restoring work site	<p>May include, but not limited to:</p> <ul style="list-style-type: none"> • Backfilling • Compacting • Planting or replanting vegetation • Reinstating site
Site	<p>May include, but not limited to:</p> <ul style="list-style-type: none"> • Dry

	<ul style="list-style-type: none"> • Wet • Mud • Dust • Varying day/night visibility
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Evidence guide	
Critical aspects of competence	<p>Must demonstrates knowledge and skills to:</p> <ul style="list-style-type: none"> • Plan work site layout • Select appropriate work and safety equipment • Store and secure materials and equipment safely • Clear and prepare work site according to specifications • Restore work site according to environmental and organisational procedures • Clean, maintain and store equipment • Complete relevant workplace documentation
The required knowledge and attitudes	<p>Demonstrate knowledge of</p> <ul style="list-style-type: none"> • OHS procedures • Site preparation requirements • Personal work site safety • Public and site safety • Risk factors and potential hazards of site preparation and restoration • Environmental aspects of site preparation and restoration • Trenching, shoring and excavation management • Excavation procedures and site restoration • Relevant utilities and service bodies • Communication systems • Landscape and ground structure of work area • Equipment operation, capacity and limitations • Effects of weather and conditions on construction site • Types, uses, limitations and maintenance requirements of manual excavation tools • Basic principles of soil technology for civil works • Basic trench collapse prevention techniques including benching and

	<ul style="list-style-type: none"> battering • Site safety requirements • Site isolation and traffic control responsibilities and authorities • Project quality requirements • Civil construction terminology 		
The required skills	<p>Must demonstrate skills/ability to:</p> <ul style="list-style-type: none"> • Set up a site • Excavate backfill • Compact and reinstate site • Prepare site for planting and plant vegetation • Interpret plans, instructions and standard operating procedures • Use tools and equipment • Identify and respond to operational problems • Use communication systems • Use safety equipment and personal protective equipment • Identify hazards • Give and receive instructions • Use literacy skills in regard to verbal and written communication in the workplace • Communicate with customers and other employees • Apply legislative, organisation and site requirements and procedures for carrying out manual excavation • Select and use relevant tools and equipment safely • Identify and report on hazards related to the worksite and work activity • Communicate effectively to receive and clarify work instructions 		
Resources Implication	Access is required to real or appropriately simulated situations, including work areas, materials and equipment, and to information on workplace practices and OHS practices.		
Methods of Assessment	<p>Competency may be assessed through:</p> <ul style="list-style-type: none"> • Interview / Written test / oral questioning • Observation / demonstration 		
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Context Assessment	of	Competency may be assessed in the work place or in a simulated workplace setting
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Occupational Standard : Irrigation and Drainage Level I	
Unit Title	Apply Agricultural Extension Service
Unit Code	AGR IRD1 13 0322
Unit Descriptor	This unit covers the knowledge, skills and attitudes required to understand the concept and evolution of agricultural extension, apply extension methods and approaches, apply agricultural extension communication and facilitation for technology promotion, conduct training and record and document data.

Element	Performance Criteria
1. Understand the Concept and evolution of Agricultural Extension	<p>1.1 The <i>concept of Agricultural extension</i> is understood to gain relevant knowledge.</p> <p>1.2 The <i>evolution and progress of agricultural extension</i> is expressed to understand the concept of Agricultural Extension.</p> <p>1.3 The <i>role of extension</i> in agricultural development is understood to deliver effective extension services.</p> <p>1.4 The <i>importance of Agricultural extension</i> is determined to have appropriate knowledge.</p> <p>1.5 <i>Extension planning</i> is understood to determine extension activities</p>
2. Apply Extension methods and Approaches	<p>2.1. <i>Extension methods</i> are understood to provide Extension services based on organizational standard, extension systems, extension strategy and extension guide lines</p> <p>2.2. <i>Extension approaches</i> are understood for implementation of extension services</p> <p>2.3. The <i>importance of extension methods and approaches</i> are understood for Agricultural extension service delivery</p> <p>2.4. Appropriate extension methods and approaches are applied to transfer agricultural technologies, based on organizational standard, extension systems, extension strategy and extension guide lines,</p>
3. Apply Agricultural Extension Communication and Facilitation for technology promotion	<p>3.1. The concept, <i>principle</i> and <i>type of communication</i> is understood to have good extension communication knowledge & skill</p> <p>3.2. <i>Communication barriers</i> are identified, understood and solved to undertake effective communication.</p> <p>3.3. <i>Elements of extension communication</i> are defined and used to create positive environment for communication.</p> <p>3.4. <i>Audio visual techniques</i> are understood to provide Agricultural Extension and communication delivery services.</p> <p>3.5. <i>Roles</i> and <i>characteristics of extension communicator</i> are</p>

	<p>recommended to improve the communicator's performance.</p> <p>3.6. The basic concept of facilitation is understood to improve facilitation skills.</p> <p>3.7. The roles and responsibilities of a facilitator are applied to progress facilitation skills.</p> <p>3.8. Conflict resolution skill is understood to enhance homogeneity.</p> <p>3.9. The skills of a facilitator are applied for communication & technology promotion.</p>
4. Conduct Training	<p>4.1. Need assessment is conducted to provide appropriate training.</p> <p>4.2. Preparation is carried-out to facilitate the training process.</p> <p>4.3. Implementation is conducted to capacitate trainees based on organizational training guide line.</p> <p>4.4. Evaluation is carried-out to understand the outcome.</p>
5. Record and Document Data	<p>5.1 Data collecting formats are developed.</p> <p>5.2 Appropriate data are collected and organized.</p> <p>5.3 Collected and organized data are documented and reported.</p>

Variable	Range
Concept of Agricultural Extension	<p>May include but not limited to:</p> <ul style="list-style-type: none"> • Definition of agricultural extension • Purpose of agricultural extension
Evolution and progress of agricultural extension	<p>May include but not limited to:</p> <ul style="list-style-type: none"> • National Agricultural Extension systems • Related reading materials • Professionals • Electronic mail • Briefing notes • Journal articles • Code of conduct
Role of extension	<p>May include but not limited to:</p> <ul style="list-style-type: none"> • Situation analysis • Awareness creation • Training • Facilitation • Demonstrations • Field day exchange visit • Establish farmers group • Link farmers with relevant stakeholders • Monitoring and evaluation • Experience sharing • Assist and provide extension services for farmers • Organize farmer to farmer learning • Promotion of Agricultural Technologies

Importance of Agricultural extension	<p>May include but not limited to;</p> <ul style="list-style-type: none"> • Identify problem • Find solution • Bring behavioural change • Transfer of technology • Assist farmers to help themselves • <u>Improve livelihood</u>
Extension planning	<p>May include but not limited to:</p> <ul style="list-style-type: none"> • Conduct survey • Identification of activities • Data collection • Development of formats • <u>develop the plan</u>
Extension methods	<p>May include but not limited to:</p> <ul style="list-style-type: none"> • Individual • Group • Mass
Extension approaches	<p>May include but not limited to:</p> <ul style="list-style-type: none"> • Participatory • Pluralistic • Farmers field school • Pastoral field school • Mobile extension • Model village • Cluster approaches • Scaling/up/out/down • Market oriented extension
Importance of extension methods and approaches	<p>May include but not limited to:</p> <ul style="list-style-type: none"> • Information and technology dissemination • Deliver extension message effectively • Increase knowledge of farmers • Bring attitude change • Formation of opinion • Encourage farmers to raise issues • To get/provide possible alternative solutions • <u>information and knowledge sharing</u>
Type of communication	<p>May include but not limited:</p> <ul style="list-style-type: none"> • Intra personal communication • Inter personal communication • Organizational communication
Principles of communication	<p>May include but not limited to:</p> <ul style="list-style-type: none"> • Awareness creation • Designed message with respect to objectives and respective audience • Message content should suite to the target audience

Communication barriers	<p>May include but not limited to:</p> <ul style="list-style-type: none"> • The use of jargons words/terms • Cultural differences • Lack of attention, interest, distractions • Differences in perception and viewpoint • Physical disabilities • Physical barriers to non-verbal communication • Language differences and the difficulty in understanding unfamiliar accents • Expectations and prejudices • Emotional barriers and taboos
Elements of extension communication	<p>May include but not limited to:</p> <ul style="list-style-type: none"> • Source • Sender • Message • Channel • Receiver • Feedback
Audio visual techniques	<p>May include but not limited to:</p> <ul style="list-style-type: none"> • Audio visual aids • Assembling • Character • Advantages • Uses
Characteristics of extension communicator	<p>May include but not limited to:</p> <ul style="list-style-type: none"> • Confident • Friendly/ welcoming • Observant • Appreciative • Respectful • Organized • Good judgment • Consistent • Honest • Pro-active

Role of extension communicator	<p>May include but not limited to:</p> <ul style="list-style-type: none"> • Create motivation and feeling • Be aware of problem of the local people • Priority of direct needs • Create self-belief in rural people • Emphasis on self-depend aces • Change in social attitude • Rebuilding of the village • Full uses of local resources • Develop close relationships with stakeholders
Basic concept of facilitation	<p>May include but not limited to:</p> <ul style="list-style-type: none"> • Definition of facilitation • Purpose of facilitation • Evolution and progress of facilitation
Role and responsibility of facilitator	<p>May include but not limited to:</p> <ul style="list-style-type: none"> • Does not evaluate group ideas • Helps the group focus its energies on a task • Suggests methods and procedures • Protects all members of the group from attack • Helps find win/win solutions • Makes sure that everyone has the opportunity to participate • Periodically summarizes the group consensus on issues to validate and clarify the progress of the discussion • Encouraging of every one's knowledge
Conflict resolution skill	<p>May include but not limited to:</p> <ul style="list-style-type: none"> • Recognize • Resolve conflicting needs • Relieve stress • Recognize and manage emotions • Improve nonverbal communication skills • Use humor and play to deal with challenges
Skill of facilitator	<p>May include but not limited to:</p> <ul style="list-style-type: none"> • Active Listening • Summarizing • Synthesis • Conflict resolution
Need assessment	<p>May include but not limited to:</p> <ul style="list-style-type: none"> • Identification of areas • Selection of respondents • Preparation of tools • Conduct the assessment • Organize data

Preparation	<p>May include but not limited to:</p> <ul style="list-style-type: none"> • Identify trainees and trainers • Organize logistics • Select Venue • Selecting and organize training materials • Select and Organize training aids • Prepare schedule and others • Implement
Evaluation	<p>May include but not limited to:</p> <ul style="list-style-type: none"> • Preparation of evaluating formats • Identify sample • Conduct evaluation • Organize result • Report • Plan the lesson learnt
Data collecting formats	<p>May include but not limited to:</p> <ul style="list-style-type: none"> • Recording formats • Writing formats
Reporting	<p>May include but not limited:</p> <ul style="list-style-type: none"> • Organizing • Writing • Submitting/transfer

Evidence Guide	
Critical Aspects of Competence	<p>Demonstrates knowledge and skill to :</p> <ul style="list-style-type: none"> • Identify and interpret the role of Agricultural Extension • Apply Extension method and Approaches • Develop Extension planning • Perform Conflict resolution • collect, record, organize and document data
Required Knowledge and Attitudes	<p>Demonstrates knowledge and attitude of :</p> <ul style="list-style-type: none"> • Agricultural extension • Conflict resolution • Extension method and Approaches • Agricultural Extension Communication and Facilitation • collecting, recording, organizing and documenting of data
Required Skills	<p>Demonstrates skills to:</p> <ul style="list-style-type: none"> • Resolve conflict • Develop Extension planning • Apply extension method and Approaches • Facilitate Agricultural Extension Communication

Resource Implications	Access is required to real or appropriately simulated situations, including work areas, materials and equipment, and to information on workplace practices and Occupational health and safety (OHS) practices.
Methods of Assessment	Competence may be assessed through: <ul style="list-style-type: none"> • Written Test, Interview, quiz, practical assignment • Observation, Demonstration with Oral Questioning
Context of Assessment	Competence may be assessed in the work place or in a simulated work place setting.

Occupational Standard: Irrigation and Drainage Level I	
Unit Title	Implement Agribusiness Marketing
Unit Code	<u>AGR IRD1 14 0322</u>
Unit Descriptor	This unit covers the knowledge, skills and attitude required to Understand concept of agricultural marketing Understand concepts of agribusiness Identify marketing targets for Agricultural products Implement marketing strategy . Establish contract farming, and Apply Agricultural marketing services.

Element	Performance Criteria
1. Understand concept of agricultural marketing	<p>1.1 .Concept of agricultural marketing is understood for Agricultural marketing</p> <p>1.2 Importance of agricultural marketing is understood to provide agricultural marketing services</p> <p>1.3 .Roles of agricultural market-oriented service is identified and understood</p> <p>1.4 .Principles of agricultural marketing and strategies are identified and understood</p> <p>1.5 Marketing mix is understood to implement agricultural marketing activities</p> <p>1.6 Types of marketing are understood and identified to implement the appropriate marketing services</p>
2. Understand concepts of agribusiness	<p>2.1. Concept of agribusiness is understood for Agricultural marketing</p> <p>2.2 Importance of agribusiness is understood to provide agribusiness services</p> <p>2.3 Roles of agribusiness-oriented service is identified and understood</p> <p>2.4 Principles of agribusiness and strategies are identified and understood</p> <p>2.5. Characteristic of Agribusiness are understood to implement Agribusiness</p> <p>2.6. Dimension and structures of Agribusiness are understood and distinguished</p>
3. Identify marketing targets for Agricultural products	<p>3.1 .Marketing targets are identified for Agricultural products and services.</p> <p>3.2 Approaches of agricultural market are understood for agricultural market product and service.</p> <p>3.3 Segment descriptors are used to display the targets of agricultural market.</p> <p>3.4 Strategic of agricultural marketing options are identified to develop agricultural marketing plan.</p> <p>3.5 Business plans are prepared to perform cost and benefit analysis</p>

4. Implement marketing strategy	<p>4.1 .Agricultural marketing functions strategy is designed to perform agriculture business.</p> <p>4.2 Action plan is developed to implement Agricultural marketing strategies.</p> <p>4.3 .Require resource are identified and coordinated to implement agricultural marketing</p> <p>4.4 Marketing mix is implemented according to the strategy Agricultural.</p>
5. Establish contract farming	<p>5.1 Concept of contract farming is understood to enhance market oriented production</p> <p>5.2 Types of contract farming are identified to select the appropriate approach</p> <p>5.3 Models of Contract farming are understood and identified</p> <p>5.4. Steps and procedures of contract farming establishments are identified</p> <p>5.5 Contract farming requirements are identified and applied based on the organizational standard</p> <p>5.6 Contract farming systems are established</p>
6. Apply Agricultural marketing services	<p>6.1 Agricultural products are identified to delivered provided marketing services</p> <p>6.2 Need assessment is conducted to identify marketing conditions</p> <p>6.3 Market strategies are developed to implement the Agricultural marketing services</p> <p>6. 4Customer feedbacks are collected and organized to improve Agricultural marketing services</p> <p>6.5 Data is organized and documented to report the appropriate body.</p>

Variable	Range
Concept agricultural marketing	<p>May include, but not limited to:</p> <ul style="list-style-type: none"> • Needs • Product • Demand • Value • Transaction • Satisfaction and Quality • Exchange • Market
Roles marketing	<p>May include but not limited to:</p> <ul style="list-style-type: none"> • Determine price • Consumer choice • Increase efficiency

	<ul style="list-style-type: none"> • Improve scarcity
Principles agricultural marketing	<p>May include but not limited to:</p> <ul style="list-style-type: none"> • Product • Price • promotion • Place • People • Process
Marketing mix	<ul style="list-style-type: none"> • May include, but not limited to: • Price • Promotion • Place • Product
Types of marketing	<p>May include, but not limited to</p> <ul style="list-style-type: none"> • Perfect competitive • Monopoly • Oligopoly • Monopolistic
Concept of Agribusiness	<p>May include, but are not limited to:</p> <ul style="list-style-type: none"> • Agricultural impute supply • Farmer producer • Process of wholesaler • Distribution and retailer
Characteristic of Agribusiness	<p>May include but not limited to:</p> <ul style="list-style-type: none"> • Existence around production areas • Variety and size of Ag organization • Scale and type of competition • Conservativeness of Ag: • Decision making: • Community oriented business
Dimension	<p>May include, but not limited to:</p> <ul style="list-style-type: none"> • Agricultural sector and their interdependence • farm either private or government • Market oriented. • Dynamic sector and continuously meets current demands of consumers • Provides forward and backward linkages
Structures	<p>May include but not limited to:</p> <ul style="list-style-type: none"> • Input sector: • Farm/production sector: • Product sector:
Marketing	<p>May include but not limited to:</p>

targets	<ul style="list-style-type: none"> • Demographic • Geographic • Psychographic • Behaviours pattern
Marketing conditions	<p>May include but not limited to:</p> <ul style="list-style-type: none"> • Government • International transaction • Speculation and expectation • Supply and demand
Agricultural Market strategies	<p>May include, but not limited to:</p> <ul style="list-style-type: none"> • Analyse agricultural market • Analyse competition • Define market mix • Determine position • Marketing budget • Execution plan understand potential customers
Approaches for agricultural market	<p>May include, but not limited to:</p> <ul style="list-style-type: none"> • Functional • Institution • Commodity • Behavioural
Segment descriptors	<p>May include, but not limited to:</p> <ul style="list-style-type: none"> • Demographic • Behavioural • Geographic • Psychographic
Marketing plans	<p>May include, but not limited to</p> <ul style="list-style-type: none"> • Function of marketing • Market program • Achieve the market objectives
Action plan	<p>May include, but not limited to:</p> <ul style="list-style-type: none"> • Resource • Budget • Times • Output

Contract farming	<p>May include, but not limited to</p> <ul style="list-style-type: none"> • Agreement between buyer and seller • Farmer and processing making firms for production • Supplies of agricultural product
Types of contract farming	<p>May include, but not limited to</p> <ul style="list-style-type: none"> • Market specifying • Recourse providing • Production management
Models of Contract	<p>May include, but not limited to</p> <ul style="list-style-type: none"> • Full model contract farming • Specific
Requirements	<ul style="list-style-type: none"> • Traceability • Site history and management • Propagation material • Soil/substrate management • Fertilizer use • Irrigation • Crop protection

Evidence Guide	
Critical Aspects of Competence	<p>Must demonstrate skills and knowledge to:</p> <ul style="list-style-type: none"> • Understand the concept of agribusiness to apply agribusiness marketing • Identify Principles of agribusiness and strategies to implement Agribusiness marketing • Determine Agricultural Marketing targets for provide products and services • Develop Action plan to implement Agricultural marketing strategies. • Prepare Business plans to perform cost and benefit analysis • Apply marketing conditions to conducted Need assessment for products and service • Understand concept of contract farming to enhance market oriented production • Apply appropriate models to established contract farming • Contract farming requirements are identified and applied based on the organizational guide line • Established Contract farming systems based on the organizational standard
Required Knowledge and Attitude	<p>Demonstrate knowledge of :</p> <ul style="list-style-type: none"> • Principles of agricultural marketing to implement marketing strategy • Concept of agribusiness to apply agribusiness marketing

	<ul style="list-style-type: none"> • the roles of agribusiness to perform agricultural marketing. • Principles of agribusiness and strategies to implement Agribusiness marketing • Agricultural Marketing targets that provide products and services • Required resource to implement agricultural marketing • concept of contract farming to enhance market oriented production • appropriate models to established contract farming • Contract farming systems based on the organizational standard
Required Skills	<p>Demonstrate Skills to :</p> <ul style="list-style-type: none"> • Determine marketing options to design marketing plan • Implement Agricultural marketing strategies develop action plan • Identified Agricultural Marketing targets for provide products and services • Select Approaches of agricultural market to implement product and service. • Use segment descriptors to display the targets of agricultural market • Develop Action plan to implement Agricultural marketing strategies. • Prepare Business plans to perform cost and benefit analysis • Apply marketing conditions to conducted Need assessment for products and service • Organize customer feedbacks to improve Agricultural marketing services • Apply appropriate models to established contract farming • Contract farming requirements to applied based on the organizational guide line • Established Contract farming systems based on the organizational standard
Resources Implication	Access is required to real or appropriately simulated situations, including work areas, materials and equipment, and to information on workplace practices and OHS practices.
Methods of Assessment	<p>Competence may be assessed through:</p> <ul style="list-style-type: none"> • Interview/Written Test • Observation/Demonstration with Oral Questioning
Context of Assessment	Competence may be assessed in the work place or in a simulated work place setting.

Occupational Standard: Irrigation and Drainage Level I	
Unit Title	Apply Basics of Human Nutrition Practices
Unit Code	AGR IRD1 15 0322
Unit Descriptor	This unit covers the knowledge, skill and attitude required to categorize agricultural foods items, recognize malnutrition in the community, identify the role of agriculture in nutrition and contribute to the awareness creation of the community in utilization of agricultural products.

Element	Performance Criteria
1. Identify Categories of agricultural foods items	<p>1.1. Basic <i>terminologies and concepts</i> in nutrition are identified and explained</p> <p>1.2. <i>Food groups, nutrient and their sources</i> of balanced diet are identified and explained</p> <p>1.3. <i>Origin</i> and composition of food stuffs are identified and described</p> <p>1.4. <i>Energy dense</i> and <i>nutrient dense</i> food sources are identified and explained</p>
2. Recognize malnutrition in the community	<p>2.1. Physical signs of malnutrition are identified and explained</p> <p>2.2. Forms, causes and consequences of <i>malnutrition</i> in different groups of community are identified</p> <p>2.3. Measures to overcome malnutrition, importance of maintenance of adequate and balanced diet are promoted</p> <p>2.4. Contribution is made in elders, family heads and women awareness creation programs</p>
3. Identify the role of agriculture in nutrition	<p>3.1. The role of agriculture as source of variety foods is recognized and promoted</p> <p>3.2. The contribution of agriculture sector in nutrition sensitive intervention is described</p> <p>3.3. <i>Nutrition sensitive agricultural practices</i> are identified and communicated as per the nutrition program guideline</p>
4. Demonstrate diversified Agricultural food production and consumption techniques	<p>4.1. Importance of diet diversification is identified and discussed with family holds and community according to the program guideline</p> <p>4.2. Techniques of diversified food production are identified and</p>

	<p>demonstrated to farmers and family members</p> <p>4.3. Techniques of enhancing the nutrient content of family foods are assessed and implemented according to the program guideline and cultural requirements of the rural community</p> <p>4.4. Utensils are identified and cooking techniques demonstrated for specific agricultural products</p> <p>4.5. PPE are selected and used in accordance to OHS requirement and code of ethics</p> <p>4.6. Balanced and nutrient dense diet preparation is demonstrated using food stuff ingredients</p>
5.Perform proper handling and storage of agricultural food products	<p>5.1. Importance of hygiene for nutrition is explained</p> <p>5.2. Storage facilities are identified and family holds supported in construction.</p> <p>5.3. Agricultural products are safely handled and stored</p> <p>5.4. Methods and techniques of safely handling and storing agricultural products are demonstrated in accordance products requirement</p>
6.Document and report food production, consumption and difficulties	<p>6.1. Diversified food production and consumption activities are documented</p> <p>6.2. Difficulties happened in the processes are reported to the respective authorities.</p>

Variable	Range
Terminologies and concepts	<p>May include, but not limited to:</p> <ul style="list-style-type: none"> • Food • Diet • Nutrient • Balanced Diet • Nutritious food • Hidden hunger • Malnutrition • Stunting • Underweight • Overweight • Nutrition • Diversification • Body growth • Body Development

	<ul style="list-style-type: none"> • Food fortification • Bioavailability • Food taboos • Window of opportunity • Fortification • Food security • Nutrition security • Small holder farmer • Cretinism
Food groups	<p>May include, but not limited to:</p> <ul style="list-style-type: none"> • Vegetables food group • Fruits food group • Legumes and nuts food group • Animal source food group • Fats oils and sweets food group • Staples food group
Nutrient and their sources	<p>May include, but not limited to:</p> <ul style="list-style-type: none"> • Carbohydrates • Lipids/Fats • Proteins • Minerals • Vitamins
Food origin	<p>May include, but not limited to:</p> <ul style="list-style-type: none"> • Animal • Plant
Energy dense	<p>May include, but not limited to:</p> <ul style="list-style-type: none"> • Calories • Nutrient
Nutrient dense	<p>May include, but not limited to:</p> <ul style="list-style-type: none"> • Vitamins • Minerals • Fibbers
Malnutrition	<p>May include, but not limited to:</p> <ul style="list-style-type: none"> • Under nutrition may be: <ul style="list-style-type: none"> ➤ stunting ➤ wasting ➤ underweight • Over nutrition may be: <ul style="list-style-type: none"> ➤ obesity ➤ overweight
Nutrition sensitive	<p>May include, but not limited to:</p>

agricultural practices	<ul style="list-style-type: none"> • Nutrition sensitive agricultural intervention • Diversification in: <ul style="list-style-type: none"> ➤ Production of fruits, vegetable, nutritious roots, cereals, pulse, and mushroom ➤ Animal source foods (Dairy, poultry, shoat, fish)
Techniques of enhancing	<p>May include, but not limited to:</p> <ul style="list-style-type: none"> • Fortification, • Germination, • Fermentation, • Roasting and Cooking
Hygiene	<p>May include, but not limited to:</p> <ul style="list-style-type: none"> • Food hygiene • Personal hygiene • Environmental hygiene
Storage facilities	<p>May include, but not limited to:</p> <ul style="list-style-type: none"> • Bins • Refrigerator • Shelf • Rack and Barn
Safely handling and storing	<p>May include, but not limited to:</p> <ul style="list-style-type: none"> • Sanitation • Ventilation

Evidence Guide

Critical Aspects of Competence	<p>Demonstrate knowledge and skills to:</p> <ul style="list-style-type: none"> • Use utensils and prepare balanced nutrition • Distinguish and demonstrate energy dense and nutrients- dense foods and preparation techniques • Demonstrate food storing and preserving techniques • Explain the need for variety and diversification of foods • Explain agricultural food types, and sources • Describe forms, causes and consequences of excess or deficient intake of certain food types • Maintain personal hygiene to minimize risk to food product safety
Required Knowledge and Attitude	<p>Demonstrate knowledge of:</p> <ul style="list-style-type: none"> • Terminologies and concepts of nutrition • OHS requirements • Food groups and nutrient composition and diet requirement

	<ul style="list-style-type: none"> • Adequate and balanced diets • Agricultural food types, and sources • Need for variety and diversification of family diet with a variety of agricultural food products • Basic principles of producing quality/ nutritious agricultural products • Effect of food production and /or preparation on nutrient content of a variety of energy- dense and nutrients- dense foods • Child and maternal nutrition • Forms, causes and consequences of malnutrition • Basic food safety principles and requirements • Hygiene and food safety procedures • food safety recording requirements • Common hazards and sources of contamination in area of work • Legal and regulatory requirements pertaining to food production, storage, handling and packaging relevant to area of work • Personal hygiene practices and clothing requirements relevant to area of work.
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<p>Required Skills</p>	<p>Demonstrate skills to:</p> <ul style="list-style-type: none"> • Categorize agricultural food items into major food groups based on their nutrient contents • Identify local varieties of animal and plant products, • Demonstrate production and /or preparation of nutrient rich diets • Communicate appropriate information with regard to diversified foods for pregnant women and children • Demonstrate various methods of integrated nutritious agricultural products production • Identify the consequences of excess or deficient intake of certain food types • Demonstrate how to enhance nutrient content using different food groups • Handle food products to prevent damage, spoilage and waste • Identify hazards, contaminants and risks or control points • Document and report food safety hazards and risks to appropriate personnel • Store food products in appropriate areas at correct
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	temperatures
Resource Implications	Access is required to real or appropriately simulated situations, including work areas, materials and equipment, and to information on workplace practices and OHS practices.
Methods of Assessment	Competence may be assessed through: <ul style="list-style-type: none"> • Interview/Written Test • Observation/Demonstration with Oral Questioning
Context of Assessment	Competence may be assessed in the work place or in a simulated work place setting.

Occupational Standard: Irrigation and Drainage Level I	
Unit Title	Apply 5S Procedures
Unit Code	AGR IRD1 16 0322
Unit Descriptor	This unit covers the knowledge, skills and attitude required to apply 5S techniques to his/her workplace. It covers responsibility for the day-to-day operations of the workplace and ensuring that continuous improvements of Kaizen elements are initiated and institutionalized.

Elements	Performance Criteria
1. Prepare for work.	<p>1.1. Work instructions are used to determine job requirements, including method, material and equipment.</p> <p>1.2. Job specifications are read and interpreted following working manual.</p> <p>1.3. OHS requirements, including dust and fume collection, breathing apparatus and eye and ear personal protection needs are observed throughout the work.</p> <p>1.4. Tools and equipment are prepared and used to implement 5S.</p> <p>1.5. Safety equipment and tools are identified and checked for safe and effective operation.</p> <p>1.6. Kaizen Board (Visual Management Board) is prepared and used in harmony with different workplace contexts.</p>
2. Sort items.	<p>2.1. Plan is prepared to implement sorting activities.</p> <p>2.2. Cleaning activities are performed.</p> <p>2.3. All items in the workplace are identified following the appropriate procedures.</p> <p>2.4. Necessary and unnecessary items are listed using the appropriate format.</p> <p>2.5. Red tag strategy is used for unnecessary items.</p> <p>2.6. Unnecessary items are evaluated and placed in an appropriate place other than the workplace.</p> <p>2.7. Necessary items are recorded and quantified using appropriate format.</p> <p>2.8. Performance results are reported using appropriate formats.</p> <p>2.9. Necessary items are regularly checked in the workplace.</p>
3. Set all items in order.	<p>3.1. Plan is prepared to implement set in order activities.</p> <p>3.2. General cleaning activities are performed.</p> <p>3.3. Location/Layout, storage and indication methods for items are decided.</p> <p>3.4. Necessary tools and equipment are prepared and used for setting in order activities.</p> <p>3.5. Items are placed in their aIRDgnd locations.</p> <p>3.6. After use, the items are immediately returned to their aIRDgnd locations.</p> <p>3.7. Performance results are reported using appropriate formats.</p>

	3.8. Each item is regularly checked in its assigned location and order.
4. Perform shine activities.	4.1 Plan is prepared to implement shine activities. 4.2 Necessary tools and equipment are prepared and used for shining activities. 4.3 <i>Shine activity</i> is implemented using appropriate procedures. 4.4 Performance results are reported using appropriate formats. 4.5 Regular shining activities are conducted.
5. Standardize 5S.	5.1. Plan is prepared and used to standardize 5S activities. 5.2. <i>Tools and techniques to standardize 5S</i> are prepared and implemented based on <i>relevant procedures</i> . 5.3. Checklists are followed for standardize activities and <i>reported to relevant personnel</i> . 5.4. The workplace is kept to the specified standard. 5.5. Problems are avoided by standardizing activities.
6. Sustain 5S.	6.1. Plan is prepared and followed to sustain 5S activities. 6.2. Tools and techniques to sustain 5S are discussed, prepared and implemented based on relevant procedures. 6.3. Workplace is inspected regularly for compliance to specified standard and sustainability of 5S techniques. 6.4. Workplace is cleaned up after completion of job and before commencing next job or end of shift. 6.5. Situations are identified where compliance to standards is unlikely and actions specified in procedures are taken. 6.6. Improvements are recommended to lift the level of compliance in the workplace. 6.7. Checklists are followed to sustain activities and report to relevant personnel. 6.8. Problems are avoided by sustaining activities.

Variable	Range
OHS requirements	<p>May include, but not limited to:</p> <ul style="list-style-type: none"> • Legislation/Regulations/Codes of practice and enterprise safety policies and procedures. This may include protective clothing and equipment, use of tooling and equipment, workplace environment and safety, handling of material, use of fire fighting equipment, enterprise first aid, hazard control and hazardous materials and substances. • Personal protective equipment is to include that prescribed under legislation/regulations/codes of practice and workplace policies and practices. • Safe operating procedures are to include, but are not limited to the conduct of operational risk assessment and treatments associated with workplace organization.

	<ul style="list-style-type: none"> • Emergency procedures related to this unit are to include but may not be limited to emergency shutdown and stopping of equipment, extinguishing fires, enterprise first aid requirements and site evacuation.
Tools and equipment	<p>May include, but not limited to:</p> <ul style="list-style-type: none"> • Paint • Hook • Sticker • Signboard • Nails • Shelves • Chip wood • Sponge • Broom • Pencil • Shadow board/Tools board
Safety equipment and tools	<p>May include, but not limited to:</p> <ul style="list-style-type: none"> • Dust masks/goggles • Glove • Working cloth • First aid and safety shoes
Items	<p>May include, but not limited to:</p> <ul style="list-style-type: none"> • Tools • Jigs/Fixtures • Materials/components • Machine and equipment • Manuals • Documents • Personal items (e.g. Bags, lunch boxes and posters) • Safety equipment and personal protective equipment • Other items which happen to be in the work area
The appropriate procedures	<p>May include, but not limited to:</p> <ul style="list-style-type: none"> • Steps for implementing 5S (sort, set in order and shine) activities. • Written, verbal and computer based or in some other format.
Unnecessary items	<p>Are not needed for current production or administrative operation and include but not limited to:</p> <ul style="list-style-type: none"> • Defective or excess quantities of small parts and inventory • Out dated or broken jigs and dies • Worn-out bits • Out dated or broken tools and inspection gear • Old rags and other cleaning supplies • Electrical equipment with broken cords

	<ul style="list-style-type: none"> • Out dated posters, signs, notices and memos • Some locations where unneeded items tend to accumulate • In rooms or areas not designated for any particular purpose • In corners next to entrances or exists • Along interior and exterior walls • Next to partitions and behind pillars • Under the eaves of warehouses • Under desks and shelves and in desk and cabinet drawers • Near the bottom of tall stacks of items • On unused management and production schedule boards • In tools boxes that are not clearly sorted
Appropriate format	<p>May include, but not limited to:</p> <ul style="list-style-type: none"> • All items, necessary and unnecessary items.
Red tag	<p>A format prepared with a red color paper or card which is filled and attached temporarily on the unnecessary items until decision is made. The red tag catch people's attention because red is a color that stands out. So to fill and attach red tag on items, asks the following three questions:</p> <ul style="list-style-type: none"> • Is this item needed? • If it is needed, is it needed in this quantity? • If it is needed, does it need to be located here?
Necessary items	<p>Are required in the workplace for current production or administrative operation in the amount needed.</p>
Shine activity	<p>May include, but not limited to:</p> <ul style="list-style-type: none"> • Inspection • Cleaning • Minor maintenance May include, but not limited to: <ul style="list-style-type: none"> ➤ Tightening bolts ➤ Lubrication and Replacing miIRDng parts
Tools and techniques to standardize 5S	<p>May include, but not limited to:</p> <ul style="list-style-type: none"> • 5S Job Cycle Charts • Visual 5S • The Five Minute 5S • Standardization level checklist • 5S checklist • The five Whys and one How approach(5W1H) • Suspension • Incorporation and Use Elimination • 5S slogans • 5S posters • 5S photo exhibits and storyboards • 5S newsletter

	<ul style="list-style-type: none"> • 5S maps • 5S pocket manuals • 5S department/benchmarking tours • 5S months • 5S audit • Awarding system • Big cleaning day • Patrolling system May include, but not limited to: <ul style="list-style-type: none"> ➤ Top management Patrol ➤ 5S Committee members and Promotion office Patrol ➤ Mutual patrol ➤ Self-patrol • Checklist and Camera patrols
Relevant procedures	<p>May include, but not limited to:</p> <ul style="list-style-type: none"> • AIRDgn 5S responsibilities • Integrate 5S duties into regular work duties • Check on 5S maintenance level • OHS measures such as signage, symbols / coding and labelling of workplace and equipment • Creating conditions to sustain your plans • Roles in implementation
Reporting	<p>May include, but not limited to:</p> <ul style="list-style-type: none"> • Verbal responses • Data entry into enterprise database • Brief written reports using enterprise report formats
Relevant personnel	<p>May include, but not limited to:</p> <ul style="list-style-type: none"> • Supervisors, managers and quality managers • Administrative, laboratory and production personnel • Internal/external contractors, customers and suppliers

Evidence Guide	
Critical Aspects of Competence	<p>Demonstrates skills and knowledge to:</p> <ul style="list-style-type: none"> • Discuss how to organize KPT. • Describe the pillars of 5S. • Discuss the relationship between Kaizen elements. • Implement 5S in own workplace by following appropriate procedures and techniques.
Required Knowledge and Attitudes	<p>Demonstrates knowledge of:</p> <ul style="list-style-type: none"> • Kaizen principle, pillars and concept • Key characteristic of Kaizen • Elements of Kaizen

	<ul style="list-style-type: none"> • Wastes/MUDA • Basics of KPT • Aims, benefits and principles of KPT • Stages of KPT • Structure and role of the components of Junior KPT • Concept and parts of Kaizen board • Concept and benefits of 5S • The pillars of 5S • Three stages of 5S application • Benefits and procedure of sorting activities • The concept and application of Red Tag strategy • Relevant Occupational Health and Safety (OHS) and environment requirements • Benefits and procedure of set in order activities • Set in order methods/techniques • Benefits and procedure of shine activities • Inspection methods • Planning and reporting methods • Method of Communication • Benefits of standardizing and sustaining 5S • Tools and techniques to sustain 5S • Ways to improve Kaizen elements • Benefits of improving kaizen elements • Relationship between Kaizen elements
Required Skills	<p>Demonstrates skills of:</p> <ul style="list-style-type: none"> • Participating actively in KPT • Technical drawing • Communication skills • Planning and reporting own tasks in implementation of 5S • Following procedures to implement 5S in own workplace • Using sorting formats to identify necessary and unnecessary items • Improving workplace layout following work procedures • Preparing labels, slogans, etc. • Reading and interpreting documents • Observing situations • Gathering evidence by using different means • Recording activities and results using prescribed formats • Working with others • Solving problems by applying 5S • Preparing and using kaizen board • Preparing and using tools and equipment to implement and sustain 5S

	<ul style="list-style-type: none"> • Improving Kaizen elements by applying 5S • Standardizing and sustaining procedures and techniques to avoid problems • Procedures to standardizing 5S activities • Analysing and preparing shop layout of the workplace • Standardizing and sustaining checklists
Resources Implication	Access is required to real or appropriately simulated situations, including work areas, materials and equipment, and to information on workplace practices and OHS practices.
Methods of Assessment	Competence may be assessed through: <ul style="list-style-type: none"> • Interview/Written Test • Observation/Demonstration with Oral Questioning
Context of Assessment	Competence may be assessed in the work place or in a simulated work place setting.

Level II

Occupational Standard: Irrigation and Drainage Level II	
Unit of Competence:	Identify and select irrigation methods
Unit Code	<u>AGR IRD2 01 0322</u>
Unit Descriptor	This unit covers the knowledge, skills and attitude required to gathering of relevant information and Select appropriate Irrigation Method.

Element of competence	Performance criteria
1. Gather relevant information	1.1 Information on <i>indigenous practice</i> irrigation methods is gathered based on standard survey technique 1.2 Discussion is made with target group in a participatory approach 1.3 Data on soil type is collected & collated using standard guide lines
2. Select appropriate Irrigation Method	2.1 Irrigation method is identified based on crop type and land use capability of the area 2.2 Irrigation method is selected based on water source potential in agreement with water resource utilization policy 2.3 Land gradient of the command area is determined using contour map 2.4 Chosen method is compared with indigenous method in light of productivity

Variable	Range
Indigenous practices:	May include but not limited to: <ul style="list-style-type: none"> • Local or traditional activities.

Evidence Guide	
Critical Aspects of competence	Must demonstrates knowledge and skills to: <ul style="list-style-type: none"> • Identify indigenous practices • Collect data for soil type, crop type, water source potential • Read topographic map • Describe irrigation methods, their advantages and disadvantages, applicability • Select appropriate irrigation methods

The required Knowledge and Attitudes	<p>Must demonstrates knowledge to:</p> <ul style="list-style-type: none"> • Basic knowledge of indigenous practices • Communication • Irrigation methods, their advantages & disadvantages, applicability and cost • Developments in related technology • Environmental issues. • Data collection and recording techniques
The required skills	<p>Must demonstrates skills to:</p> <ul style="list-style-type: none"> • Undertake economic analysis • Read topographic map • Collect and analyses data • Select appropriate irrigation methods
Resources Implication	<p>Access is required to real or appropriately simulated situations, including work areas, materials and equipment, and to information on workplace practices and OHS practices.</p>
Methods of Assessment	<p>Competence may be assessed through:</p> <ul style="list-style-type: none"> • Interview/Written Test • Observation/Demonstration with Oral Questioning
Context of Assessment	<p>Competence may be assessed in the work place or in a simulated work place setting.</p>

Occupational Standard: Irrigation and Drainage Level II	
Unit of competence	Perform Irrigated crops and Pasture Production
Unit Code	AGR IRD2 02 0322
Unit Descriptor	This unit covers the knowledge, skills and attitude required to Preparation for crop and pastures establishment operations, prepare the site for planting and Care for young plants.

Element of competence	Performance Criteria
1. Prepare for crop and pasture establishment operations	<p>1.1 Instructions about establishing the crop and pasture are interpreted and clarified with the supervisor.</p> <p>1.2 Machinery, equipment and tools are selected and prepared for the task being undertaken.</p> <p>1.3 OHS hazards are identified, risks assessed and reported to the supervisor.</p> <p>1.4 The environmental implications of the crop and pasture establishment program are identified and discussed with the supervisor.</p> <p>1.5 Suitable personal protective equipment (PPE) is selected, used and maintained.</p>
2. Prepare the site for planting	<p>2.1 Old crop and other waste materials are removed and disposed of in full consideration of environmental implications.</p> <p>2.2 Where soil is the growing media, samples are taken for testing according to established procedures.</p> <p>2.3 Where soil is the growing media, soil treatment/ amendments are applied according to soil test results and supervisors' instructions.</p> <p>2.4 Growing media is prepared according to the crop establishment plan.</p> <p>2.5 Crop protection is implemented according to guidelines.</p> <p>2.6 The planting pattern is marked out according to the crop Establishment plan.</p> <p>2.7 Materials & tools are operated according to enterprise guidelines.</p>
3. Carry out planting operations	<p>3.1 Planting material is selected according to the type of Crop and pasture as per organization quality standards.</p> <p>3.2 Planting material is treated according to the crop and pasture as per Supervisor's instructions.</p> <p>3.3 Planting material, waiting to be planted is maintained Under conditions that will ensure maximum viability.</p> <p>3.4 Planting material is handled and transported to the site With no signs of transport damage.</p>

	3.5 Planting is carried out according to the planting plan.
4. Care for young plants	4.1 Treatments are applied to plantings according to the Supervisor's instructions. 4.2 Water is applied to plantings according to the irrigation Schedule and established sustainable farming practices. 4.3 Plants are trained according to the supervisors Directions.

Variable	Range statement
Instructions	May include but not limited to: <ul style="list-style-type: none"> • Standard Operating Procedures (SOPs), • company policy and procedures in regard crop establishment, • specifications, • work notes, • Material Safety Data Sheets, • manufacturer's instructions, • product labels, or verbal directions from the manager, supervisor, or senior operator.
Machinery, equipment and tools	May include but not limited to: <ul style="list-style-type: none"> • Tractors, • rotary hoes, • cultivators, • fertilizer spreaders, • surveying and measuring equipment, • seeding or planting machinery.
OHS hazards	May include but not limited to: <ul style="list-style-type: none"> • the use of machinery • moving machinery and machinery parts, • falling trees and plant debris • chemicals and hazardous substances • manual handling, • solar radiation, • dust • noise
Environmental implications	May include but not limited to: <ul style="list-style-type: none"> • contamination of off-site ground water or soils from solids • debris, nutrients or chemicals; • land disturbance, • spread of Noxious weeds

	<ul style="list-style-type: none"> • water run-off.
PPE	<p>May include but not limited to:</p> <ul style="list-style-type: none"> • Hat • Boots • Overalls • Gloves • Goggles • respirator or face mask • hearing protection • sunscreen lotion • hardhat.
disposal	<p>May include but not limited to:</p> <ul style="list-style-type: none"> • Disinfestations • ploughing organic waste into the soil, • mulching or composting of plant material, • bagging and removal of seed heads • disposing of noxious or poisonous material at approved disposal sites.
testing	<p>May include but not limited to:</p> <ul style="list-style-type: none"> • Tests for: <ul style="list-style-type: none"> ➤ pH, ➤ salinity, ➤ water repellence, ➤ slaking, ➤ proportion of organic matter.
Soil treatments/ amendments	<p>May include but not limited to:</p> <ul style="list-style-type: none"> • Gypsum • organic matter • artificial fertilizers • the planting of a temporary or permanent cover crop.
Crop protection	<p>May include but not limited to:</p> <ul style="list-style-type: none"> • Wind protection such as artificial structures, permanent shelter belts or temporary plantings of cereals, stakes; and mulch, including straw, plastic, cover crop or any vegetative material.
Planting material	<p>May include but not limited to:</p> <ul style="list-style-type: none"> • Seeds • Seedlings • Runners • cuttings or bare rooted trees.

Treatment	May include but not limited to: <ul style="list-style-type: none"> • fungicide dips • fungicide dusts for seeds • root trimming • shoot trimming crown gall dips • Anti-transparent
Applying water	May include but not limited to: <ul style="list-style-type: none"> • Drips • Overheads • central pivot • micro irrigation • under tree • flood.
trained	May include but not limited to: <ul style="list-style-type: none"> • trimming • staking • trellising.

Evidence Guide	
Critical Aspects of Competence	Must demonstrates knowledge and skills to: <ul style="list-style-type: none"> • interpret a site map, • clear the site of old plantings, • prepare the soil and site for plantings, • Prepare the plants, plant the crop and pasture, maintain the new crop or pasture.
The required Knowledge and Attitudes	Must Demonstrates knowledge to: <ul style="list-style-type: none"> • Principles of sustainable horticultural practices • Importance of field hygiene and quality control in regard to crop and pasture establishment • Principles and operations of a range of irrigation systems use for field crops • Principles and operations of a range of irrigation systems use for pasture and forage • Nutritional, water and other requirements of the crop • The importance of correct timing and procedures for crop planting • Range of pre-planting soil treatments and their importance • Methods of waste disposal causing minimal impact on the environment.

The required skills	<p>Must demonstrate Skills to:</p> <ul style="list-style-type: none"> • Participate in teams and contribute to team objectives • Communicate ideas and information relating to preparation, planting and crop and pasture care, and problems encountered with other members of the work team and the supervisor. • Read and interpret a range of workplace information • Calculate spacing and planting patterns, measure quantities of treatment • Collect, analyze and organize information and Enterprise work procedures, such as a daily planting plan, mulching, fertilizing and water requirements of crops and pasture, • Plan and organize activities materials, tools, equipment and work activities for crop and pasture establishment routines • Solve problems relating to site preparation, crop and pasture planting, treatments, watering, machinery and equipment, workplace safety, • Use technology in the preparation, use and maintenance of horticultural equipment and machinery used for spreading of fertilizer or other crop treatments.
Resources Implication	Access is required to real or appropriately simulated situations, including work areas, materials and equipment, and to information on workplace practices and OHS practices.
Methods of Assessment	<p>Competence may be assessed through:</p> <ul style="list-style-type: none"> • Interview/Written Test • Observation/Demonstration with Oral Questioning
Context of Assessment	Competence may be assessed in the work place or in a simulated work place setting.

Occupational Standard: Irrigation and Drainage Level II	
Unit of Competence:	Apply Basics of Estimating Crop Water Requirements
Unit Code	<u>AGR IRD2 03 0322</u>
Unit Descriptor	This unit covers the knowledge, skills and attitude required to Collect & organize all Required Data and compilation of data and compute crop water requirement

Element of competence	Performance criteria
1. Collect & organize all Required Data	<p>1.1 Factors influencing Crop water requirement (CWR) are identified</p> <p>1.2 Crop characteristics, crop coefficient, growth stage, period and root depth at different growth stages are identified from official research publication.</p> <p>1.3 Data of climate , crop types, sunshine hour, wind speed, humidity are Collected from methodology agency or from relevant institute and Organized</p> <p>1.4 Soil related data are collected and organized.</p> <p>1.5 <i>Tools, Materials and Equipment</i> Proper Use and Maintenance are conducted.</p> <p>1.6 Crop water requirement works are conducted according to <i>OHS requirements</i>.</p>
2. Compute crop water requirement	<p>2.1. Economically and agro-ecologically beneficial crop is selected in accordance with preference of site.</p> <p>2.2. Method for estimating crop water requirement is selected based on data preference.</p> <p>2.3. Crop Water Requirement is estimated.</p>

Variable	Range
Tools, materials and equipment	<p>May include but not limited to:</p> <ul style="list-style-type: none"> • Auger • core sampler • Computer and software • Spatula • Oven • pressure apparatus • sensitive balance • Sieve • soil grinder

	<ul style="list-style-type: none"> • hydro meter • shaker • measuring cylinder • Thermometer • stop watch • flasks.
OHS Requirements	<p>May include but not limited to:</p> <ul style="list-style-type: none"> • chemicals • slippery or uneven surfaces • moving machinery and vehicles, • Snake • spider and Insect bites • solar radiation and dust • Glove • safety wear • Helmet • eye glass

Evidence Guide	
Critical Aspects of competence	<p>A candidate must demonstrate the ability to:</p> <ul style="list-style-type: none"> • Collect climatic data • Identify soil type • Select crop type
The required Knowledge and Attitudes	<p>Demonstrates knowledge and understanding of:</p> <ul style="list-style-type: none"> • Soil, crop and climatic data analysis • Soil-plant-water relationship • Computer software models related to irrigation water requirement • Developments in related technology • Environmental issues
The required skills	<p>Skills include the ability to:</p> <ul style="list-style-type: none"> • Collect climatic data • Identify soil type • Select crop type
Resources Implication	<p>Access is required to real or appropriately simulated situations, including work areas, materials and equipment, and to information on workplace practices and OHS practices.</p>

Methods of Assessment	Competence may be assessed through: <ul style="list-style-type: none"> • Interview/Written Test • Observation/Demonstration with Oral Questioning
Context of Assessment	Competence may be assessed in the work place or in a simulated work place setting.

Occupational Standard: Irrigation and Drainage Level II	
Unit of competence	Operate and Maintain Basic Surface irrigation System
Unit Code	AGR IRD2 04 0322
Unit Descriptor	This unit covers the knowledge, skill and attitude required to prepare and set up field for surface irrigation operation, carry out irrigation operations and maintenance, and clean and store surface irrigation equipment.

Element of competence	Performance Criteria
1. prepare equipment and set up field for surface irrigation operation	<p>1.1 Irrigation equipment is handled safely in accordance with OHS practices.</p> <p>1.2 Irrigation equipment is positioned in accordance with organization requirements.</p> <p>1.3. set up field for surface irrigation</p> <p>1.3 Rot buck area is checked for irrigation set up and action taken as required in accordance with organization policy and procedures.</p> <p>1.4 water delivery mechanisms are checked for irrigation set up and action taken as required in accordance with enterprise policy and procedures.</p> <p>1.5 Tarpaulins or other water control devices are positioned and secured as required in accordance with organization procedures.</p>
2. Carry out irrigation operations	<p>2.1 Gates and/or valves are opened and shut as necessary in accordance with organization procedures.</p> <p>2.2 Required head and water levels in head ditch are achieved and maintained to ensure sufficient water flow and availability to crops.</p> <p>2.3 Required number of siphons is started /opened in accordance with enterprise procedures.</p> <p>2.4 Progress of water flow in furrows is monitored in accordance with organization procedures.</p> <p>2.5 Siphons are lifted where irrigation is complete in accordance with organization procedures.</p> <p>2.6 Irrigation change is carried out and marked as required.</p> <p>2.7 Irrigation equipment is shifted, as required, for irrigation changes in accordance with OHS guidelines.</p>
3. Carry out pre- and post-seasonal maintenance preparation	<p>3.1 Plans the maintenance activities.</p> <p>3.2 Tools and materials is prepared pre-season for effective operation in accordance with design specifications and enterprise standards.</p>

	<p>3.3 System is closed and made resistant to damage during post-season in accordance with design specifications and standards.</p> <p>3.4 Equipment is stored during <i>post-season</i> according to standards.</p>
4. Carry out routine and Periodical maintenance activities on Surface irrigation delivery systems	<p>4.1 All <i>routine and Periodical maintenance</i> activities are carried out according to the maintenance program, OHS requirements and the Manufacturers' specifications.</p> <p>4.2 Mechanical equipment is serviced in accordance with the operators' manual or as directed.</p> <p>4.3 Supply and distribution <i>system</i> is flushed and cleaned as directed.</p> <p>4.4 System inlets, <i>outlets</i>, structures, and fittings are maintained as directed.</p> <p>4.5 System is checked for smooth running and is free of damage, leaks, and blockages in channels, drains, and outlets, as necessary, in accordance with design specifications and organization procedures.</p> <p>4.6 Silt is cleared from channels, drains, sumps, and crossings with no disruption to gradients and levels, as necessary.</p> <p>4.7 <i>Adverse environmental impacts</i> of the irrigation system are identified and reported.</p> <p>4.8 Appropriate materials are used for backfilling and building/repairing <i>banks</i> in accordance with organization standards.</p>
5. Clean and store irrigation equipment as required	<p>5.1 Equipment is cleaned and prepared for storage, as necessary, in accordance with organization policy and procedures.</p> <p>5.2 Equipment is loaded for transport safely, if necessary, in accordance with OHS practices.</p> <p>5.3 Equipment is stored as required, in accordance with organization policy and procedures.</p>
6. Record and report maintenance activities	<p>6.1 All damage and blockage are recorded by damage type, location and the section of the system affected.</p> <p>6.2 Damage or faulty irrigation components are recorded and reported, and action taken to effect repairs.</p> <p>6.3 All routine maintenance activities are recorded and reported in accordance with standards.</p>

Variable	Range
Irrigation equipment	May include but not limited to: <ul style="list-style-type: none"> • Siphons

	<ul style="list-style-type: none"> • Flexible gated pipe • partial flume • Water hose (high pressure) • pressure gauge • gate valve
Sufficient water flow	<p>May include but not limited to:</p> <ul style="list-style-type: none"> • Depth of water • Measurement of water • Application • prevent over or under watering
Tools and Materials	<p>May include but not limited to:</p> <ul style="list-style-type: none"> • Measuring tape • ranging pole • string • pegs/pins • water level • wheelbarrows • spades • shovels and forks • water measuring device
Pre-season	<p>May include but not limited to:</p> <ul style="list-style-type: none"> • Weed control • motor servicing • flushing and supply distribution • De-silting channels • equipment service
Post-season	<p>May include but not limited to:</p> <ul style="list-style-type: none"> • Disconnecting flow • flushing and draining • servicing equipment
Routine and Periodical maintenance	<p>May include but not limited to:</p> <ul style="list-style-type: none"> • Pump <ul style="list-style-type: none"> ➤ Changing engine oil, ➤ replacing the oil filter, ➤ replacing the air cleaner, ➤ checking battery water level, ➤ pre-cleaner, gear box oil, ➤ cooling system/water, ➤ fuel, ➤ battery charge ➤ fuel tank,

	<ul style="list-style-type: none"> ➤ greasing the pump jack shaft and bearings, ➤ flushing (De-silting) the pump • Weed control • flushing and supply distribution • de silting channels • de-scaling and irrigation structures service
OHS requirements	<p>May include but not limited to:</p> <ul style="list-style-type: none"> • systems and procedures for safe manual handling • outdoor work (including protection from solar radiation, dust and noise) • selection, use and maintenance of relevant personal protective clothing and equipment • selection, care and safe use of hand tools • Safe systems for the prevention of electrical injury
Systems	<p>May include but not limited to:</p> <ul style="list-style-type: none"> • Border check • contour irrigation • furrow irrigation • hillside flooding • basin irrigation
Outlets	<p>May include but not limited to:</p> <ul style="list-style-type: none"> • Siphons • cups and flumes • Pipes and gates/slides/doors
Adverse environmental impacts	<p>May include but not limited to:</p> <ul style="list-style-type: none"> • Leaking channels or water storages • The secondary impacts of erosion and salinity • safe disposal of oils/grease • Other contaminants
Banks	<p>May include but not limited to:</p> <ul style="list-style-type: none"> • Washouts • Subsidence • Run-off • Animals

Evidence Guide

Critical Aspects of Competence	<p>Must demonstrate knowledge and skills to:</p> <ul style="list-style-type: none"> • Describe basic operation and maintenance of surface irrigation system • Identify and describe components of a surface irrigation
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	<p>system</p> <ul style="list-style-type: none"> • set up fields for irrigation • operate, check, clean and store irrigation equipment • Carryout all basic activities involved in surface irrigating operations • Apply OHS procedures relating to Surface irrigation maintenance • Describe damage and problems that can occur with Surface irrigation systems • check for problems and return the system to smooth running, build or repair banks • control weeds and silt build-up • Carry out maintenance activities under routine supervision. 		
<p>The required knowledge and attitude</p>	<p>Demonstrates knowledge of:</p> <ul style="list-style-type: none"> • basic operation and maintenance of surface irrigation system • irrigation times for organization fields to deliver sufficient volume without over watering • components of a surface irrigation system including cleaning and storage requirements • manual handling procedures • required head and water levels in head ditch • Organization and OHS procedures relating to general activities involved in surface irrigation • system cleaning procedures • damage and problems that can occur with Surface irrigation systems • weed types encountered in gravity fed irrigation systems and their control 		
<p>The required skills</p>	<p>Demonstrates knowledge of:</p> <ul style="list-style-type: none"> • start up and close down the system • monitor progress of water flow • handle and shift loads • clean and store system components • interpret organization policy and procedures relating to irrigation duties • estimate water levels and volumes/flow • Follow OHS procedures relating to general activities involved in irrigating field crops using surface irrigation systems. • Collect analyze and organize information by checking set up information for equipment. • Use mathematical ideas and techniques estimating time and 		
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	<p>water levels for sufficient water flow.</p> <ul style="list-style-type: none"> • Solve problems in determining required action once set up information has been checked • read and follow procedures for Surface irrigation system maintenance • Identified and access technical damages of surface irrigation system • use mechanical equipment to build/repair banks and for weed removal • record and report maintenance observations and activities • Collect and organize information while recording maintenance activities.
Resources Implication	Access is required to real or appropriately simulated situations, including work areas, materials and equipment, and to information on workplace practices and OHS practices.
Methods of Assessment	Competence may be assessed through: <ul style="list-style-type: none"> • Interview/Written Test • Observation/Demonstration with Oral Questioning
Context of Assessment	Competence may be assessed in the work place or in a simulated work place setting.

Occupational Standard: Irrigation Drainage Level II	
Unit of competence	Lay micro irrigation systems
Unit Code	AGR IRD2 05 0322
Unit Descriptor	This unit covers the knowledge, skill and attitude required to prepare tools and materials, setting out, installing components and complete layout and installation work of micro irrigation systems.

Element of competence	Performance Criteria
1. Prepare tools and materials for installation work	<p>1.1. Materials, tools, equipment and accessories are selected according to irrigation design requirements and supervisors instructions.</p> <p>1.2. The site for installation of the micro-irrigation system is identified</p> <p>1.3. Parts and accessories delivered to site are checked according to system drawings and specifications.</p> <p>1.4. System specifications are checked to ensure that it is compatible with Water supply.</p>
2. Set out and prepare site	<p>2.1. Measurement and marking out of irrigation lines are undertaken as directed by supervisor.</p> <p>2.2. Equipment operation and work practices conform to organization and legislative OHS requirements.</p> <p>2.3. Pre-operational and safety checks are carried out on tools, accessories according to manufacturer's specifications and organization work procedures.</p> <p>2.4. OHS hazards are identified, risks assessed, controls implemented and reported to the supervisor.</p> <p>2.5. Suitable safety and personal protective equipment (PPE) are selected, used and maintained</p>
3. Install irrigation components	<p>3.1. Work is undertaken according to plan and supervisors instructions</p> <p>3.2. Components are assembled and connected according to plan, joints are completed and tested.</p> <p>3.3. A clean and safe work area is maintained while installation work is carried out.</p> <p>3.4. Tools are chosen appropriate to the task being undertaken and used according to guidelines and safe working practices are employed.</p>
4. Complete installation work	<p>4.1. Earthworks are finished off to (as per) plan specifications and organization work procedures.</p> <p>4.2. The site is restored and waste material is removed from the site and disposed of in an environmentally aware and safe manner</p>

	<p>according to organization work procedures.</p> <p>4.3. System is flushed, tested and commissioned as directed</p> <p>4.4. Tools are cleaned, maintained and stored according to enterprise work procedures.</p> <p>4.5. Operating faults are identified and reported to supervisor and/or corrective actions taken.</p>
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Variable	Range statement
Materials, Tools, equipment and accessories	<p>May include but not limited to:</p> <ul style="list-style-type: none"> • surveying and leveling equipment such as automatic level, laser level, dumpy level, Cowley level, staff, boning rods, pegs, notebook, pencil and calculator; • hand tools such as rakes, shovels, spades, rollers, wheelbarrows, hoses and hose fittings; • pumps and pump fittings; and • fitting and welding tools appropriate to the irrigation system
micro-irrigation system	<p>May include but not limited to:</p> <ul style="list-style-type: none"> • low pressure micro-sprays • Micro-drippers.
Water supply	<p>May include but not limited to:</p> <ul style="list-style-type: none"> • Underground • Mains or surface storage including fixtures such as dams bores windmills, tanks, and channels.
OHS requirements	<p>May include but not limited to:</p> <ul style="list-style-type: none"> • identifying hazards; • assessing risks and implementing controls; • cleaning, • maintaining and storing tools, equipment and machinery; • appropriate use of PPE including sun protection; • safe operation of tools, equipment and machinery; • safe handling, use and storage of chemicals and hazardous substances; correct manual handling; • basic first aid; personal hygiene, and • Reporting problems to supervisors.
organization work procedures	<p>May include but not limited to:</p> <ul style="list-style-type: none"> • supervisors oral or written instructions, • installation program, • organization Standard Operating Procedures (SOP), • specifications, • routine maintenance schedules,

	<ul style="list-style-type: none"> • work notes, • product labels and Material Safety Data Sheets (MSDS), • manufacturers service specifications and operators manuals, • waste disposal, • recycling and re-use guidelines, and • OHS procedures.
PPE	<p>May include but not limited to:</p> <ul style="list-style-type: none"> • Hat • Boots • Overalls • Gloves • Goggles • respirator or face mask • face guard, • hearing protection, • sunscreen lotion • hard hat.
A clean and safe work area	<p>May include but not limited to:</p> <ul style="list-style-type: none"> • Disabling unused tools, equipment and machinery and storing neatly out of the way of installation activities; • safely storing materials on site; • using signage and safety barriers during and removing after construction activities are completed; and • swiftly and efficiently removing and processing debris and waste from the work area.
Waste material	<p>May include but not limited to:</p> <ul style="list-style-type: none"> • Unused construction and excavated materials, plant debris, litter and broken components. • Waste may be removed to designated areas for recycling, reuse, and return to the manufacturer or disposal. • Plant-based material may be mulched or composted, plastic, metal, paper-based materials may be recycled, re-used, returned to the manufacturer, or disposed of according to enterprise work procedures.

Evidence Guide		
Critical Aspects of Competence	Must demonstrate knowledge and skills to:	<ul style="list-style-type: none"> • Describe methods, components and techniques of micro-irrigation • prepare for installation, • set out the installation works,

		<ul style="list-style-type: none"> • install and test the irrigation system, • Communicate with work team members, supervisors • Clean up the site.
The Required Knowledge and Attitudes		<p>Demonstrates knowledge of:</p> <ul style="list-style-type: none"> • Methods and techniques of micro-irrigation • Components of an micro-irrigation system • Characteristics and operation of joints, valves and sprinkler components • Operation of pumps and water flow rates • Behaviour of water on varying terrain and soil types • Organization OHS procedures.
The required skills		<p>Demonstrates skill of:</p> <ul style="list-style-type: none"> • Organize tools, materials and accessories for installation work • Set out and prepare site • Install irrigation components • Complete installation work • Collect and organize information organization work procedures and site and irrigation system plans • Use mathematical ideas to measuring materials and interpreting/identify specifications for the irrigation installation.
Resources Implication		Access is required to real or appropriately simulated situations, including work areas, materials and equipment, and to information on workplace practices and OHS practices.
Methods of Assessment		<p>Competence may be assessed through:</p> <ul style="list-style-type: none"> • Interview/Written Test • Observation/Demonstration with Oral Questioning
Context of Assessment		Competence may be assessed in the work place or in a simulated work place setting.

Occupational standard: Irrigation and Drainage Level II	
Unit of Competence	Operate and Maintain Irrigation Pumps
Unit Code	AGR IRD2 06 0322
Unit Descriptor	This unit covers the knowledge, skill and attitude of site selection for irrigation pumps. It requires the ability to select, install, operate, and carry out pre- and post-seasonal inspection, out routine maintenance activities on irrigation pump and store irrigation pumps.

Elements of competence	Performance criteria
1. Select site for irrigation pumps	1.1. Site is checked for proximity of resources. 1.2. Power requirement for suction & delivery head is optimized using standard technique
2. Install and operate irrigation pumps	2.1 The <i>irrigation pumps</i> is placed considering topographic conditions 2.2 <i>Components</i> are fixed together as of manufacturer's installation procedures 2.3 Irrigation pumps are placed on well leveled bed and anchored firmly 2.4 Irrigation pumps are characterized. 2.5 Capacity (horse power) required, brake horse power, efficiency and total head requirement are estimated and determined. 2.6 Pump is operated and maintained according to OHS procedure, system performance criterion and environmental issues.
3. Carry out pre- and post-seasonal inspection	3.1. Pre-season and <i>day to day inspection</i> activities is carried out and reported for routine maintenance accordance with the organization standard. 3.2. <i>Annual or post seasonal inspection</i> activities are carried out and reported for overall maintenance.
4. Carry out routine maintenance activities on irrigation pump	4.1 Equipment is prepared pre-season for effective operation in accordance with design specifications and organization standards. 4.2 System is flushed, cleaned, closed down and maintained post-season in accordance with design specifications and organization standards. 4.3 All maintenance activities are carried out according to the maintenance program and the manufacturer's specifications. 4.4 Motorized and manual irrigation pump components are flushed and cleaned, with simple components replaced as

	<p>directed.</p> <p>4.5 Motorized and manual irrigation pump is visually inspected for operating faults (turbines, diesel, dynamo), and observations are recorded in the maintenance book.</p> <p>4.6 Operation area is maintained in a clean and safe condition, and OHS procedures are followed.</p>
5. Maintain components (overall maintenance)	<p>system (overall maintenance)</p> <p>5.1 System maintenance is carried out at scheduled times using equipment and materials in accordance with organization`s standards.</p> <p>5.2 Components are inspected for operating faults and damages, and reported or replaced according to organization guidelines.</p> <p>5.3 Operation area is maintained in a clean and safe condition, and OHS procedures are followed.</p>
6. Record and report maintenance activities	<p>6.1. All damage and blockage caused by vermin is recorded by damage type, location and the section of the system affected.</p> <p>6.2. Damage or faulty pumps, valves, electrical components and computer systems are recorded and reported, and action taken to effect repairs.</p> <p>6.3. All routine and periodic maintenance activities are recorded and reported in accordance with organization standards.</p>

Variable	Range statement
Irrigation pumps	<p>May include but not limited to:</p> <ul style="list-style-type: none"> • Centrifugal pump • Submerged pump • treadle pump • rope and washer • Electrical driven pump • Engine driven pumps
Components	<p>May include but not limited to:</p> <ul style="list-style-type: none"> • Suction hose • Delivery hose • Foot valve • Impeller • shaft • bearing • stuffing box • flanges and coupling • seal
Day to day inspection	<p>May include but not limited to:</p> <ul style="list-style-type: none"> • Unusual noise, vibration, temperature

	<ul style="list-style-type: none"> • Leaks in pump or piping • Pump general condition • Pressure gage reading
Annual or post season inspection	<p>May include but not limited to:</p> <ul style="list-style-type: none"> • Packing box • Seal water • Impeller for corrosion or excessive wear • Damages
Organization guidelines	<p>May include but not limited to:</p> <ul style="list-style-type: none"> • procedures for the operation and maintenance of machinery and equipment • the handling, transporting, use and storage of farm chemicals, and protection against chemical residues, including that in/on foliage, water, soil and other items

Evidence Guide	
Critical Aspects of competence	<p>Must demonstrate skills and knowledge to:</p> <ul style="list-style-type: none"> • Select pumping site • fix Parts together as of manufacturer’s installation procedures • Pump operation • inspect, repair and replace simple pump components • Carry out maintenance activities under routine supervision. • Apply OHS procedures relating to drainage system maintenance. • carry out pre- and post-season maintenance • record and report maintenance observations and activities
The required Knowledge and attitude	<p>Demonstrates knowledge of:</p> <ul style="list-style-type: none"> • Determining capacity (horse power) required • Characterizing and operating irrigation pumps • Estimating brake horse power and computing efficiency and total head requirement • pump cleaning procedures • OHS procedures relating to pump maintenance • Equipment used to clean and maintain pump • legislation regarding the use of pump • Environmentally safe disposal procedures oils/grease and used parts
The required skills	<p>Demonstrate skills of:</p> <ul style="list-style-type: none"> • Characterize and operate irrigation pumps • Estimate brake horse power and computing efficiency and total head requirement

	<ul style="list-style-type: none"> • Select site for pumps • Install water pumps • Operate pumps • Carry out day to day and annual inspection • Carry out pre- and post-season maintenance • Carry out routine maintenance activities • Maintain system components • Record and report maintenance observations and activities
Resources Implication	Access is required to real or appropriately simulated situations, including work areas, materials and equipment, and to information on workplace practices and OHS practices.
Methods of Assessment	Competence may be assessed through: <ul style="list-style-type: none"> • Interview/Written Test • Observation/Demonstration with Oral Questioning
Context of Assessment	Competence may be assessed in the work place or in a simulated work place setting.

Occupational Standard: Irrigation and Drainage Level II	
Unit Title	Prepare Technical drawings and specifications
Unit Code	AGR IRD2 07 0322
Unit Descriptor	This unit covers knowledge, skills and attitudes required to draw, interpret, prepare and use plans, maps, drawings and specifications.

Elements	Performance Criteria
1. Draw map or plan	<p>1.1. Requirements and purpose of drawing are determined from customer and/or work specification and associated documents.</p> <p>1.2 <i>Drawing instruments</i> are prepared</p> <p>1.3 All data necessary to produce the drawing are identified and collected</p> <p>1.4 Drawing requirements are confirmed with <i>relevant personnel</i> and timeframes for completion is established</p> <p>1.5. Product/system/component/item to be manufactured/modified is identified</p> <p>1.6. A simple map or plan, including selecting tools and equipment and a workable scale, key and abbreviations is prepared.</p> <p>1.7. Real world measurements are taken and features on a drawing are recorded.</p> <p>1.8. Field notes and measures are used to draw a local area map.</p> <p>1.9. Legend is located on project drawings, and symbols and abbreviations are correctly interpreted.</p>
2. Interpret maps, plans and drawings	<p>2.1. Find out what <i>types of maps, plans and drawings and specifications</i> are used to support work tasks.</p> <p>2.2. Parts of work systems and their interrelationship on a range of drawing types are identified.</p> <p>2.3. <i>Key features of maps and site plans</i> and commonly used symbols and abbreviations are checked and interpreted.</p> <p>2.4. Function of the legend is identified and explained.</p> <p>2.5. Natural and man-made features on maps, plans and drawings are checked and explained.</p>

	2.6. Environmental requirements and controls are identified from job plans, specifications and environmental plan.
3. Prepare for work	3.1. Work instructions are identified, followed and used to determine job requirements 3.2. Job specifications are read and interpreted 3.3. The latest version of map, plan or drawing is checked and validated against job requirements or equipment. 3.4. Title panel of <i>project documentation</i> is checked to verify latest amendments to drawing. 3.5. Amendments to <i>specifications</i> are checked to ensure currency of <i>information</i> and conveyed to others where appropriate 3.6. Correct equipment for safe use is identified and checked
4. Use maps, plans drawings and specifications	4.1. Use organisation system to access maps, plans, drawings and specifications. 4.2. <i>Translate technical data</i> and apply quality standards into work site environment. 4.3. Calculate distances using maps and plans with a range of scales. 4.4. Confirm orientation, boundaries and identified features of the site. 4.5. Identify any errors in the maps, plans, drawings and specifications.
5. Clean up work area and equipment	5.1. Equipment and work area are cleaned and inspected for serviceable condition in accordance with workplace procedures 5.2. Unserviceable equipment is tagged and faults are identified in accordance with workplace procedures

Variable	Range
Drawing instruments	May include but not limited to: <ul style="list-style-type: none"> • Technical pens • Square sets • Drafting machine • Compasses • T-square
Relevant personnel	May include but not limited to: <ul style="list-style-type: none"> • Technical personnel, supervisors, manufacturers, suppliers, contractors, customers
Types of maps, plans	May include but not limited to:

and drawings	<ul style="list-style-type: none"> • Urban and rural topographical maps • Site plans and elevations • Process flow sheets • Survey plans • Sectional plans and elevations • Channel drainage plans • Pipe system plans • Location of assets plans • Details and specifications providing illustrations and dimensions
Specifications	<p>May include but not limited to:</p> <ul style="list-style-type: none"> • Design information • Customer requirements • Sketches and preliminary layouts
Key features of maps and site plans	<p>May include but not limited to:</p> <ul style="list-style-type: none"> • Shape and orientation of site • Road • Existing buildings and structures • Services, including: <ul style="list-style-type: none"> ➤ Drainage ➤ Water ➤ Dimensions ➤ Grades of pipelines and channels ➤ Geographical features • Types of structures, including: <ul style="list-style-type: none"> ➤ Buildings ➤ Bridges ➤ Fences ➤ Pipelines ➤ Regulators ➤ Poles ➤ Environmental barriers • Environmental features, including: <ul style="list-style-type: none"> ➤ Fauna and flora habitats ➤ Cultural features ➤ Heritage features ➤ Water catchments ➤ Shape of structure and building ➤ Vertical and horizontal measurements ➤ Clearance distance ➤ Geological features ➤ Service layouts

	➤ Bore and casing details
Project documentation	May include but not limited to: <ul style="list-style-type: none"> • Plans and specification • Studies, data and drawing related to the project/work area
Information	May include but not limited to: <ul style="list-style-type: none"> • Schedules/plans/specifications, memos, material safety data sheets, diagrams or sketches • Organisation work specifications and requirements • Instructions issued by authorised organization or external body
Translate technical data	May include but not limited to: <ul style="list-style-type: none"> • Prepare drawing board and instruments for simple drawings • Map interpret and Set specifications

Evidence guide	
Critical aspects of competence	Must demonstrate skills and knowledge to: <ul style="list-style-type: none"> • Prepare map, plan and drawings • Interpret plans, drawings and specifications • Prepare and use plans, drawings and specifications • Observe safety procedures and requirements
The required knowledge and attitudes	Demonstrate knowledge of: <ul style="list-style-type: none"> • OHS and environmental regulations/requirements, equipment, material and personal safety requirements • Engineering drawing procedures and interpretive techniques • The range of maps, plans and drawings to different assignment situations • Objects represented in the drawing • Features of maps, plans drawings and specifications • Work organisation and planning processes • Requirements and purpose of the drawing to be produced • Sources of relevant data/information • The reasons for selecting the chosen drawing method
The required skills	Demonstrate skills to: <ul style="list-style-type: none"> • Interpret plans, drawings and specifications • Use information provided in maps, plans and drawings to complete a job in different work situations • Measure accurately • Undertake numerical operations, geometry and calculations/formulae • Use mathematical ideas and techniques to correctly interpret drawing specifications • Prepare and use maps, plans and drawings

	<ul style="list-style-type: none"> • Check the completed drawing in accordance with standard operating procedures • Record, handle and store completed drawings, approved drawings and or part • Report/document of results
Resource implications	Access is required to real or appropriately simulated situations, including work areas, materials and equipment, and to information on workplace practices and OHS practices.
Methods of assessment	Competence may be accessed through: <ul style="list-style-type: none"> • Interview/written test • Observation/demonstration with oral questioning
Context of assessment	Competence may be assessed in the work place or in a simulated work place setting.

Occupational Standard: Irrigation and Drainage Level II	
Unit Title	Construct Irrigation and Drainage Structure
Unit Code	AGR IRD2 08 0621
Unit Descriptor	This unit covers knowledge, skills and attitude required to plan and prepare for work, set out for masonry and concrete work, construct and install drains, channels, pipes and associated fittings, Inspect construction material for masonry and concrete works, carry out masonry and concrete works, carry out Strip formwork and cleanup for concrete works, and Restore work site and equipment.

Elements	Performance Criteria
1. Plan and prepare for work	<p>1.1 Work requirements from design plans, specifications, instructions and work orders are determined according to the organizational standard. Personal protective equipment are selected, fitted and used.</p> <p>1.2 Site check is performed to identify hazards and prevent damage to other utilities according to legislative and organisational requirements.</p> <p>1.3 Appropriate drainage and diversion arrangements are made without damage to environment.</p> <p>1.4 Equipment and excavation methods are checked to meet safety requirements of task and site.</p> <p>1.5 Signage requirements are identified and obtained from the project traffic management and implementation plan.</p> <p>1.6 Plant, tools and equipment are selected to carry out tasks consistent with the requirements of the job, checked for serviceability and any faults are rectified or reported</p> <p>1.7 Environmental protection requirements are identified from the project environmental management plan, confirmed and applied to the allotted task</p> <p>1.8 Site is prepared according to specifications and organizational requirements.</p>
2. Set out for masonry and concrete work	<p>2.1 String lines are set accurately from existing pegs</p> <p>2.2 Grades are checked to ensure correct fall</p> <p>2.3 Services are identified and protected to prevent damage</p>
3. Construct and install drains, channels, pipes and associated fittings	<p>3.1. Bedding and foundations are provided according to structure type, location and specification</p> <p>3.2. Earthen channels and batters are constructed to planned width, depth and gradient</p> <p>3.3. Soil additives are applied if necessary, and earth samples are compacted to meet organisational requirements</p>

	<p>3.4. Construction works are checked to ensure that specifications are met</p> <p>3.5. Join <i>pipes</i> and <i>fittings</i> are selected, laid and installed according to manufacturer and organisational requirements</p> <p>3.6. Prefabricated components are selected, placed and joined according to manufacturer and organisational requirements</p> <p>3.7. Installed pipes, fittings and prefabricated components are checked to ensure that test specifications are met</p> <p>3.8. Cast is constructed in situ components according to specifications and organisational requirements</p> <p>3.9. Constructions and installations are checked to ensure that specifications are met.</p>		
<p>4. Inspect construction material for masonry and concrete works</p>	<p>4.1 Stone and Sand for mortar for masonry is inspected and checked as per the specification</p> <p>4.2 the cement for mortar (package, Storage life of cement and freshness and fineness) is checked in accordance to the technical specification</p> <p>4.3 Water for mortar and curing checked that it comply with the specification</p> <p>4.4 Location of steel reinforcement and formwork is determined from drawings and reinforcement schedule.</p> <p>4.5 Reinforcement is checked against reinforcement drawings and specifications</p> <p>4.6 Formwork components are selected consistent with job</p> <p>4.7 Fixing/fasteners are selected and used consistent with requirements of the job</p> <p>4.8 Reinforcing fabric and bars are cut and bent as required to project drawings and specifications</p> <p>4.9 Fabric and bars are tied/ fixed to configuration from project drawings and specifications</p> <p>4.10 Stiffening rods are attached to panels as required to facilitate handling</p> <p>4.11 Reinforcement material is located in formwork and placed on bar chairs/spacers as determined from drawings, noting clearance from formwork</p> <p>4.12 Cast-ins are located and secured</p>		
<p>5. Carry out masonry and concrete works</p>	<p>5.1 Concrete and mortars are placed correctly to specified levels and grades</p> <p>5.2 Concrete is compacted to specification using immersion vibrator or other specified method</p> <p>5.3 The mix ratio for masonry and concrete are inspected</p> <p>5.4 Concrete and masonry works are screeded, finished and curing process applied to specifications</p>		
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	<p>5.5 Concrete and masonry surface are adequately covered and protected</p> <p>5.6 Pointing and plastering works of masonry are performed as per the specification</p>
6. Carry out Strip formwork and cleanup for concrete works	<p>6.1 Edge boxing and braces are removed sequentially</p> <p>6.2 Timber components are de-nailed, cleaned and stored or stacked</p> <p>6.3 Steel components are cleaned, oiled and stored or stacked</p> <p>6.4 Damaged formwork components are discarded after stripping</p> <p>6.5 Screens are safely cleaned before movement where applicable</p> <p>6.6 Work area is cleared and materials disposed of or recycled in accordance with project environmental management plan</p> <p>6.7 Plant, tools and equipment are cleaned, checked, maintained and stored in accordance with manufacturers' recommendations and standard work practices</p>
7. Restore work site and equipment	<p>7.1 Equipment, tools and <i>materials</i> are checked, maintained and stored according to manufacturer guidelines and organizational procedures.</p> <p>7.2 Work site and <i>environmental improvements or controls</i> are restored to complete work according to plans and organizational requirements.</p> <p>7.3 Workplace records are maintained as required.</p>

Variable	Range
Work requirements	<p>May include but not limited to:</p> <ul style="list-style-type: none"> • Extent and scope of work • Risk assessment and prevention measures • Signage • Traffic control • Confirmation of site availability • Confirmation of statutory approvals (including Vegetation clearing approval, Riverine protection permits, Use of borrow approvals) • Preparations for conditions included in statutory approvals for work • STE boundaries • Borrow and spoil areas • Boundary protection • Location, timing and type of work activity • Access roads • Specifications for depth, width and gradient • Utility location and Safe work methods

Legislative and organizational requirements	<p>May include but not limited to:</p> <ul style="list-style-type: none"> • Relevant federal and state or territory legislation and regulations • Codes of practice, associated standards and guidance material • Documented organisational policies, manuals and induction programs • Relevant community planning and development agreements, such as land care agreements • Relevant federal water legislation and regulations • Local authority by-laws • Organizational procedures • Environmental procedures • Cultural heritage • OHS procedures • Dangerous goods and chemicals
Equipment	<p>May include but not limited to:</p> <ul style="list-style-type: none"> • Hand and power tools • On- and off-road vehicles • Lifting and winching equipment • Mechanical excavation equipment • Trenching systems • Portable pumps • Communication equipment • Breathing apparatus • Rescue equipment • Off-road plant • Compressors • Profiles • Automatic level • Motorized cutting equipment
Preparing site	<p>May include but not limited to:</p> <ul style="list-style-type: none"> • Installation of temporary erosion control structures • Cultural heritage monitors • Safety barricades • Removal of vegetation, debris, silt and soil
Structure	<p>May include, but not limited to:</p> <ul style="list-style-type: none"> • Drop structures • Regulators • Erosion barriers • Head walls • Concrete channels

pipes and fittings	<p>May include but not limited to:</p> <ul style="list-style-type: none"> • Vitrified clay • Polyvinyl Chloride (PVC) • Polyethylene • Reinforced concrete • Jointing systems for pipe types and prefabricated sections (like Gibault and tension bands) • Solvent cement joints • Compression rings • Bolted flanges • Malleable jointing mate
Materials	<p>May include but not limited to:</p> <ul style="list-style-type: none"> • Structures including: <ul style="list-style-type: none"> ➤ Meter pits ➤ Person access pits ➤ Regulators ➤ Erosion barriers ➤ Head walls
Environmental improvements or controls	<p>May include but not limited to:</p> <ul style="list-style-type: none"> • Re-vegetation processes • Drainage measures • Sedimentation control

Evidence Guide	
Critical Aspects of Competence	<p>Must demonstrate skills and knowledge to:</p> <ul style="list-style-type: none"> • Plan work and prepare work site according to given specifications and instructions • Construct assets according to specifications • Inspect construction materials for earthen channel, masonry and concrete works • Install assets according to specifications • Check that work meets specifications • Complete documentation • Plan work and prepare work site in accordance with the given specifications and instructions • Cut channels to specification • Compact soil

	<ul style="list-style-type: none"> • Take soil samples • Check that work meets specifications • Restore work site • Clean and store equipment
The required Knowledge and Attitudes	<p>Demonstrate knowledge of:</p> <ul style="list-style-type: none"> • System layout • Environmental aspects of construction • Construction procedures and processes • Landscape and ground structure of work area • Risk factors and potential hazards of construction processes • Control systems • Pre-cast components • Pipes and fittings • Channel and batter construction processes • Measures to reduce channel deterioration, infestation of weeds, pests and seepage • Capabilities of plant used for construction, including equipment operation, capacity and limitations • Cork-related calculations
The required Skills	<p>Demonstrate skills of:</p> <ul style="list-style-type: none"> • Plan and prepare construction work • Equipment operation, capacity and limitations • Use safety and personal protective equipment • Use tools and machinery • Interpret plans, charts and instructions • Perform work-related calculations • Inspection of construction materials • Carry out construction of earthen channels, masonry and concrete • Apply procedures, processes and standards • Apply channel and batter construction techniques

Resource implications	Access is required to real or appropriately simulated situations, including work areas, materials and equipment, and to information on workplace practices and OHS practices.
Methods of assessment	Competence may be accessed through: <ul style="list-style-type: none"> • Interview/written test • Observation/demonstration with oral questioning
Context of assessment	Competence may be assessed in the work place or in a simulated work place setting.

Occupational Standard: Irrigation and Drainage Level II	
Unit of Competence:	Apply Basic Techniques of Water Harvesting Structures
Unit Code	AGR IRD2 09 0322
Unit Descriptor	This unit covers the knowledge, skill and attitude required collect, organized and identify all required data, design water storage capacities, identify construction material, design and construct flood water harvesting, micro catchments techniques, construct roof top water harvesting structures, ground and surface water storage structure, ground Surface catchments, diversion canals & sediment ponds.

Element of competence	Performance criteria
1. Collect, organized and identify all required data	1.1. Data is collected from metrological station. 1.2. Rain fall data is used to estimated runoff based on site requirements 1.3. Soil sampling is done based on soil sampling techniques 1.4. Sampled soil is organized and analyzed based on the required information 1.5. Soil is selected for catchments and cultivation area based on basic requirements 1.6. Identified crops are practiced according to the area condition 1.7. Crop species is identified based on the water requirements
2. Design water storage capacities	2.1. Capacity of structures are designed based on the water requirements/demand 2.2. Water is stored based on the demand
3. Identify construction material	3.1. Construction materials are identified based on structure to be constructed. 3.2. Materials are used for construction in accordance with area and types of structure 3.3. Tools and equipment are identified based on structure to be constructed.
4. Design and construct flood water harvesting, micro catchments techniques	4.1. Different flood water harvesting, micro catchments types are identified based on required information 4.2. Identified flood water harvesting, micro and macro catchments are designed based on necessary information 4.3. Designed structures are constructed based on technical procedures and guideline
5. construct roof top Water harvesting structures	5.1. Site is selected for roof top Water harvesting structures based on technical guidelines. 5.2. Required materials are prepared based on requirement. 5.3. Structure is constructed based on technical procedures.

	5.4. Water is harvested and supplied based on demand
6. construct ground and surface water storage structure	6.1. Structures are designed according to the catchments area. 6.2. Materials for <i>ground and surface water storage structure</i> are collected based on the requirements. 6.3. Structures are constructed according to technical procedures
7. Construct ground Surface catchments, diversion canals & sediment ponds	7.1. Surface catchments, diversion canals and sediment ponds are identified based on work place suitability. 7.2. Materials are arranged based on the requirements. 7.3. Surface catchments, diversion canals and sediment ponds are constructed according to technical procedures.

Variable	Range Statement
Construction materials	May include but not limited to: <ul style="list-style-type: none"> • Stones • Gravel • Cement, bricks • Chicken mesh wire • Bamboo/reed • Corrugated iron sheet • Pipes & fittings
Tools and equipment	May include but not limited to: <ul style="list-style-type: none"> • Line level/A-frame • String • Graduated staff • Clinometers • Altimeter • Measuring tape • Digging instruments • watering can • Double-ring infiltrometer • Soil sampler (Auger) • Stop-watch • Ranging pole • Strings • Pegs • Water tank /pump • Hooker • Soil texture chart • Compass • GPS • Aerial photographs

	<ul style="list-style-type: none"> • Top maps • Automatic level • Gabion Wire box
Flood water harvesting types	<p>May include but not limited to:</p> <ul style="list-style-type: none"> • Flood spreading bund • Permeable rock dam • Sand dam
Micro catchments types	<p>May include but not limited to:</p> <ul style="list-style-type: none"> • Negarims • small semi-circular bund • water collection trench • conservation bench terrace • eyebrow basin, contour ridges
Roof top water harvesting structures	<p>May include but not limited to:</p> <ul style="list-style-type: none"> • ferro-cement tank • brick tank • stone masonry tank • gutter • downpipe
Ground surface water storage structure	<p>May include but not limited to:</p> <ul style="list-style-type: none"> • Hemispherical • Storage tank • Dome cap tank • Farm pond

Evidence Guide	
Critical Aspects of competence	<p>Must demonstrate skills and knowledge of:</p> <ul style="list-style-type: none"> • Collect metrological data • Select soil for catchments and cultivation area • Practice identified crops • Determine net socio-economic benefits of water • Identify and describe different micro and macro catchments water harvesting types • Identify different flood water harvesting types • Used materials for construction • Select site for construction of structures • Construct surface catchments, diversion canals and sediment ponds
The required knowledge and attitude	<p>Demonstrates knowledge of:</p> <ul style="list-style-type: none"> • Water harvesting technology principles

	<ul style="list-style-type: none"> • Principles of hydrology • Site selection techniques • Identify crop type and crop water requirement • Identify and describe design and construction methods • Identify and describe components of water harvesting • Identify and describe different micro catchments, macro catchment, roof top and flood water harvesting structures • Harvested and supplied water • Know the health and safety risks and safe systems of work associated with rainwater harvesting • Know the types and layouts of rainwater harvesting system • Know the purpose of components used within rainwater harvesting • Know the fundamental techniques used to select, size and position components for rainwater harvesting • Know the information requirements to enable rainwater harvesting system component selection and sizing
The required skills	<p>Demonstrate skills to:</p> <ul style="list-style-type: none"> • Identify proper site for water harvesting • Identify construction material • Delineate catchment area • Identify catchments areas • Identify different water harvesting techniques • Identify roof top and ground surface water harvesting storage structures • Use appropriate tools and equipment on site. • Practice layouts of rainwater harvesting system • Apply the purpose of components used within rainwater harvesting • Apply the fundamental techniques used to select, size and position components for rainwater harvesting • Enable rainwater harvesting system component select and sizing based on the information
Resource implications	Access is required to real or appropriately simulated situations, including work areas, materials and equipment, and to information on workplace practices and OHS practices.
Methods of assessment	<p>Competence may be accessed through:</p> <ul style="list-style-type: none"> • Interview/written test • Observation/demonstration with oral questioning
Context of assessment	Competence may be assessed in the work place or in a simulated work place setting.

Occupational Standard: Irrigation and Drainage Level II	
Unit of competence	Apply Erosion and Sediment Control Activities
Unit Code	<u>AGR IRD2 10 0322</u>
Unit Descriptor	This unit of covers the knowledge, skill and attitude required to apply work site practices with erosion and sediment control principles and implement erosion and sediment control principles.

Element of competence	Performance Criteria
1. Apply work site practices with erosion and sediment control principles	1.1 Erosion and sedimentation legislation is adhered. 1.2 Procedures relating to <i>erosion and sediment control structures</i> are applied. 1.3 <i>Erosion and sediment control activities</i> are properly performed according to community and agency guidelines and best practice procedures.
2. Implement erosion and sediment control principles	2.1 Erosion and sediment control are implemented according to legislation. 2.2 practices for erosion and sediment control are applied.

Variable	Range
Erosion and sediment control activities	May include but not limited to: <ul style="list-style-type: none"> • Land shaping including <ul style="list-style-type: none"> ➤ batter stabilization ➤ Banks ➤ Channels • Sediment basins <ul style="list-style-type: none"> ➤ Traps ➤ Filters ➤ Fence • Re-vegetation
Erosion and sediment control structures	May include but not limited to <ul style="list-style-type: none"> • Grade stabilizing structures • Outlet protection structures • Storm water detention measures • Dust control • Rural roads and tracks

Evidence Guide			
Critical Aspects of Competence		Must demonstrate skills and knowledge of:	<ul style="list-style-type: none"> • Perform erosion and sediment control work • Identify erosion and sediment control structures/measures/practices • Carry out routine work with control measures and structures • Conduct erosion and sediment control activities on development sites • Use mathematical ideas and techniques to measurement and timing
The required Knowledge and Attitudes		Demonstrates knowledge of:	<ul style="list-style-type: none"> • Relevant legislation • Estimate cost of erosion and sedimentation mitigation strictures • Re-occurring maintenance/repair/monitoring • Basic catchments characteristics • Role of vegetation • Characteristics of soils with an emphasis on erodible soils
The required skills		Demonstrate skills to:	<ul style="list-style-type: none"> • Identify erosion and sediment control structures/measures/practices • Carry out routine work with control measures and structures. • Undertake activities in accordance with legislation/community expectation and project specifications. • Collect and organize information • Plan and organize erosion and sediment control activities on development sites • Conduct erosion and sediment control activities on development sites • Use mathematical ideas and techniques to measurement and timing • Solve technical and organizational problems while conducting erosion and sediment control activities on development sites
Resource implications		Access is required to real or appropriately simulated situations, including work areas, materials and equipment, and to information on workplace practices and OHS practices.	
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Methods of assessment	Competence may be accessed through: <ul style="list-style-type: none"> • Interview/written test • Observation/demonstration with oral questioning
Context of assessment	Competence may be assessed in the work place or in a simulated work place setting.

Occupational Standard : Animal production Level II	
Unit Title	Apply Agricultural Extension service for Rural development
Unit Code	AGR IRD2 11 0322
Unit Descriptor	This unit covers the knowledge, skills and attitudes required to promote the use of digital technology agricultural extension, understand adult learning, Integrated gender agricultural extension and Recognize Indigenous Knowledge

Element	Performance Criteria
1. Promote the use of digital technology in Agricultural Extension	<p>1.1 The <i>use of Digital technology in Agricultural extension</i> is introduced to familiarize its importance</p> <p>1.2 <i>Skills in using digital technology</i> is built to strengthen agricultural extension services</p> <p>1.3 The <i>role of digital technologies in agricultural extension</i> services is understood to enhance agricultural development.</p>
2. Understand Adult Learning	<p>2.1 The <i>concept of adult learning</i> is understood to bring behavioural changes</p> <p>2.2 <i>Principles of Adult learning</i> is determined for the implementation of extension services</p> <p>2.3 The <i>importance of Adult learning</i> in Agricultural Extension is understood to enhance agricultural extension services</p> <p>2.4 <i>Adult learning methods</i> are understood to enhance the knowledge and skills of extension beneficiaries</p> <p>2.5 <i>The role of adult learning</i> is understood to allow farmers develop knowledge and skills</p>
3. Integrate Gender in Agricultural Extension	<p>3.1 The <i>concept of gender</i> is understood to provide inclusive agricultural extension services</p> <p>3.2 Gender awareness and sensitization is created to increase the contribution of gender in agricultural development</p> <p>3.3 The <i>role of gender in agriculture</i> is determined to enhance agricultural development.</p> <p>3.4 <i>Gender mainstreaming</i> is implemented for effective outcome of extension services</p>
4. Recognize Indigenous	<p>4.1. The <i>concept of indigenous knowledge</i> is understood to strengthen</p>

Knowledge	<p>the service of agricultural extension</p> <p>4.2. Characters of indigenous knowledge are understood to promote local experience</p> <p>4.3. Exchange of indigenous knowledge is promoted to enhance community development</p> <p>4.4. The importance of indigenous knowledge is understood to facilitate its contribution to the development processes.</p> <p>4.5. The controversial issues of the debate on indigenous knowledge are further studied to propose the urgent need, to document, learn, preserve, and exchange indigenous knowledge</p>
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Variable	Range
Use of Digital technology in Agricultural extension	<p>May include but not limited to:</p> <ul style="list-style-type: none"> • Define Digital Technology • Evolution and progress of digital technologies • Digital technology for Agricultural Extension • Tools for digital technology • Utilization of digital technologies
Skills in using digital technology	<p>May include but not limited to:</p> <ul style="list-style-type: none"> • Demonstrate digital technologies • Practice digital technologies • Apply digital technologies • Maintain and manage digital technologies
Role of digital technologies in agricultural extension	<p>May include but not limited to:</p> <ul style="list-style-type: none"> • Provide diverse knowledge to beneficiaries • Supply Efficient information products • Provide technology-related advice • provide location-specific market information • enhance technology adoption in agriculture
Concept of adult learning	<p>May include but not limited to:</p> <ul style="list-style-type: none"> • Adult learning theories • Characteristics • Adult learning approaches • Purpose of Adult learn • Adult learning practices

Principles of Adult learning	<p>May include but not limited to:</p> <ul style="list-style-type: none"> • Self-directed • Experiential • Problem-centered • Motivated to learn • Learner oriented • Practice Oriented • looks for help and mentorship • Open for modern ways of learning • Choose how to learn
Importance of Adult learning	<p>May include but not limited to;</p> <ul style="list-style-type: none"> • Increase effective participation in decision making • Improves individuals' technology utilization • Enhances working efficiency, • Keep up with the growing economic competition • Self-improvement • Financial growth and benefit
Adult learning methods	<p>May include but not limited to:</p> <ul style="list-style-type: none"> • Visual Aids • Audio • Print Media • Tactile • Interactive
The role of adult learning	<p>May include but not limited to:</p> <ul style="list-style-type: none"> • Behavioral change • Enhance to acquire new skills and knowledge • Access disadvantaged groups • Promote Participatory decision making
Concept of gender	<p>May include but not limited to:</p> <ul style="list-style-type: none"> • Definition of Gender • Historical development of Gender • Importance of Gender • Gender awareness and sensitization
Role of gender in agriculture	<p>May include but not limited to:</p> <ul style="list-style-type: none"> • Women's contribution in Agricultural Production • Women's participations in rural labor market • Women's participation in Agricultural Extension • Gender difference in rural labor markets • Impact of gender role in Agricultural Extension services

Gender mainstreaming	<p>May include but not limited to:</p> <ul style="list-style-type: none"> • Understanding of gender equality • Mainstreaming strategy • Steps of gender mainstreaming
Concept of indigenous knowledge	<p>May include but not limited to:</p> <ul style="list-style-type: none"> • Definition of Indigenous knowledge • Historical development of indigenous knowledge • Importance of indigenous knowledge for development processes
Characters of indigenous knowledge	<p>May include but not limited to:</p> <ul style="list-style-type: none"> • Experiences • its compatibility with indigenous environment and culture • insufficient knowledge of rural people • combination of culture, belief and religion
Exchange of indigenous knowledge	<p>May include but not limited to:</p> <ul style="list-style-type: none"> • Recognition and identification • Validation of indigenous knowledge • Recording and document indigenous knowledge • Storage in retrievable repositories • Dissemination of indigenous knowledge • Utilization of indigenous knowledge
Importance of indigenous knowledge	<p>May include but not limited to:</p> <ul style="list-style-type: none"> • Problem solving strategies • Important component of global knowledge • Resource in the development processes • Understanding of local conditions • Increase responsiveness of client • Enhance cross cultural understanding
Controversial issues of the debate on indigenous knowledge	<p>May include but not limited to:</p> <ul style="list-style-type: none"> • Discrimination, • Exploitation, • Dispossession • Miss-Used And • Miss- Appropriation • Violation Of The Right Of Indigenous People

Evidence Guide	
Critical Aspects of Competence	<p>Demonstrate knowledge attitude and skill to:</p> <ul style="list-style-type: none"> • Use of Digital technology in Agricultural extension • Applies the role of digital technologies in agricultural extension • Implements Adult learning methods

	<ul style="list-style-type: none"> • Implements Gender mainstreaming • Facilitates the Exchange of indigenous knowledge • Understands the controversial issues of the debate on indigenous knowledge
Required Knowledge and Attitudes	<p>Demonstrates knowledge of -</p> <ul style="list-style-type: none"> • Understands concept of adult learning • Recognize the Principles of Adult learning • Appreciates the importance of Adult learning • Understands the concept of gender • Understands the concept of indigenous knowledge • Understand the Characters of indigenous knowledge • Appreciates the importance of indigenous knowledge • Understands the controversial issues of the debate on indigenous knowledge
Required Skills	<p>Demonstrates skills:</p> <ul style="list-style-type: none"> • Demonstrates the use of Digital technology in Agricultural extension • Applies the role of digital technologies in agricultural extension • Implements the Adult learning methods • Understands and implements the role of adult learning • Understands and implement the role of gender in agriculture • Implements Gender mainstreaming • Facilitates the Exchange of indigenous knowledge
Resource Implications	<p>Access is required to real or appropriately simulated situations, including work areas, materials and equipment, and to information on workplace practices and Occupational health and safety (OHS) practices.</p>
Methods of Assessment	<p>Competence may be assessed through:</p> <ul style="list-style-type: none"> • Written Test, Interview, Quiz, Practical assignment • Observation and Demonstration with Oral Questioning
Context of Assessment	<p>Competence may be assessed in the work place or in a simulated work place setting.</p>

Occupational Standard: Irrigation and Drainage Level II	
Unit Title	Prevent and Eliminate MUDA
Unit Code	<u>AGR IRD2 12 0322</u>
Unit Descriptor	This unit covers the knowledge, skills and attitude required by a worker to prevent and eliminate MUDA/wastes in his/her workplace by applying scientific problem-solving techniques and tools to enhance quality, productivity and other kaizen elements on continual basis It covers responsibility for the day-to-day operation of the work and ensures Kaizen Elements are continuously improved and institutionalized.

Element	Performance Criteria
1. Prepare for work.	1.1. Work instructions are used to determine job requirements, including method, material and equipment. 1.2. Job specifications are read and interpreted following working manual. 1.3. OHS requirements , including dust and fume collection, breathing apparatus and eye and ear personal protection needs are observed throughout the work. 1.4. Appropriate material is selected for work. 1.5. Safety equipment and tools are identified and checked for safe and effective operation.
2. Identify MUDA and problem	2.1 Plan of MUDA and problem identification is prepared and implemented. 2.2 Causes and effects of MUDA are discussed. 2.3 All possible problems related to the process /Kaizen elements are listed using statistical tools and techniques . 2.4 All possible problems related to kaizen elements are identified and listed on Visual Management Board/Kaizen Board. 2.5 Tools and techniques are used to draw and analyze current situation of the work place. 2.6 Wastes/MUDA are identified and measured based on relevant procedures . 2.7 Identified and measured wastes are reported to relevant personnel.
3. Analyze causes of a problem.	3.1 All possible causes of a problem are listed. 3.2 Cause relationships are analyzed using 4MIE . 3.3 Causes of the problems are identified. 3.4 The root cause which is most directly related to the problem is selected. 3.5 All possible ways are listed using creative idea generation to eliminate the most critical root cause. 3.6 The suggested solutions are carefully tested and evaluated for

	<p>potential complications.</p> <p>3.7 Detailed summaries of the action plan are prepared to implement the suggested solution.</p>
4. Eliminate MUDA and Assess effectiveness of the solution.	<p>4.1. Plan of MUDA elimination is prepared and implemented by medium KPT members.</p> <p>4.2. Necessary attitude and the ten basic principles for improvement are adopted to eliminate waste/MUDA.</p> <p>4.3. Tools and techniques are used to eliminate wastes/MUDA based on the procedures and OHS.</p> <p>4.4. Wastes/MUDA are reduced and eliminated in accordance with OHS and organizational requirements.</p> <p>4.5. Tangible and intangible results are identified.</p> <p>4.6. Tangible results are compared with targets using various types of diagrams.</p> <p>4.7. Improvements gained by elimination of waste/MUDA are reported to relevant bodies.</p>
5. Prevent occurrence of wastes and sustain operation.	<p>5.1. Plan of MUDA prevention is prepared and implemented.</p> <p>5.2. Standards required for machines, operations, defining normal and abnormal conditions, clerical procedures and procurement are discussed and prepared.</p> <p>5.3. Occurrences of wastes/MUDA are prevented by using visual and auditory control methods.</p> <p>5.4. Waste-free workplace is created using 5W and 1H sheet.</p> <p>5.5. The completion of required operation is done in accordance with standard procedures and practices.</p> <p>5.6. The updating of standard procedures and practices is facilitated.</p> <p>5.7. The capability of the work team that aligns with the requirements of the procedure is ensured and trained on the new Standard Operating Procedures (SOPs).</p>

Variable	Range
OHS requirements	<p>May include, but not limited to:</p> <ul style="list-style-type: none"> • Are to be in accordance with legislation/ regulations/codes of practice and enterprise safety policies and procedures. This may include protective clothing and equipment, use of tooling and equipment, workplace environment and safety, handling of material, use of firefighting equipment, enterprise first aid, hazard control and hazardous materials and substances. • PPE are to include that prescribed under legislation/regulations/codes of practice and workplace policies and practices. • Safe operating procedures are to include, but are not limited to the conduct of operational risk assessment and treatments associated

	<p>with workplace organization.</p> <ul style="list-style-type: none"> • Emergency procedures related to this unit are to include but may not be limited to emergency shutdown and stopping of equipment, extinguishing fires, enterprise first aid requirements and site evacuation.
Safety equipment and tools	<p>May include, but not limited to:</p> <ul style="list-style-type: none"> • Dust masks/goggles • Glove • Working cloth • First aid and • Safety shoes
Statistical tools and techniques	<p>May include, but not limited to:</p> <ul style="list-style-type: none"> • 7 QC tools May include, but not limited to: <ul style="list-style-type: none"> ➤ Stratification ➤ Pareto Diagram ➤ Cause and Effect Diagram ➤ Check Sheet ➤ Control Chart/Graph ➤ Histogram and Scatter Diagram • QC techniques May include, but not limited to: <ul style="list-style-type: none"> ➤ Brain storming ➤ Why analysis ➤ What if analysis ➤ 5W1H
Tools and techniques	<p>May include, but not limited to:</p> <ul style="list-style-type: none"> • Plant Layout • Process flow • Other Analysis tools • Do time study by work element • Measure Travel distance • Take a photo of workplace • Measure Total steps • Make list of items/products, who produces them and who uses them & those in warehouses, storages etc. • Focal points to Check and find out existing problems • 5S • Layout improvement • Brainstorming • Andon • U-line • In-lining • Unification

	<ul style="list-style-type: none"> • Multi-process handling & Multi-skilled operators • A.B. control (Two point control) • Cell production line • TPM (Total Productive Maintenance)
Relevant procedures	<p>May include, but not limited to:</p> <ul style="list-style-type: none"> • Make waste visible • Be conscious of the waste • Be accountable for the waste and measure the waste.
4M1E	<p>May include, but not limited to:</p> <ul style="list-style-type: none"> • Man • Machine • Method <p>Material and Environment</p>
Creative idea generation	<p>May include, but not limited to:</p> <ul style="list-style-type: none"> • Brainstorming • Exploring and examining ideas in varied ways • Elaborating and extrapolating • Conceptualizing
Medium KPT	<p>May include, but not limited to:</p> <ul style="list-style-type: none"> • 5S • 4M (Machine, Method, Material and Man) • 4p (Policy, Procedures, People and Plant) • PDCA cycle <p>Basics of IE tools and techniques</p>
The ten basic principles for improvement	<p>May include, but not limited to:</p> <ul style="list-style-type: none"> • Throw out all of your fixed ideas about how to do things. • Think of how the new method will work- not how it won. • Don't accept excuses. Totally deny the status quo. • Don't seek perfection. A 50 percent implementation rate is fine as long as it's done on the spot. • Correct mistakes the moment they are found. • Don't spend a lot of money on improvements. • Problems give you a chance to use your brain. • Ask "why?" At least five times until you find the ultimate cause. • Ten people's ideas are better than one person's. • Improvement knows no limits.
Tangible and intangible results	<p>May include, but not limited to:</p> <ul style="list-style-type: none"> • Tangible result may include quantifiable data • Intangible result may include qualitative data
various types of diagrams.	<p>May include, but not limited to:</p> <ul style="list-style-type: none"> • Line graph

	<ul style="list-style-type: none"> • Bar graph • Pie-chart • Scatter diagrams • Affinity diagrams
Visual and auditory control methods	<p>May include, but not limited to:</p> <ul style="list-style-type: none"> • Red Tagging • Sign boards • Outlining • Add ones • Kanban, etc.
5W and 1H	<p>May include, but not limited to:</p> <ul style="list-style-type: none"> • Who • What • Where • When • Why and • How
Standard Operating Procedures (SOPs).	<p>May include, but not limited to:</p> <ul style="list-style-type: none"> • The customer demands • The most efficient work routine (steps) • The cycle times required to complete work elements • All process quality checks required to minimize defects/errors • The exact amount of work in process required

Evidence Guide	
Critical Aspects of Competence	<p>Demonstrate knowledge and skills to:</p> <ul style="list-style-type: none"> • Discuss why wastes occur in the workplace • Discuss causes and effects of wastes/MUDA in the workplace • Analyze the current situation of the workplace by using appropriate tools and techniques • Identify, measure, eliminate and prevent occurrence of wastes by using appropriate tools and techniques • Use 5W and 1H sheet to prevent • Detect non-conforming products/services in the work area • Apply effective problem-solving approaches/strategies. • Implement and monitor improved practices and procedures • Apply statistical quality control tools and techniques.
Underpinning Knowledge and Attitude	<p>Demonstrate knowledge of:</p> <ul style="list-style-type: none"> • Targets of customers and manufacturer/service provider • Traditional and kaizen thinking of price setting • Kaizen thinking in relation to targets of manufacturer/service

	<p>provider and customer</p> <ul style="list-style-type: none"> • value • The three categories of operations • the 3“MU” • wastes occur in the workplace • The 7 types of MUDA • QC story/PDCA cycle/ • QC story/ Problem solving steps • QCC techniques • 7 QC tools • The Benefits of identifying and eliminating waste • Causes and effects of 7 MUDA • Procedures to identify MUDA • Necessary attitude and the ten basic principles for improvement • Procedures to eliminate MUDA • Prevention of wastes • Methods of waste prevention • Definition and purpose of standardization • Standards required for machines, operations, defining normal and abnormal conditions, clerical procedures and procurement • Methods of visual and auditory control • TPM concept and its pillars. • Relevant OHS and environment requirements • Method and Lines of communication • Methods of making/recommending improvements. • Reporting procedures • Workplace procedures associated with the candidate's regular technical duties • organizational structure of the enterprise
The required skills	<p>Demonstrate skills to:</p> <ul style="list-style-type: none"> • Draw & analyze current situation of the work place • Use measurement apparatus (stop watch, tape, etc.) • Calculate volume and area • Apply statistical analysis tools • Use and follow checklists to identify, measure and eliminate wastes/MUDA • Identify and measure wastes/MUDA in accordance with OHS and procedures • Use tools and techniques to eliminate wastes/MUDA in accordance with OHS procedure. • Apply 5W and 1H sheet

	<ul style="list-style-type: none"> • Update and use standard procedures for completion of required operation • Apply Visual Management Board/Kaizen Board. • Detect non-conforming products or services in the work area • Work with others • Read and interpret documents • Observe situations • Solve problems • Communicate information • Gather evidence by using different means • Report activities and results using report formats • Implement and monitor improved practices and procedures
Resources Implication	Access is required to real or appropriately simulated situations, including work areas, materials and equipment, and to information on workplace practices and OHS practices.
Methods of Assessment	Competence may be assessed through: <ul style="list-style-type: none"> • Interview/Written Test • Observation/Demonstration with Oral Questioning
Context of Assessment	Competence may be assessed in the work place or in a simulated work place setting.

Level III

Occupational Standard: Irrigation Drainage Level III	
Unit Title	Determine Crop Water Requirement
Unit Code	<u>AGR IRD3 01 0322</u>
Unit Descriptor	This unit covers the knowledge, skills and attitude required to collect & collate all required data, identify type and characteristics of crop, monitor irrigation system process, record, compile & analyze data.

Elements	Performance criteria
1. Collect & Collate all required data	1.1. Rainfall, wind speed, sunshine hour, minimum & maximum temperature and humidity mean monthly values are collected and collated from a qualified meteorological station. 1.2. Soil data is collected following standard procedures of soil survey 1.3. Available water amount is known
2. Identify type and characteristics of crop	2.1. Economically and <i>agro-ecologically</i> beneficial crop is selected in accordance with preference of project owner. 2.2. Data on crop characteristics, <i>crop coefficient</i> , growth stage, and period and root depth at different growth stages is identified from official research publication.
3. Monitor irrigation system process	3.1 Frequency of irrigation is recorded. 3.2 Water usage is measured and recorded and does not exceed water allocation for a given period. 3.3 Differences between estimated water use and actual water used are calculated. 3.4 <i>Water quality</i> is checked according to organization <i>OHS</i> policy and procedures. 3.5 Plant or crop growth and water use efficiency is assessed. 3.6 Soil <i>chemical characteristics</i> are tested and soil moisture is assessed. 3.7 Climate and weather conditions are recorded.
4. Record, Compile, analyze Data and interpret the result	4.1 Plant or crop environment data is recorded. 4.2 Water orders and water usage is recorded. 4.3 Irrigation shifts are recorded. 4.4 System process data are recorded 4.5 Soil data is analyzed for physical properties following standard laboratory procedure. 4.6 Data consistency is checked using standard statistical package. 4.7 Method for computing crop water requirement is chosen based on data preference and performance. 4.8 Appropriate computer software model is selected. 4.9 Crop water requirement is computed and determined.

Variable	Range
Agro-ecology	May include but not limited to: <ul style="list-style-type: none"> • consider rain fall temperature • altitude to decide the suitability of growing crop and irrigation methods
Crop coefficient	May include but not limited to: <ul style="list-style-type: none"> • Consider crop factor which depends on the growing stages of crop.
Water quality	May include but not limited to: <ul style="list-style-type: none"> • Physical, • microbiological • chemical
Occupational Health & safety	May include but not limited to: <ul style="list-style-type: none"> • chemicals, slippery or uneven surfaces • moving machinery and vehicles, • snake, • spider • Insect bites • Solar radiation and dust.
Chemical characteristics	<ul style="list-style-type: none"> • May include but not limited to : • Salts: <ul style="list-style-type: none"> ➤ total concentration of soluble salts ➤ residual sodium carbonate • hardness • PH • fluoride • Chloride • metals nutrients • organics

Evidence Guide	
Critical Aspects of competence	Must demonstrate knowledge and skills to: <ul style="list-style-type: none"> • collect and collate data • analyze and generate crop water requirement • Schedule and optimize irrigation water application to irrigated field. • Analyze soil, crop and climatic data
The required Knowledge and Attitude	Demonstrates knowledge of : <ul style="list-style-type: none"> • Principles of statistical models • Soil-plant-water relationship • Computer software models related to irrigation requirement

	<ul style="list-style-type: none"> • Developments in related technology • Environmental issues and • Economic analysis • understanding of work value and ethics • accountable to work • loyalty and honest to the work he/she being doing • Dedication and commitment • Respect and follow organizational rules and regulation
The required skills	<p>skills include the ability to</p> <ul style="list-style-type: none"> • Collect climatic data • Identify soil type • Select crop type
Resource Implication	Access is required to real or appropriately simulated situations, including work areas, materials and equipment, and to information on workplace practices and OHS practices.
Method of Assessment	<p>Competence may be assessed through:</p> <ul style="list-style-type: none"> • Interview/Written Test • Observation/Demonstration with Oral Questioning
Context of Assessment	1.7. Competence may be assessed in the work place or in a simulated work place setting.

Occupational Standard: Irrigation and Drainage Level III	
Unit Title	Measure Water Flow In-pipes and Open Channels
Unit Code	AGR IRD3 02 0322
Unit Descriptor	This unit covers the knowledge, skills and attitude required to calculate energy losses and energy gradients in pipe flow, calculate flow in open channels, Calculate flows through notches and weirs and calculate proportions for an economic section.

Element	Performance Criteria
1. Calculate energy losses and energy gradients in pipe flow	<p>1.1 Measurements are reviewed and compared against expected trends.</p> <p>1.2 Standard processes are used to identify, estimate, adjust and justify data and review inconsistent data on <i>flow conditions</i>.</p> <p>1.3 Pipeline design <i>charts</i> are prepared using standard formulae.</p> <p>1.4 The limitations of formulae are identified.</p> <p>1.5 Variations in <i>roughness coefficients</i> are identified.</p> <p>1.6 The pipe discharge from reservoirs is calculated.</p>
2 Calculate flow in open channels.	<p>2.1 The <i>methods used for measuring flows</i> in open channels are identified.</p> <p>2.2 The <i>formulae for calculating flows</i> in open channels are used.</p> <p>2.3 The <i>characteristics of open channels</i> are distinguished.</p> <p>2.4 The uses of different measuring instruments and devices used in open channels are identified/ distinguished.</p> <p>2.5 The hydraulic principles which apply to different <i>meters</i> are assessed.</p> <p>2.6 The limitations of the meters are identified.</p>
3 Calculate flows through notches and weirs.	<p>3.1 The methods used for measuring flows in notches and weirs are identified.</p> <p>3.2 The formulae used for calculating flows in notches and weirs are implemented.</p> <p>3.3 The applications and <i>characteristics of notches and weirs</i> is distinguished.</p>

	<p>3.4 The uses of different measuring instruments and devices used for notches and weirs are distinguished.</p> <p>3.5 The hydraulic principles which apply to different meters are assessed.</p>
4 Calculate proportions for an economic section.	<p>4.1 The proportions of rectangular, trapezoidal and circular channels for maximum discharge are calculated.</p> <p>4.2 A partial flow chart is used to identify the depth of flow for maximum discharge and maximum velocity.</p>

Variable	Range
Flow conditions	<p>May include but not limited:</p> <ul style="list-style-type: none"> • laminar flow • turbulent flow • smooth and rough pipe and channel surfaces • full pipe flow • submerged flow conditions • backwater • critical flow, sub critical and supercritical • uniform flow • rapidly changing flow • Weir and flumes behavior under various flow conditions.
Charts	<p>May include but not limited:</p> <ul style="list-style-type: none"> • Colebrook-White charts • Hazen and Williams charts • Manning charts.
Roughness coefficients	<p>May include but not limited:</p> <ul style="list-style-type: none"> • biological growths and other obstructions • slime deposits • incrustations • general debris • deterioration of unlined ferrous surfaces, because the bore may be diminished by oxide formations • irregularities at joints: • eccentricity • abrupt decrease of diameter • protrusions of mortar or other jointing materials • inadequate closure, especially if this has permitted tree roots to enter • amount and size of solids being transported

	<ul style="list-style-type: none"> • Disturbances by flow from branch lines especially in sewers.
Methods used for measuring flows	<p>May include but not limited:</p> <ul style="list-style-type: none"> • container method • tilt tank method • trajectory method
Formulae for calculating flows	<p>May include but not limited:</p> <ul style="list-style-type: none"> • Chezy equation • Colebrook-White • Hazen and Williams • Darcy-Weisbach • Manning equation.
Characteristics of open channels	<p>May include but not limited:</p> <ul style="list-style-type: none"> • types of open channel • steadiness • uniformity • state of open channel flow • laminar, transitional and turbulent flow • Critical, subcritical, and supercritical flow.
Meters	<p>May include but not limited:</p> <ul style="list-style-type: none"> • mechanical meters <ul style="list-style-type: none"> ➤ the displacement type ➤ The inferential type. • pressure meters <ul style="list-style-type: none"> ➤ pitot tube ➤ orifice plate ➤ Venturi meter.
Characteristics of notches and weirs	<p>May include but not limited:</p> <ul style="list-style-type: none"> • type of the crest • shape of the notch • Crest and conditions.

Evidence Guide

Critical Aspects of Competence	<p>Must demonstrate skills and knowledge to:</p> <ul style="list-style-type: none"> • Calculate energy in pipe flows • calculate hydraulic and energy gradient for pipelines • calculate flow in open channels • calculate flows through notches and weirs • Calculate proportions for an economic section.
The required Knowledge and	<p>Demonstrate Knowledge of:</p> <ul style="list-style-type: none"> • principles of fluid statics, fluid dynamics and hydraulic

Attitudes	<p>mechanics</p> <ul style="list-style-type: none"> • Pascal's Law and hydrostatic effect on submerged surfaces • distinction between laminar and turbulent flow • Identify formulas used to calculate flow • Identify different characteristics of flow • the effect of velocity variation on velocity head • equations for calculating the approximate value of the friction factor • smooth and rough wall turbulent flow • minimize pipeline losses
The required skills	<p>Demonstrate Skill to:</p> <ul style="list-style-type: none"> • draw velocity distribution curves for fluids in pipes or channels with both laminar flow and turbulent flow • use data to determine the value of roughness • use simple equations for determining pipe friction with their appropriate application • calculate head losses in non-circular pipes • calculate minor energy losses associated with enlargements, contractions, valves, fittings and bends • calculate the flow in a pipe using data regarding minor energy losses • apply flow formulae to different open channel cross-sections in developing the proportions for an economic section • calculate the flow in pipelines • calculate the gradual varied flow profiles in uniform channels when the discharge is known • use analytical tools and formulae • interpret and apply technical documentation to the collection, analysis and reporting of hydrometric data • identify potential or actual operational problems • use computer systems • Use recording and reporting systems.
Resources Implication	Access is required to real or appropriately simulated situations, including work areas, materials and equipment, and to information on workplace practices and OHS practices.
Methods of Assessment	<p>Competence may be assessed through:</p> <ul style="list-style-type: none"> • Interview/Written Test • Observation/Demonstration with Oral Questioning
Context of Assessment	Competence may be assessed in the work place or in a simulated work place setting.

Occupational Standard: Irrigation and Drainage Level III	
Unit Title	Schedule irrigation water deliveries
Unit Code	<u>EIS IRD3 03 0621</u>
Unit Descriptor	This unit covers the knowledge, skills and attitudes required to communicate information about workplace processes, schedule irrigation water deliveries, monitor irrigation water deliveries, coordinate and control irrigation water delivery, identify and communicate issues arising in the workplace and to compile reports and records of irrigation water delivery.

Elements	Performance Criteria
1. Communicate information about workplace processes	1.1. <i>Communication method</i> is selected. 1.2. Multiple operations involving several topics areas are communicated accordingly. 1.3. Questions are used to gain extra information. 1.4. Correct sources of information are identified. 1.5. Information is selected and organized correctly. 1.6. Verbal and written reporting is undertaken when required. 1.7. Communication skills are maintained in all situations.
2. Schedule irrigation water deliveries	2.1. Customer water orders are identified and recorded. 2.2. Water orders are analysed to determine water delivery and flow rate requirements. 2.3. <i>Irrigation Water deliveries are scheduled</i> to meet flow rate requirements and organizational standards for channel balance and capacity restraints.
3. Monitor irrigation water delivery	3.1. Channel flow rate, regulation and delivery are monitored according to customer requirements. 3.2. Delivery performance records are maintained according to organizational requirements. 3.3. System performance is analysed using system data and recorded to determine actual and planned performance.
4. Coordinate and control irrigation water delivery	4.1. System adjustments are calculated according to demand and organizational requirements. 4.2. Flow regulation, channel levels, security of flow devices and settings are coordinated according to demand and organizational requirements.
5. Identify and communicate issues arising in the workplace	5.1. Issues and problems are identified as they arise. 5.2. Information regarding problems and issues are organized coherently to ensure clear and effective communication. 5.3. Dialogue is initiated with appropriate staff/personnel. 5.4. Communication problems and issues are raised as they arise.
6. Compile reports and	6.1. Reports are compiled from system performance data according to

records of irrigation water delivery	organizational requirements. 6.2. Appropriate measurements and delivery records are maintained according to organizational requirements.
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Variable	Range
Communication Methods	May include but not limited to: <ul style="list-style-type: none"> • Nonverbal gestures • Verbal • Face to face • Two-way radio • Speaking to groups • Using telephone • Written • Using internet • Cell phone
Scheduling irrigation Water deliveries	May include but not limited to: <ul style="list-style-type: none"> • Interaction and communication with: <ul style="list-style-type: none"> • Team members • Other authorities • The general public • Implementation of reporting procedures that may also include: <ul style="list-style-type: none"> • Procedures for the implementation of by laws • Organizational policies • Standard operating procedures • Statutory requirements

Evidence Guide	
Critical Aspects of Competence	Must demonstrate knowledge and skills in: <ul style="list-style-type: none"> • Analyze volumes and flow rates required for water deliveries • Prepare schedules for water deliveries from customer orders • Monitor and regulating system performance • Adjust system according to demand • Complete relevant documentation • Deal with a range of communication/information at one time • Make constructive contributions in workplace issues • Seek workplace issues effectively • Respond to workplace issues promptly • Use appropriate sources of information

<p>The required Knowledge and Attitudes</p>	<p>Demonstrate knowledge of:</p> <ul style="list-style-type: none"> • Types of water delivery • Impact of the principles of hydraulics on the operation of flows • Coordination processes • Principles of scheduling • System layout • System operations • Policies and standard operating procedures • Environmental aspects of irrigation and/or stock and domestic supply system asset infrastructure • Safety procedures • Risk factors and potential hazards of irrigation and/or domestic and stock supply systems • Effects of weather and conditions on operation of site plant • Water flow calculations • Flow measurement procedures • Organization requirements for written and electronic communication methods • Understand and convey intended meaning
<p>The required skills</p>	<p>Must demonstrate skills to:</p> <ul style="list-style-type: none"> • Identify and respond to operational problems • Produce basic reports and logs • Follow plans, charts and instructions • Use safety equipment and personal protective equipment • Perform work related calculations • Operate irrigation • Check channel flow • Identify control system faults • Organize information • Comply with organization requirements for the use of written and electronic communication methods
<p>Resource Implications</p>	<p>Access is required to real or appropriately simulated situations, including work areas, materials and equipment, and to information on workplace practices and OHS practices.</p>
<p>Methods of Assessment</p>	<p>Competence may be accessed through:</p> <ul style="list-style-type: none"> • Interview/Written Test • Observation/Demonstration with Oral Questioning
<p>Context of Assessment</p>	<p>Competence may be assessed in the work place or in a simulated work place setting.</p>

Occupational Standard: Irrigation and Drainage Level III	
Unit Title	Measure and Apply Irrigation Water
Unit Code	<u>AGR IRD3 04 0322</u>
Unit Descriptor	This unit covers the knowledge, skills and attitudes required to compute the water to be Applied, to apply a measured amount of water, to determine soil intake rate, and to identify Irrigation measuring device & techniques.

Element	Performance Criteria
1. Compute the water to be Applied	1.1 <i>Soil moisture deficit</i> is measured using standard technique 1.2 Area to be irrigated is measured using standard technique. 1.3 Amount of water to be applied is decided based on crop growth stage
2. Apply a measured amount of water	2.1 A pre-determined deficit is predicted using a scheduling system(s). 2.2 Irrigation is applied to partly or fully replace the deficit. 2.3 Where appropriate, water quantities are increased to ensure dilution and transport of toxic solutes below the root zone.
3. Determine soil intake Rate	3.1. Method for intake rate determination is selected appropriately. 3.2. <i>Tools and equipment</i> are made available to fulfill the requirements. 3.3. Soil moisture holding capacity is determined using standard technique
4. Identify Irrigation water Measuring device & Techniques	4.1 Irrigation water measuring devices are identified. 4.2. Type of irrigation method is identified and selected to fit the need of the organization. 4.3 Operation feasibility is identified based on local conditions. 4.4 Site of measurement is identified using standard technique.

Variable	Range
Soil moisture deficit	May include but not limited to: <ul style="list-style-type: none"> • Amount of water required to bring soil moisture content of the soil to field capacity.
Tools and equipment	May include but not limited to: <ul style="list-style-type: none"> • Ring infiltrometer • Siphon, • flumes, • Auger, • Core sampler, • Spatula • Sensitive balance

	<ul style="list-style-type: none"> • Oven • Cylinder and hose • Stop watch • Tensiometer • Current meter • Pressure apparatus
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Evidence Guide	
Critical Aspects of Competence	Demonstrate knowledge and skills in: <ul style="list-style-type: none"> • Measure soil moisture content, • Measure water holding capacity and amount of water to be applied, • Determine crop growth stage and growing period. • Developments in related technology • How to apply a measured water • Basic knowledge of indigenous practices • Identify irrigation measuring device & techniques
The required Knowledge and Attitude	Demonstrate knowledge of <ul style="list-style-type: none"> • Water holding capacity and amount of water to be applied, • Application of measured water • Basic knowledge of indigenous practices • Economic analysis • Environmental issues • Environmental protection agency regulations
The required skills	Demonstrate skill to: <ul style="list-style-type: none"> • Decide amount of water to be applied • Identify irrigation measuring device & techniques • Measure soil moisture content • Measure Water holding capacity Determining crop growth stage and growing period. • Apply measured Irrigation Water
Resources Implication	Access is required to real or appropriately simulated situations, including work areas, materials and equipment, and to information on workplace practices and OHS practices.
Methods of Assessment	Competence may be assessed through: <ul style="list-style-type: none"> • Interview/Written Test • Observation/Demonstration with Oral Questioning
Context of Assessment	Competence may be assessed in the work place or in a simulated work place setting.

Occupational Standard: Irrigation and Drainage Level III	
Unit Title	Operate and Manage Surface Irrigation Systems
Unit Code	<u>AGR IRD3 05 0322</u>
Unit Descriptor	This unit covers the knowledge, skill and attitude required to perform pre-start checks for surface irrigation system, Start up and inspect system, Shut down system based upon irrigation indicators.

Element	Performance Criteria
1. Perform pre-start checks for surface irrigation system	<p>1.1 Checks of water, power, fuel and lubricants ensure that all are available and the control system is operational.</p> <p>1.2 Pumps are primed, if necessary, and gates and controls are open or closed in accordance with organization procedures.</p> <p>1.3 Pipes, system equipment and <i>outlets</i> are positioned and set up in accordance with enterprise standards and <i>OHS requirements</i>.</p> <p>1.4. The <i>surface irrigation structures</i> are checked to ensure for proper functioning</p>
2. Start up and inspect system	<p>2.1 Siphons and other delivery mechanisms are primed and started in accordance with enterprise procedures.</p> <p>2.2 Startup sequence is implemented in accordance with operations manual and water levels, and pressure built up slowly as directed.</p> <p>2.3 Pressure at the head works and control valves is within design specifications indicating efficient filter operation, and water is <i>distributed evenly</i> to the targeted areas with minimal wastage and run-off.</p> <p>2.4 All malfunctions, leaks, damage to water courses and blockages are corrected or repaired immediately and reported in accordance with OHS and enterprise procedures.</p> <p>2.5 The surface irrigation structures systems operation is managed</p> <p>2.6 Head water levels are monitored and maintained.</p> <p>2.7 If used, pumps are monitored during operation, rubbish is cleared from outlets, and pump is back flushed in accordance with enterprise procedures.</p> <p>2.8 Irrigation changes are implemented in accordance with enterprise procedures.</p> <p>2.9 Water <i>reuse systems</i> are checked for clearance and freedom from weeds.</p>

<p>3. Shut down system based upon irrigation indicators</p>	<p>3.1 Area is irrigated in accordance with organization procedures, and time lag between shut down and end of watering is observed to minimize run-off and deep percolation.</p> <p>3.2 System components are shut down in sequence in accordance with manufacturers and organization procedures.</p> <p>3.3 Drainage and treatment systems are checked in accordance with enterprise procedures.</p> <p>3.4 Tail water control systems are implemented in accordance with statutory requirements and organization standards.</p> <p>3.5 Irrigation activities are reported and recorded in accordance with regulatory requirements and organization procedures.</p>
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Variable	Range
<p>surface irrigation systems</p>	<p>May include but not limited to:</p> <ul style="list-style-type: none"> • Flood irrigation systems <ul style="list-style-type: none"> ➤ border check ➤ contour irrigation ➤ furrow irrigation ➤ hillside flooding ➤ basin irrigation. • Border check <ul style="list-style-type: none"> ➤ either permanent or temporary earth ➤ plastic or concrete devices for insertion in a drain for reticulating water ➤ contour banks used to collect and distribute water along the perimeter of an irrigation plot ➤ contour banks within a plot to collect/ distribute water, or larger scale systems to stop water exiting one area to another. • Surface irrigation systems <ul style="list-style-type: none"> ➤ manual operation ➤ monitoring to fully automated with computer control and monitoring.
<p>Outlets</p>	<p>May include but not limited to:</p> <ul style="list-style-type: none"> • Siphons • cups and fluming • pipes • Gates/slides/doors.
<p>OHS requirements</p>	<p>May include but not limited to:</p> <ul style="list-style-type: none"> • systems and procedures for the safe operation of irrigation equipment, and to ensure protection against injury when working with pumps

	<ul style="list-style-type: none"> • outlets and other system equipment • prevention of electrical type injury • Manual handling and procedures for working outdoors, including protection from solar radiation, dust and noise.
Inspection	<p>May include but not limited to:</p> <ul style="list-style-type: none"> • This may include water flow • water quality at delivery points • water courses for leaks and blocks • Drainage flow.
surface irrigation structures	<p>May include but not limited to:</p> <ul style="list-style-type: none"> • Headwork and its components • Canal and related structures • Field canals • Water control structures • Drainage structures
Distributed evenly	<p>May include but not limited to:</p> <ul style="list-style-type: none"> • Even distribution of water depends on channel levels (if applicable) • Time number and position of siphons running (if applicable) • time, number and position of outlets running • water pressure • no leaks/blocks in system • wind (weather conditions) • flow rates and times.
Reuse systems	<p>May include but not limited to:</p> <ul style="list-style-type: none"> • Disinfestations • Filtering equipment.
Irrigation indicators	<p>May include but not limited to:</p> <ul style="list-style-type: none"> • Soil moisture • Weather reports and information • Plant/crop condition.

Evidence Guide

Critical Aspects of Competence	<p>Must demonstrate skills and knowledge to:</p> <ul style="list-style-type: none"> • Perform pre-start checks, start and operation activities of surface irrigation • Inspect the system • shut down in response to irrigation indicators • OHS, environmental and enterprise policies and procedures relating to the operation of gravity fed irrigation systems
The required knowledge	Demonstrates Knowledge of:

and attitude	<ul style="list-style-type: none"> • General irrigation methods for surface irrigation systems • Main components of gravity fed irrigation systems • Pump types used in surface irrigation systems and their operation • Environmental impacts of irrigation, using water from any ground or underground source • Inspection procedures • Soil/plant/water relationships to operate the system • Water requirements of plants/crops consistent with sound environmental management • Shutdown and start up sequences • OHS, environmental and enterprise policies and procedures relating to the operation of gravity fed irrigation systems.
The required skills	<p>Demonstrates skill of:</p> <ul style="list-style-type: none"> • Read and follow operations manual and irrigation schedules • Check pressure at the head works and control valves • Carry out running repairs on irrigation delivery and drainage systems • Identify adverse environmental impacts of irrigation activities and appropriate remedial action • Implement and follow relevant OHS and environmental policies and procedures relating to the operation of gravity fed irrigation systems • Communicate ideas and information • Collect analyze and organize information • Check pressure and flow rates, and recording irrigation activities • Plan and organize activities • Perform shut down sequence • Report irrigation activities, malfunctions, leaks, damage to water courses and blockages • Use mathematical ideas and techniques in measuring and interpreting pressure and flow rates • Solve problems in identifying and correcting malfunctions, leaks and blockages.
Resources Implication	Access is required to real or appropriately simulated situations, including work areas, materials and equipment, and to information on workplace practices and OHS practices.
Methods of Assessment	<p>Competence may be assessed through:</p> <ul style="list-style-type: none"> • Interview/Written Test • Observation/Demonstration with Oral Questioning
Context of Assessment	Competence may be assessed in the work place or in a simulated work place setting.

Occupational Standard: Irrigation and Drainage Level II	
Unit Title	Install and commission Pressurized irrigation systems
Unit Code	AGR IRD3 06 0322
Unit Descriptor	This unit covers the knowledge, skill and attitude required to Organize resources, setting out and prepare site, install components and commission pressurized irrigation systems.

Elements	Performance Criteria
1. Organize resources for installation work	<p>1.1. Materials, tools, accessories, equipment and machinery are Selected and used</p> <p>1.2. Checked that the parts and equipment are matched with system drawings and specifications</p> <p>1.3. Carry out pre-operational and safety checks on tools, equipment and machinery Carried out</p> <p>1.4. work health and safety hazards, assess risks and implement suitable controls are identified</p> <p>1.5. suitable safety and personal protective equipment select, used and maintained</p> <p>1.6. environmental considerations of irrigation installation activities identified</p> <p>1.7. <i>water supply</i> to ensure that it is compatible with system specifications is Checked</p>
2. Set out and prepare site	<p>2.1. Irrigation lines are measured and marked out</p> <p>2.2. Trenches are confirmed at the specified depth without damage to services, facilities, features and established plants</p> <p>2.3. Regulations relevant to the situation are observed</p> <p>2.4 work practices that reflect sustainable horticulture principles used and responded to local community requirements</p> <p>2.5 OHS requirements are identified, risks assessed, controls implemented and reported to the supervisor</p> <p>2.6. Suitable safety and personal protective equipment (PPE) are selected, used and maintained</p>
2 Install pipe system	<p>2.1 Irrigation pipes are set out according to plans, specifications and site requirements.</p> <p>2.2. Pipe trenches are excavated according to plans and specifications.</p> <p>2.2. Pipe system is installed according to organizational and manufacturer's principles and concepts.</p> <p>2.2. Pipelines are flushed of air and foreign matter to installation standard.</p> <p>2.2. Backflow prevention device, water emitters and control valves are installed, operated and adjusted according to standards.</p>

	<p>2.2. Installation is tested to comply with standards and authorities' requirements, and is adjusted.</p> <p>2.2. Trenches are backfilled according to plans and specifications and ground surface is reinstated.</p>
3. Install irrigation components	<p>3.1 The irrigation system plan and, where applicable, supervise contractors and monitor work to ensure it conforms to the plan are interpreted</p> <p>3.2 components and complete and test joints are assembled and connected</p> <p>3.3 Fittings and valves fitted and adjusted and secured all joints</p> <p>3.4 A clean and safe work area while installation work is carried out and maintained</p>
4 Commission irrigation system	<p>4.3 Testing and monitoring equipment are calibrated</p> <p>4.2 The start-up sequence in accordance with the operations manual confirmed</p> <p>4.3 Systems flushed as required</p> <p>4.4 operating faults identified and corrective measures taken where required</p> <p>4.5 work outcomes record and reported to supervisor</p>
5 Complete installation work and clean up	<p>5.1 earthworks are finished</p> <p>5.2 The system configuration confirmed and capacity is matched with the installation plan</p> <p>5.3 Materials and equipment from the site on completion of maintenance works site restored and cleared</p> <p>5.4 Tools and equipment are cleaned and stored</p>

Variable	Range
Tools, equipment and accessories	<p>May include but not limited to:</p> <ul style="list-style-type: none"> • surveying and leveling equipment <ul style="list-style-type: none"> ➤ automatic level ➤ laser level ➤ dumpy level ➤ Crowley level ➤ Staff ➤ boning rods ➤ pegs ➤ notebook ➤ pencil and calculator

	<ul style="list-style-type: none"> ➤ hand tools (rakes, shovels, spades, rollers, wheelbarrows, hoses and hose fittings; • pumps and pump fittings • fitting and welding tools appropriate to the irrigation system
OHS requirements	<p>May include but not limited to:</p> <ul style="list-style-type: none"> • identifying hazards; • assessing risks and implementing controls; • cleaning, maintaining and storing tools, equipment and machinery; • appropriate use of PPE including sun protection; • safe operation of tools, equipment and machinery; • safe handling, use and storage of chemicals and hazardous substances; • correct manual handling; • basic first aid; • personal hygiene • reporting problems to supervisors.
PPE	<p>May include but not limited to:</p> <ul style="list-style-type: none"> • Hat, • boots, • overalls, • gloves, • goggles • respirator or face mask, • face guard • hearing protection • sunscreen lotion • hard hat.
Water supplies	<p>May include but not limited to:</p> <ul style="list-style-type: none"> • Underground • mains or surface storage including fixtures <ul style="list-style-type: none"> ➤ dams ➤ bores ➤ windmills ➤ tanks ➤ channels.

Evidence Guide	
Critical Aspects of Competence	<p>Must demonstrate skills and knowledge to:</p> <ul style="list-style-type: none"> • organize resources for installation work • set out and prepare the site.

	<ul style="list-style-type: none"> • install, operate and adjust backflow prevention device, water emitters and control valves • calibrate testing and monitoring equipment • complete installation work • test and install pipe system • commission irrigation system
The required knowledge and Attitudes	<p>Must demonstrate knowledge of:</p> <ul style="list-style-type: none"> • the behavior of water on varying terrain and soil types • calculations for installing irrigation systems • characteristics and operation of joints, valves and sprinkler components • components of an irrigation system • methods and techniques of installing irrigation • soil characteristics • soil water retention testing techniques • Water quality and water filtration techniques.
The required skills	<p>Demonstrates skill of:</p> <ul style="list-style-type: none"> • Collect and organize information organization work procedures and site and irrigation system plans • Organize tools, materials and accessories for installation work • Set out and prepare site • Set out irrigation pipe • Install and flesh pipes • Install pressurized irrigation components • Complete installation work • Communicate with work team members, supervisors, contractors and consultants. • Use mathematical ideas to measuring materials and interpreting/identify specifications for the installation of pressurized irrigation
Resources Implication	Access is required to real or appropriately simulated situations, including work areas, materials and equipment, and to information on workplace practices and OHS practices.
Methods of Assessment	<p>Competence may be assessed through:</p> <ul style="list-style-type: none"> • Interview/Written Test • Observation/Demonstration with Oral Questioning
Context of Assessment	Competence may be assessed in the work place or in a simulated work place setting.

Occupational Standard: Irrigation Drainage Level III	
Unit Title	Operate and Maintain Pressurized Irrigation Systems
Unit Code	<u>AGR IRD3 07 0322</u>
Unit Descriptor	This unit covers the knowledge, skill and attitude required to perform pre-start checks for pressurized irrigation system, start up and inspect system, shut down system based upon irrigation indicators, carry out pre- and post-season maintenance, carry out routine maintenance activities, maintain system components, maintain system components, and record and report maintenance activities.

Element	Performance Criteria
1. Perform pre-start checks for pressurized irrigation system	<p>1.1 Checks of water, power, fuel and lubricants ensure that all are available and the control system is operational.</p> <p>1.2 Pumps are primed, if necessary, and valves and controls are open or closed as directed, shut down system based upon irrigation indicators</p> <p>1.3 Pressure and flow testing equipment are calibrated and available as required.</p> <p>1.4 Other pre-start system checks are carried out in accordance with manufacturers, <i>OHS</i> and organization procedures.</p>
2. Start up and inspect system	<p>2.1 Startup sequence is implemented in accordance with operations manual.</p> <p>2.2 All malfunctions, leaks and blockages are corrected or repaired immediately and reported in accordance with OHS and enterprise procedures.</p> <p>2.3 Pressure at the head works and control valves is within design specifications indicating efficient filter operation, and water is distributed evenly to the targeted areas with minimal wastage and run-off.</p>
3. Shut down system based upon irrigation indicators	<p>3.1 Water is applied for sufficient time to allow amount of water necessary to achieve required soil moisture levels in accordance with irrigation schedule, <i>environmental considerations</i> and allowing for weather conditions.</p> <p>3.2 <i>System components</i> are shut down and drained in sequence</p>

	<p>in accordance with manufacturers, OHS and enterprise procedures.</p> <p>3.3 Drainage and treatment systems are checked in accordance with enterprise procedures.</p> <p>3.4 Irrigation activities are recorded and in reported accordance with regulatory requirements and enterprise procedures.</p>
4. Carry out pre- and post-season maintenance	<p>4.1 Equipment is prepared pre-season for effective operation in accordance with design specifications and enterprise standards.</p> <p>4.2 System is flushed, cleaned, closed down and maintained post-season in accordance with design specifications and organization standards.</p> <p>4.3 Equipment requiring storage is dismantled, loaded, transported and stored without damage according to enterprise standards and safe working practices.</p>
4. Carry out routine maintenance activities	<p>2.1 All maintenance activities are carried out according to the maintenance program and the manufacturer's specifications.</p> <p>2.2 Mechanical equipment is serviced in accordance with the operator's manual or as directed.</p> <p>2.3 Supply and distribution systems are flushed and cleaned and sprinklers, emitters and/or drip line tapes are replaced as directed.</p> <p>2.4 Outlets, strainers, pump screens and filters are cleaned and replaced as directed.</p> <p>2.5 System is visually inspected for leaks, operating faults and dry areas, and observations recorded in the maintenance book.</p> <p>2.6 Operation area is maintained in a clean and safe condition, and OHS procedures are followed.</p>
5. Maintain system components	<p>3.1 System maintenance is carried out at scheduled times using equipment and materials in accordance with organization standards and manufacturers specifications.</p>

	<p>3.2 Parts are inspected for wear or blockage and reported or replaced according to enterprise guidelines.</p> <p>3.3 Outlets are removed and cleaned and damaged parts are reassembled and replaced according to manufacturer's specifications.</p> <p>3.4 Operation area is maintained in a clean and safe condition following OHS procedures.</p>
7. Record and report maintenance activities	<p>4.1 All damage and blockage caused by pests and vermin is recorded by damage type, location and the section of the system affected.</p> <p>4.2 Damage or faulty pumps, valves, electrical components and computer systems are recorded and reported, and action taken to effect repairs.</p> <p>4.3 All routine maintenance activities are recorded and reported in accordance with organization standards.</p>

Variable	Range
OHS	<p>May include but not limited to:</p> <ul style="list-style-type: none"> • prevention of electrical type injury • Manual handling and procedures for working outdoors, including protection from solar radiation, dust and noise. • protection against cleansing agents including acids, • safe systems and procedures for protection against risks of slips and falls.
Environmental considerations	<p>May include but not limited to:</p> <ul style="list-style-type: none"> • Efficient operation of the system to conserve water by identifying and repairing leaks • avoidance of over watering • even distribution of water to targeted areas with minimal wastage and run-off.
System components	<p>May include but not limited to:</p> <ul style="list-style-type: none"> • pumps • Tensiometers • probe tubes\ • flow meter • catch cans

	<ul style="list-style-type: none"> • pressure gauge • computer and/or other scheduling devices • recycling equipment • spray equipment.
Records	<p>May include but not limited to:</p> <ul style="list-style-type: none"> • Water used • time of shutdown • malfunctions • blockages • leaks and • other faults requiring repair.
Organization standards	<p>May include but not limited to:</p> <ul style="list-style-type: none"> • environmental considerations such as the identification of the impacts of pumping water from any ground or underground source and appropriate remedial action • procedures for dealing with cleaning agents and waste water
Safe working practices	<p>May including but not limited to:</p> <ul style="list-style-type: none"> • safe procedures for manual handling, and the operation of machinery and equipment.
Mechanical equipment	<p>May include but not limited to:</p> <ul style="list-style-type: none"> • Periodical maintenance for changing <ul style="list-style-type: none"> ➤ engine oil ➤ replacing the oil filter ➤ replacing the air cleaner ➤ checking battery water level ➤ pre-cleaner ➤ gear box oil ➤ cooling system/water fuel, ➤ battery charge ➤ greasing the pump jack shaft and bearings, ➤ flushing (de-silting) the pump. • Centre control tower maintenance <ul style="list-style-type: none"> ➤ greasing head of pivot and all gearboxes ➤ checking tire pressure ➤ cleaning electrical controls of authorized components.
Materials	<p>May include but not limited to:</p> <ul style="list-style-type: none"> • gland packing • rubber rings

	<ul style="list-style-type: none"> • belts and pulleys, • hazardous substances, or chemicals.
Parts	<p>May include but not limited to:</p> <ul style="list-style-type: none"> • pipes • jets • micro jets • laterals • sprinklers • emitters • integrated drip line "thin wall" • seals and outlets.
Outlets	<p>May include but not limited to:</p> <ul style="list-style-type: none"> • Outlets drip lines • cups and fluming • pipes • risers • valves • sprinklers • emitters.

Evidence Guide	
Critical Aspects of Competence	<p>Must demonstrate skills and knowledge to:</p> <ul style="list-style-type: none"> • Perform pre-start checks • operate and inspect the system • Shut down in response to irrigation indicators • Read and interpret flow rates and recording irrigation activities • Plan and organize activities • Use mathematical ideas and techniques in measuring • Interpret pressure and flow rates. • inspect and replace worn parts, • follow procedures to carry out routine maintenance with only routine supervision.
The required Knowledge and Attitude	<p>Demonstrates knowledge of:</p> <ul style="list-style-type: none"> • General irrigation methods for pressurized systems • main components of pressurized irrigation systems • pump types used in pressurized irrigation systems and their operation • environmental impacts of irrigation using water from any ground or underground source • soil/plant/water relationships

	<ul style="list-style-type: none"> • water requirements of plants/crops consistent with sound environmental management • shutdown sequence • OHS, environmental and enterprise policies and procedures relating to the operation of pressurized irrigation systems. • work value and ethics • loyalty and honest to the work he/she being doing • Dedication and commitment • Respect and follow organizational rules and regulation • maintenance requirements and procedures for system components • environmentally safe disposal procedures for chemical containers and residues, oils/grease and used parts.
The required skills	<p>Demonstrates skills of:</p> <ul style="list-style-type: none"> • read and follow operations manual • schedule irrigation • measure and interpret flow rates and pressures • identify adverse environmental impacts of irrigation activities and appropriate remedial action • Collect, analyze, organize and communicate ideas and information • Read and interpret flow rates and recording irrigation activities • Plan and organize activities • Perform shut down sequence • Use mathematical ideas and techniques in measuring and interpreting pressure and flow rates • Solve problems in identifying and correcting malfunctions • leaks and blockages • read and follow operator's manual and manufacturers specifications for pressurized irrigation systems • maintain selected irrigation system components • record and report maintenance observations and activities. • carry out pre- and post-season maintenance • carry out routine maintenance activities on pressurized irrigation delivery systems

Resources Implication	Access is to real or appropriately simulated situations, including work areas, materials, and equipment, and to information on workplace practices and OHS practices.
Methods of Assessment	Competence may be assessed through: <ul style="list-style-type: none"> • Interview/Written Test Observation/Demonstration with Oral Questioning
Context of Assessment	Competence may be assessed in the workplace or a simulated workplace setting.

Occupational Standard: Irrigation and Drainage Level III	
Unit Title	Operate and Process Fertigation Equipment
Unit Code	AGR IRD3 08 0322
Unit Descriptor	This unit covers the knowledge, skill and attitude required to Prepare materials and equipment for operation, operate the fertigation process and shut down fertigation equipment.

Element	Performance Criteria
1. Prepare materials and equipment for operation	<p>1.1. Materials and services are confirmed as available and ready for operation.</p> <p>1.2. Materials are prepared to meet fertigation requirements.</p> <p>1.3. Injection or fertigation equipment is connected, as directed, and calibrated according to manufacturers' specifications.</p> <p>1.4. Fertilizer concentration is calculated and the solution thoroughly mixed according to organization, OHS procedures and environmental requirements.</p> <p>1.5. Equipment is set to meet fertigation requirements.</p>
2. Operate the fertigation process	<p>2.1. Startup sequence is implemented according to operations manual and organization procedures</p> <p>2.2. Fertigation process is operated and monitored to ensure delivery is maintained according to organization specifications and procedures</p> <p>2.3. Fertigation equipment is monitored to ensure no adverse environmental impact is caused by faulty operation</p> <p>2.4. Corrections to the process and equipment adjustments are implemented as necessary.</p>
3. Shut down fertigation equipment	<p>3.1. Equipment is cleaned according to organization procedures.</p> <p>3.2. Waste generated by both the fertigation process and cleaning procedures is managed according to environmental protection requirements and organization OHS procedures</p> <p>3.3. Fertigation activities are reported and recorded according to regulatory requirements and organization procedures.</p>

Variable	Range
Materials	<p>May include but not limited to:</p> <ul style="list-style-type: none"> • Wet or dry <ul style="list-style-type: none"> ➤ Fertilizers

	<ul style="list-style-type: none"> ➤ Chlorine ➤ Acid ➤ cleaning agents.
Injection or fertigation equipment	<p>May include but not limited to:</p> <ul style="list-style-type: none"> • Injection • injection point • chemical holding tank • irrigation system <ul style="list-style-type: none"> ➤ manual operation ➤ monitoring to fully automated with computer control and monitoring.
OHS procedures	<p>May include but not limited to:</p> <ul style="list-style-type: none"> • hazards identification and risk assessment • systems and procedures for the safe operation • maintenance of machinery and equipment • selection, use and maintenance of relevant personal protective clothing and equipment, and safe systems • Procedures for handling, transporting and storing chemicals and hazardous substances taking into account toxicity levels and environmental effects.
Operation and monitoring	<p>May include but not limited to:</p> <ul style="list-style-type: none"> • Operation and monitoring may be manual or involve the use of a process control system.

Evidence Guide	
Critical Aspects of Competence	<p>Must demonstrate skills and knowledge to:</p> <ul style="list-style-type: none"> • calculate and prepare fertigation materials, • connect and calibrate equipment, • operate, monitor and adjust delivery, • Shut down and clean equipment, and dispose of waste in an environmentally responsible way.
The required knowledge and attitude	<p>Demonstrates Knowledge of:</p> <ul style="list-style-type: none"> • fertigation injection equipment • chemical handling procedures for fertiliser, chlorine, acid and cleaning agents

	<ul style="list-style-type: none"> • cleaning procedures for fertigation equipment • material safety data sheets (MSDS) • environmental impacts of delivering fertilisers via the irrigation system • OHS issues • organization policies and procedures.
The required skills	<p>Demonstrates skill of:</p> <ul style="list-style-type: none"> • calculate and prepare fertigation materials • connect, calibrate and operate the equipment • monitor and adjust the delivery of fertilizers • shut down, clean equipment and dispose of waste • use personal protective equipment • identify adverse environmental impacts of fertigation activities and appropriate remedial action • Implement organize, OHS and environmental policies and procedures.
Resources Implication	Access is to real or appropriately simulated situations, including work areas, materials, and equipment, and to information on workplace practices and OHS practices.
Methods of Assessment	<p>Competence may be assessed through:</p> <ul style="list-style-type: none"> • Interview/Written Test • Observation/Demonstration with Oral Questioning
Context of Assessment	Competence may be assessed in the workplace or a simulated workplace setting.

Occupational Standard: Irrigation Drainage Level III	
Unit Title	Troubleshoot Irrigation and Drainage Systems
Unit Code	<u>AGR IRD3 09 0322</u>
Unit Descriptor	This unit covers the knowledge, skill and attitude required to plan the job, determine access to irrigation and drainage lines, locate and identify faulty components and blockages, inspect site and shut down/isolate Component.

Element	Performance Criteria
1. Plan job	1.1 Equipment is selected and checked for safe operation. 1.2 Appropriate personal protective equipment and tools are selected and used according to OHS requirements .
2. Determine access to irrigation and drainage lines	2.1 Plan of plumbing system is determined and access points located. 2.2 Excavation or digging is carried out without unnecessary damage to structures, site, environment or existing fixtures/fittings.
3. Locate and identify faulty components and blockages	3.1 Irrigation system and component function is determined by reference to system specifications and technical manuals. 3.2 Monitoring and maintenance records are checked and reviewed. 3.3 Operational tests are carried out in accordance with system specifications, technical manuals and OHS requirements. 3.4 Faulty components and blockages are identified and documented according to organization policy and procedures.
4. Inspect site	4.1 Site is inspected to locate blocked section of irrigation and drainage lines . 4.2 Work requirements and responsibility for repair is determined and appropriate authorities/persons notified of the intention to commence work. 4.3 Repair activities are reported and recorded according to organization policy and procedures
5. Shut down/isolate Component	5.1 Shut down and start sequence and isolation procedures are applied as required according to system specifications and technical manuals. 5.2 Safe shut down or isolation is verified. 5.3 Safety/security lock off devices and signage is installed according to enterprise policy and procedures.

Variable	Range
OHS Requirements	May include but not limited to:

	<ul style="list-style-type: none"> • Manual handling, outdoor work (including protection from solar radiation, dust and noise) • selection, use and maintenance of relevant personal protective clothing and equipment, selection, care and safe use of hand tools • safe systems for the prevention of electrical injury.
Irrigation systems	<p>May include but not limited to:</p> <ul style="list-style-type: none"> • pressurized irrigation systems <ul style="list-style-type: none"> ➤ micro-irrigation ➤ spray irrigation ➤ Micro-irrigation systems <ul style="list-style-type: none"> ✓ low pressure ✓ below or above ground ✓ spray systems, drip emitter trickle ✓ t-tape ✓ mini-sprinklers ➤ Spray irrigation systems <ul style="list-style-type: none"> ✓ center pivot ✓ linear move ✓ dragline • Surface irrigation system <ul style="list-style-type: none"> ➤ border check ➤ contour irrigation ➤ furrow irrigation ➤ hillside flooding and basin irrigation.
components	<p>May include but not limited to:</p> <ul style="list-style-type: none"> • injectors • pumps • tensiometers • probe tubes • flow meter • pressure gauge

	<ul style="list-style-type: none"> • controllers • solenoid valves • wiring • quick coupling valves (QCV) • pipes • jets • micro jets • laterals • sprinklers • emitters • integrated drip line "thin wall" • seals • outlets and gears
Operational tests	<p>May include but not limited to:</p> <ul style="list-style-type: none"> • Pressures • flow rates • sprinkler performance • calculation of co-efficient of uniformity and distribution uniformity.
	<ul style="list-style-type: none"> •
Irrigation and drainage lines	<p>May include but not limited to:</p> <ul style="list-style-type: none"> • irrigation system (Irrigation networks) • drainage system (surface and subsurface)

Evidence Guide

Critical Aspects of Competence	<p>Must demonstrate skills and knowledge to:</p> <ul style="list-style-type: none"> • Describe causes of system malfunctions and their likely remedy • locate, isolate and replace faulty components and blockages • Return the system to normal operating status • operate, maintain and repair irrigation systems • Implement and follow relevant enterprise OHS and environmental policies and procedures • Identify and describe types, operational parameters of drains
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	<p>and components used in drainage systems</p> <ul style="list-style-type: none"> inspect the site to determine access to lines, locate and clear blockages Test the system and clean up afterwards. application of comply OHS procedures when locating and clearing line blockages,
The Required Knowledge and Attitudes	<p>Demonstrates knowledge of:</p> <ul style="list-style-type: none"> Replaceable components of irrigation systems system malfunctions and their likely causes environmental impacts of irrigation, using water from any ground or underground source policies and procedures Irrigation OHS and environmental guidelines types and operational parameters of drains components used in drainage systems isolation processes and procedures level and alignment processes regulatory requirements codes of practice and relevant organization service standards relating to blockage removal disconnection and reconnection activities application of OHS procedures when locating and clearing line blockages technical manuals and supply/spare parts inventories Use of personal protective equipment and materials handling.
The required skills	<p>Demonstrates skill to:</p> <ul style="list-style-type: none"> read and apply system specifications record and report maintenance activities identify adverse environmental impacts of irrigation activities and appropriate remedial action operate, maintain and repair irrigation systems Implement and follow relevant enterprise OHS and environmental policies and procedures Communicate ideas and information Order replaceable components from suppliers Collect, analyze and organize information Plan and organize activities Organize shut down and repair activities Work with others and in teams Check and review monitoring and maintenance records

	<p>completed by others</p> <ul style="list-style-type: none"> • Use mathematical ideas and techniques in interpreting system performance data and purchasing parts within budget • Solve problems in identifying and replacing faulty components • interpret plans, specifications and service manuals • isolate appliances/fixtures/fittings and related assemblies (where required) repair or remove blockages • use manual and mechanical drain cleaning equipment level and align site
Resources Implication	Access is to real or appropriately simulated situations, including work areas, materials, and equipment, and to information on workplace practices and OHS practices.
Methods of Assessment	Competence may be assessed through: <ul style="list-style-type: none"> • Interview/Written Test • Observation/Demonstration with Oral Questioning
Context of Assessment	Competence may be assessed in the workplace or a simulated workplace setting.

Occupational Standard: Irrigation and Drainage Level III	
Unit of competence	Carry out Irrigation Drainage Systems Development
Unit Code	AGR IRD3 10 0322
Unit Descriptor	This unit covers the knowledge, skill and attitude of site preparation for construction and installation of surface and sub-surface drainage systems, process of installing and construction of subsurface irrigation drainage systems under routine supervision.

Element of competence	Performance Criteria
1. Prepare site for construction of surface drainage system	<p>1.1. Symbols and terminology are recognized to ensure surface drainage system plan.</p> <p>1.2. Layout of <i>services</i> is identified, depths checked against the site or drainage system plan and discrepancies are reported to the supervisor and the relevant authority.</p> <p>1.3. Survey, measurement and marking out of the site are completed according to plan specifications and organization work procedures.</p>
2. Construct surface drainage system	<p>2.1. Excavations are completed without damage to services, facilities, features and established plants according to plan specifications and organization <i>work procedures</i>.</p> <p>2.2. The drainage system is constructed according to the drainage system plan and organization work procedures.</p> <p>2.3. The drainage system is checked for configuration and capacity consistent with the drainage system plan and according to organization work procedures.</p> <p>2.4. The supervisor is consulted and remedial action is taken when the drainage system operation does not meet the plan specifications.</p>
3. Complete construction of surface drainage system	<p>3.1. Earthworks are finished off to the plan specifications and organization work procedures.</p> <p>3.2. The site is restored and <i>waste material</i> is removed from the site and disposed of in an environmentally aware and safe manner according to organization work procedures.</p> <p>3.3. <i>Tools, equipment and machinery</i> are cleaned, maintained and stored according to manufacturer guideline and organization work procedures.</p> <p>3.4. A <i>clean and safe work area</i> is maintained throughout and on completion of work.</p> <p>3.5. Work outcomes are recorded or reported to the supervisor</p>

	according to organization work procedures.
4. Prepare for sub surface drainage system installation and construction activities	<p>4.1. The construction site for the drainage system and construction method is identified according to the site and drainage system plans and organization work procedures.</p> <p>4.2. Materials, tools, equipment and machinery are selected according to drainage system design requirements and organization work procedures.</p> <p>4.3. Pre-operational and safety checks are carried out on tools, equipment and machinery according to manufacturer's specifications and organization work procedures.</p> <p>4.4. OHS hazards are identified, risks assessed, controls implemented and reported to the supervisor.</p> <p>4.5. Suitable safety and personal protective equipment (PPE) are selected, used and maintained.</p>
5. Installation of subsurface drainage systems	<p>5.1. Materials required for the job are transported to the location and stacked in a safe position</p> <p>5.2. Setting out and excavation of trenches are carried according to design specification.</p> <p>5.3. bedding materials are laid in accordance of design specifications</p> <p>5.4. Pipes are lowered and positioned.</p> <p>5.5. Site is cleared and excess soil, debris and unwanted materials are removed in accordance with organizational procedures and environmental requirements.</p> <p>5.6. Tools and equipment are cleaned, maintained and stored.</p>

Variable	Range statement
Services	<p>May include but not limited to:</p> <ul style="list-style-type: none"> • Water supply • Gas • power (electricity) • telecommunications • irrigation • Drainage
Work procedures	<p>May include but not limited to:</p> <ul style="list-style-type: none"> • Supervisors oral or written instructions • Installation program • Organization standard operating procedures (SOPs) • Specifications • Routine maintenance schedules • Work notes

	<ul style="list-style-type: none"> • Product labels and Material Safety Data Sheets (MSDS) • Manufacturers service specifications and operators manuals • Waste disposal, recycling and re-use guidelines • OHS procedures
Waste material	<p>May include but not limited to:</p> <ul style="list-style-type: none"> • Unused construction and excavated materials • Plant debris • litter and broken components • plastic • metal • paper-based materials
Materials	<p>May include but not limited to:</p> <ul style="list-style-type: none"> • Glues • Pipes • Welds
Tools, equipment and machinery	<p>May include but not limited to:</p> <ul style="list-style-type: none"> • Surveying and levelling equipment (such as automatic level, laser level, dumpy level, Cowley level, Staff, boning rods, pegs) • notebook • pencil and calculator • hand tools (such as rakes, shovels, spades, rollers, wheelbarrows) • hoses and hose fittings • machinery (such as bobcats, ditch witches, backhoes, front-end loaders, graders, mechanical rollers, trucks, hydraulic trailers, and tractors) • pumps and pump fittings • welding tools
OHS hazards	<p>May include but not limited to:</p> <ul style="list-style-type: none"> • Disturbance or interruption of services • solar radiation • Dust • Noise • soil and waterborne micro-organisms • Chemicals and hazardous substances • manual handling • moving vehicles • machinery and machinery parts

	<ul style="list-style-type: none"> • Uneven surfaces and flying and falling objects
Safety	<p>May include but not limited to:</p> <ul style="list-style-type: none"> • signage and barriers
PPE	<p>May include but not limited to:</p> <ul style="list-style-type: none"> • Hat • Boots • Overalls • Gloves • Goggles • respirator or face mask • face guard • hearing protection • sunscreen lotion • hard hat
Environmental requirements	<p>May include but not limited to:</p> <ul style="list-style-type: none"> • Recycling or environmentally safe disposal of excess soil, debris and unwanted materials

Evidence Guide		
Critical Aspects of Competence	of	<p>Must demonstrate skills and knowledge to:</p> <ul style="list-style-type: none"> • Describe purpose and types of irrigation drainage systems • Identify and describe components of irrigation drainage system • Prepare for installation and construction of drainage system activities • Set out and excavate the installation (trenches) and construction (open ditches) site • Clean up the installation and construction site
The required Knowledge and Attitudes		<p>Demonstrates Knowledge of:</p> <ul style="list-style-type: none"> • Purpose and application of drainage system plans to the physical situation • Workplace and equipment safety requirements for excavating, filling trenches and laying pipes • Drainage pipes, types and sizes • Hand and power tools and equipment • Describe drainage types, components, installation and construction techniques • Environmental impacts of irrigation drainage systems • Organization OHS procedures

The required skills	<p>Demonstrate Skills of:</p> <ul style="list-style-type: none"> • Identify site specifications and drainage system plans • Set out drainage system works • Level and align earthworks • Use equipment, tools and machinery • Implement and follow relevant organization OHS and environmental policies and procedures
Resources Implication	Access is to real or appropriately simulated situations, including work areas, materials, and equipment, and to information on workplace practices and OHS practices.
Methods of Assessment	<p>Competence may be assessed through:</p> <ul style="list-style-type: none"> • Interview/Written Test • Observation/Demonstration with Oral Questioning
Context of Assessment	Competence may be assessed in the workplace or a simulated workplace setting.

Occupational Standard: Irrigation Drainage Level III	
Unit Title	Measure Irrigation and Drainage System Performance
Unit Code	AGR IRD3 11 0322
Unit Descriptor	This unit covers the knowledge, skill and attitude required to Assess and measure Irrigation and drainage systems, monitor supply of equipment and spare, monitor quality of work, record and report system performance status drainage systems

Element	Performance Criteria
1. Assess and measure Irrigation and drainage systems	<p>1.1 A visual <i>inspection</i> is undertaken to determine damaged or broken components and results are recorded in accordance with OHS and organization policy and procedures.</p> <p>1.2 <i>Irrigation and drainage system</i> performances are assessed and inspected.</p> <p>1.3 Operation performance of the system is assessed.</p> <p>1.4 Areas being drained are inspected for signs of water pooling and problems are recorded in accordance with <i>OHS</i> and organization policy and procedures.</p> <p>1.5 Measurements are taken with appropriate <i>equipment</i> to determine drainage performance.</p> <p>1.6 Drainage/tail water quality is measured in accordance with OHS and organization policy and procedures.</p> <p>1.7 Water table depth is measured where required in accordance with OHS and organization policy and procedures.</p> <p>1.8 Soil salinity is measured where required in accordance with OHS and enterprise policy and procedures.</p> <p>1.9 <i>Factors external to the system</i>, which may cause interference, are identified and recorded in accordance with OHS and organization policy and procedures.</p>
2. Monitor supply of equipment and spare parts	<p>2.1 Supply and part usage are recorded in accordance with organization policy and procedures.</p> <p>2.2 Purchases of spare parts and materials are within budget</p>

	<p>constraints.</p> <p>2.3 Parts requirements outside of budget constraints are reported.</p> <p>2.4 Purchases and orders are recorded in accordance with organization procedures and systems.</p>
3. Monitor quality of work	<p>3.1. Instructions against relevant organizational standards of work are interpreted and checked.</p> <p>3.2 Required clarification of work instructions is obtained.</p> <p>3.3 Work according to requirements for job quality, customer service, public responsibility and resources used are monitored and adjusted.</p>
4. Record and report system performance status	<p>4.1 Water quality is recorded in accordance with organization procedures.</p> <p>4.2 Water table depth, soil moisture and salinity are recorded in accordance with organization procedures.</p> <p>4.3 Strategies that minimize the negative environmental impacts and maximize the positive impacts of the drainage system, are documented.</p>

Variable	Range
Inspection	<p>May include but not limited to:</p> <ul style="list-style-type: none"> • Surface pooling • water logging (soil moisture) • water table depth • testing of surface and subsurface infiltration rates • symptoms associated with excessive lactates and nutrients.
Irrigation and drainage system	<p>May include but not limited to:</p> <ul style="list-style-type: none"> • Head work structure • Main, secondary and tertiary canal • Canal related structures • Field canals • Drainage systems
OHS	<p>May include but not limited to:</p> <ul style="list-style-type: none"> • safe systems and procedures for outdoor work, including protection from solar radiation, dust and noise • protection against chemical residues including that in/on foliage, water, soil and other items, and the selection

	<ul style="list-style-type: none"> • use and maintenance of relevant personal protective clothing and equipment.
equipment	<p>May include but not limited to:</p> <ul style="list-style-type: none"> • Tensiometers • probe tubes • flow meter • catch cans and pressure gauge • test wells and fault meter.
Factors external to the system	<p>May include but not limited to:</p> <ul style="list-style-type: none"> • pests and vermin (tortoises, ants, spiders, snails, rabbits, hares, foxes, wasps, rose weevil, earwigs, snakes, carp, pigs, wallabies, eels, rats, mice, kangaroos, dogs, cats, parrots) • organic (leaves, slime, weeds, algae, sticks, crop residue) • weather • channel regulators (if applicable) • fire • mechanical damage (if applicable) • power spikes • power failures • storm runoff/system breakage thatch, runoff from adjacent areas and rising water tables.
Water quality	<p>May include but not limited to:</p> <ul style="list-style-type: none"> • Salinity and electro conductivity • pH • Sodicity • Chloride • calcium carbonate • iron • turbidity • nutrients • pesticides.
Soil moisture	<p>May include but not limited to:</p> <ul style="list-style-type: none"> • Subjective measurement • gypsum blocks • tensiometers • enviroscan • neutron probe • TDR (Time Domain Reflectometer).

Evidence Guide	Range
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Critical Aspects of Competence	<p>Must demonstrate skills and knowledge to:</p> <ul style="list-style-type: none"> • identify and correct irrigation and drainage system problems, • measure, record and report soil moisture, salinity and water table depth • Determine system performance and efficiency.
The required knowledge and attitude	<p>Demonstrates Knowledge of:</p> <ul style="list-style-type: none"> • OHS guidelines • measuring and monitoring procedures for factors contributing to irrigation and drainage system performance • positive and negative environmental impacts of irrigation and drainage systems • water table and salinity measures • water quality monitoring methods and techniques • soil moisture measurement procedures • water authority standards and procedures • Enterprise policies and procedures.
The required skills	<p>Demonstrate skills to:</p> <ul style="list-style-type: none"> • measure and test techniques • record and report system performance • identify adverse environmental impacts of irrigation and drainage systems and appropriate remedial action • use computers for recording & reporting irrigation and drainage system data • Implement and follow relevant enterprise OHS and environmental policies and procedures • Communicate ideas and information on reporting irrigation and drainage system performance status • Collect, analyze and organize information irrigation and drainage system performance data • Plan and organize activities, supply of equipment & spare parts • Use mathematical ideas and techniques in manipulating data and calculating variations and compound measures • Solving problems in identifying deviations in system performance • Use measuring instruments & computers for recording data.
Resources Implication	<p>Access is to real or appropriately simulated situations, including work areas, materials, and equipment, and to information on workplace practices and OHS practices.</p>
Methods of Assessment	<p>Competence may be assessed through:</p> <ul style="list-style-type: none"> • Interview/Written Test • Observation/Demonstration with Oral Questioning
Context of Assessment	<p>Competence may be assessed in the workplace or a simulated workplace setting.</p>

Occupational Standard: Irrigation and Drainage Level III	
Unit Title	Carry out Surveying and Leveling
Unit Code	AGR IRD3 12 0322
Unit Descriptor	This unit covers the knowledge, skills and attitude required to plan and prepare for work, to perform survey techniques, to establish offsets for civil works, Set up and use leveling device, to clean up Work area and materials disposed, tools and equipment are cleaned, checked, maintained.

Elements	Performance Criteria
1. Plan and prepare work	<p>1.1 Work instructions, including plans, specifications, quality requirements and operational detail are obtained, confirmed and applied to the allotted task</p> <p>1.2 Safety requirements are obtained from the site safety plan and organizational policies and procedures, confirmed and applied to the allotted task</p> <p>1.3 Signage requirements are identified and obtained from the project traffic management plan and observed</p> <p>1.4 Tools and equipment selected to carry out tasks are consistent with the requirements of the job, checked for serviceability and any faults are rectified or reported</p> <p>1.5 <i>Leveling equipment</i> is checked for serviceability, within specified tolerances and any faults are reported</p> <p>1.6 Environmental protection requirements are identified from the project environmental management plan, confirmed and applied to the allotted task</p>
2. Perform survey techniques	<p>2.1 Different surveying methods are identified according to required information</p> <p>2.2 Work procedures are prepared to perform surveying techniques.</p> <p>2.3 Surveying techniques are applied according to work place procedures</p>

3. Establish offsets for civil works	<p>2.1 Offset and recovery pegs are established from survey controls to plans and drawings to meet project requirements</p> <p>2.2 Earthwork and pavement control lines are re-established from offsets and/or recovery pegs in accordance with plans, drawings and specifications</p> <p>2.3 Drainage offsets are established from survey control in accordance with plans, drawings and specifications</p>
4. Set up and use leveling device	<p>3.1 Heights to be transferred/established are identified from project plans or instructions</p> <p>3.2 Leveling instruments are set-up and correctly used in accordance with standard operating procedures and manufacturers' guidelines</p>
5. Clean up	<p>4.1 Work area is cleared and materials disposed of or recycled in accordance with project environmental management plan</p> <p>4.2 Tools and equipment are cleaned, checked, maintained and stored in accordance with manufacturers' recommendations and standard work practices</p>

Variable	Range
Leveling instrument	<p>May include but not limited to:</p> <ul style="list-style-type: none"> • A two-peg test for automatic level and reverse • readings for spirit level
Heights	<p>May include but not limited to:</p> <ul style="list-style-type: none"> • drawing/sketch, • verbal or written instructions, • datum/survey peg, • chalk or nail mark and mark on vertical surface

Evidence Guide		
Critical Aspects of Competence	<p>Must demonstrate knowledge and skills to:</p> <ul style="list-style-type: none"> • measure distance and angles • apply surveying techniques • Locate, interpret and apply relevant information, standards and specifications • Comply with site safety plan, OH&S regulations and legislation applicable to workplace operations • Comply with organizational policies and procedures including 	

	<p>quality requirements</p> <ul style="list-style-type: none"> • conduct of a minimum of three different leveling tasks, at least one utilizing an automatic level. One of the tasks must include • closed traverse utilizing either the height of instrument or rise and fall method of reduction • conduct of a two-peg test with an automatic level, to confirm instrument meets manufacturers' tolerances • record of the results of each leveling procedure to organizational requirements • Communicate and working effectively and safely with others
The required Knowledge and Attitude	<p>Demonstrates knowledge of:</p> <ul style="list-style-type: none"> • site safety plan, OHS regulations and legislation applicable to workplace operations • organizational policies and procedures including quality requirements • Company procedures • communication devices • Processes for care of measuring equipment • Surveying terminology • Site and equipment safety requirements • Communicating effectively • computing volume, area and linear measurements • work values and Ethics • accountable to work • loyalty and honest to the work he/she being doing • dedication and commitment
The required skills	<p>Demonstrates skills to:</p> <ul style="list-style-type: none"> • Plan and prepare work instructions • Measure distance with linear measuring instruments. • computing volume, area and linear measurements • Set up and use theodolite device • Measure distances with stadia & Sub tense bar
Resources Implication	<p>Access is required to real or appropriately simulated situations, including work areas, materials and equipment, and to information on workplace practices and OHS practices.</p>
Assessment Methods	<p>Competence may be assessed through:</p> <ul style="list-style-type: none"> • Interview/Written Test • Observation/Demonstration with Oral Questioning
Context of Assessment	<p>Competence may be assessed in the work place or in a simulated work place setting.</p>

Occupational Standard: Irrigation and Drainage Level III	
Unit Title	Apply computer Aided Drafting tool (CAD)
Unit Code	AGR IRD3 13 0322
Unit Descriptor	This unit covers the knowledge, skills and attitude required to prepare the CAD environment, produce a basic drawing and to produce a basic drawing, to produce output (final drawings).

Elements	Performance Criteria
1. Prepare for data collection	<p>1.1. Key activities and timelines are scheduled with full consideration given to specification, available resources and organizational requirements.</p> <p>1.2. <i>Administrative and legal requirements</i> for data collection are complied with and recorded.</p> <p>1.3. <i>Appropriate persons or relevant personnel</i> are informed about the project.</p> <p>1.4. <i>Appropriate components</i> are informed about the project.</p> <p>1.5. <i>Equipment, supplies and Spatial Information Services (SIS) technologies</i> are selected according to the task requirements.</p> <p>1.6. Designated responsibilities are communicated to staff to ensure clarity of understanding of the work and provide a basis for ongoing assessment.</p>
2. Prepare the CAD environment	<p>2.1. All relevant manuals, instructions and operating procedures for the CAD software are obtained in accordance with workplace procedures.</p> <p>2.2. The CAD package is booted up in accordance with workplace procedures.</p> <p>2.3. Screen display areas and <i>basic parameters</i> are set in accordance with instructions.</p>
3. Produce a basic drawing/ Modify	<p>3.1. <i>Basic CAD drawings</i> are created and guidance is sought as</p>

existing CAD drawings	<p>required.</p> <p>3.2. Drawings are prepared in accordance with AS 1100 or equivalent or in accordance with standard operating procedures.</p> <p>3.3. As required, CAD drawings are reviewed with supervisor and/or other designated staff in accordance with company procedures.</p> <p>3.4. Existing CAD drawings are located and modified by adding, deleting or changing drawing elements within that drawing.</p>
4. Produce output (final drawings)	<p>4.1. Drawing files are saved in the appropriate format in accordance with standard operating procedures.</p> <p>4.2. Drawing files are printed out using plotter or equivalent devices.</p> <p>4.3. Programs and computer are shut down in accordance with workplace procedures.</p>

Variable	Range
Basic parameters	<p>May include but not limited :</p> <ul style="list-style-type: none"> • Layer or level • Line type • Line width • Colour • Text format
Basic CAD drawings	<p>May include but not limited :</p> <ul style="list-style-type: none"> • Characteristics • Lines • Arcs • Circles • Polygons • Ellipses • Hatching or filling of areas • Text • Dimensions and • Tangents

Drawings	May include but not limited : <ul style="list-style-type: none"> • Diagrams • Charts • Circuits • Systems or schematics.
Equivalent devices	May include <ul style="list-style-type: none"> • Ink jet printers

Evidence Guide	
Critical Aspects of Competence	Must Demonstrate knowledge and skill to: <ul style="list-style-type: none"> • Interpret maps, plans, drawings and specifications • Use maps, plans drawings and specifications • Record and advise on changes and errors • Obtain and use relevant manuals, instructions and operating procedures for the CAD software • Booted up the CAD package in accordance with workplace procedures. • Set screen display areas and basic parameters are set in accordance with instructions. • use relevant manuals, instructions and operating procedures for the CAD software • Create basic CAD drawings and guidance is sought as required • Prepare drawings are prepared in accordance with standard operating procedures.
The required Knowledge and Attitudes	Demonstrate knowledge of: <ul style="list-style-type: none"> • CAD program capabilities and processes • Identify maps, plans, drawings and specifications • Use maps, plans drawings and specifications.
Underpinning Skills	Demonstrate skills in: <ul style="list-style-type: none"> • reading and interpreting engineering specifications • organising information • using computer and peripherals • using CAD program • preparing simple drawings in plane orthogonal, isometric projection or equivalent
Resource Implications	Access is required to real or appropriately simulated situations, including work areas, materials and equipment, and to information on workplace practices and OHS practices.

Methods of Assessment	Competence may be accessed through: <ul style="list-style-type: none"> • Interview/Written Test • Observation/Demonstration with Oral Questioning
Context of Assessment	Competence may be assessed in the work place or in a simulated work place setting.

Occupational Standard: Irrigation and Drainage Level III	
Unit Title	Estimate Cost of Irrigation Work
Unit Code	AGR IRD3 14 0322
Unit Descriptor	This unit covers the knowledge, skill and attitude of gather information, estimate materials, labor and time requirements, calculation of cost and document details.

Element	Performance Criteria
1. Gather information	1.1 Details of customer requirements are obtained through discussion with customer or from information supplied. 1.2. Plans and specifications are accessed and site is inspected. 1.3. Details of products and services to be provided are developed. 1.4. Delivery point and methods of transportation are determined where necessary. 1.5. Details are recorded in accordance with <i>workplace procedures</i> .
2. Estimate materials, labor and time	2.1. Work, including preparatory tasks, is planned and sequenced. 2.2. Types and quantities of materials required for product work are <i>estimated</i> . 2.3. Labor requirements to perform work are estimated. 2.4. Time requirements to perform work are estimated.
3. Calculate costs	3.1. Total materials, labor and overhead costs are calculated in accordance with workplace procedures using appropriate <i>equipment</i> . 3.2. Total work cost is calculated, including overheads and mark-up percentages. 3.3. Final cost for work is calculated.
4. Document and verify details.	4.1. Details of costs and charges are documented in accordance with workplace procedures. 4.2. Costs, calculations and other details are verified in accordance with workplace procedures. 4.3. Customer quotation and tender are prepared. 4.4. Details are documented for future reference in accordance with workplace procedures and using relevant <i>information</i> .

Variable	Range
Work place procedures	May include but not limited to:

	<ul style="list-style-type: none"> • Supervisor’s oral or written instructions • Estimation and costing irrigation work program • Organization standard operating procedures (SOPs) • Specifications • Work notes • Waste disposal, recycling and re-use guidelines
Estimation	<p>May include but not limited to:</p> <ul style="list-style-type: none"> • Labor • Materials • Overheads
Equipment	<p>May include but not limited to:</p> <ul style="list-style-type: none"> • Calculators • Computer • Measuring equipment • Stationery
Information	<p>May include but not limited to:</p> <ul style="list-style-type: none"> • Charts and hand drawings • Diagrams or sketches • Instructions issued by authorized organizational or external personnel • Job drawings • Manufacturer specifications and instructions • Material Safety Data Sheets (MSDS) • Memos • Organization work specifications and requirements • Regulatory and legislative requirements <ul style="list-style-type: none"> ➤ Building codes ➤ OHS and environmental requirements ➤ Irrigation work regulations ➤ relevant Ethiopian standards ➤ Safe work procedures relating to estimating and costing work ➤ Signage ➤ Verbal, written and graphical instructions ➤ Work bulletins ➤ Work schedules, plans and specifications

Evidence Guide

Critical Aspects of Competence	<p>Must demonstrates knowledge and skill of:</p> <ul style="list-style-type: none"> • Locate, interpret and apply relevant information, standards and specifications to the estimation and costing of work • Estimate quantities of material required • Determine types and amount of labor required to complete the work • Estimate time required to complete the work • Estimate overheads associated with the job • Provide a written quotation and tender for each of the work requirements
The required Knowledge and Attitudes	<p>Demonstrate knowledge of:</p> <ul style="list-style-type: none"> • Information and the processes for calculating material requirements • Impact of time on wages and other costs • Process for estimating and costing work • Relevant statutory and authority requirements related to estimating and costing work • Standards applicable to the work to be undertaken • Tender and contract processes
The required skills	<p>Demonstrate skill of:</p> <ul style="list-style-type: none"> • Identify customer requirements • Prepare quotes and tenders • Record details, including costs and charges • Estimate materials and labor required for a work activity • Determine costs for the provision of a quotation or tender in the plumbing and services industry
Resources Implication	<p>Access is to real or appropriately simulated situations, including work areas, materials, and equipment, and to information on workplace practices and OHS practices.</p>
Methods of Assessment	<p>Competence may be assessed through:</p> <ul style="list-style-type: none"> • Interview/Written Test • Observation/Demonstration with Oral Questioning
Context of Assessment	<p>Competence may be assessed in the workplace or a simulated workplace setting.</p>

Occupational Standard: Irrigation and Drainage Level III	
Unit Title	Design and Construct Water Harvesting Structures
Unit Code	<u>AGR IRD3 15 0322</u>
Unit Descriptor	This unit covers the knowledge, skill and attitude required for Plan water harvesting structures, design and construct water harvesting structures.

Elements	Performance criteria
1. Plan water harvesting structures	1.1. Potential areas are identified using standard techniques. 1.2. Water contributors are identified and maintained using standard technique. 1.3. Soil moisture status and level of ground water are determined using standard technique 1.4. Best practices are identified to recharge underground water table.
2. Design water harvesting structures	2.1. Catchment area is delineated and characterized for climatic variables. 2.2. Seasonal water ways are identified and characterized for flood water level using flood water routing techniques. 2.3. Proper site for water harvesting is identified using standard technique. 2.4. Appropriate water harvesting technique is chosen based on applicability and adaptability. 2.5. Design principles for the chosen water harvesting technique are selected. 2.6. Design drawings are prepared for different structures & lay outs with silt trap using standard technique 2.7. Silt trap is designed to settle and clear off sediments before entering storage structures.
3. Construct water harvesting structures	3.1. Type of construction <i>Tools, Equipment and Machinery</i> are identified considering criteria: such as availability, cost and applicability. 3.2. Man power requirements are determined 3.3. <i>OHS hazards</i> are identified, risks assessed and controls implemented and reported to the supervisor. 3.4. All service and running cost are determined for the project life time. 3.5. Bill of quantity is prepared following standard procedures. 3.6. Land leveling activities are conducted using construction equipment. 3.7. Lay out drawings and construction specifications are interpreted using chosen surveying techniques in to physical

	marks on project site. 3.8. Appropriate shade & lining materials are selected to reduce evaporation & seepage loss respectively
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Variable	Range
Tools, equipment and machinery	<p>May include but not limited to:</p> <ul style="list-style-type: none"> • Planimeter • Tape Meter • Line Level • Theodolite • Chaining Pins • Ranging Pole • Staff • Clinometers • Global Positioning System • Compass • Auger • Core Sampler • Spatula • Oven • Pressure Apparatus • Sensitive Balance • Sieve, • Soil Grinder • Hydro Meter • Shaker And Measuring Cylinder, • Thermometer • Stop Watch, • Flasks • Shovel • Rakes • Spades • Rope • Plumb Bob • Hoe • Mixer • Tracing Paper • Pencil • Graph Paper • Fixer

	<ul style="list-style-type: none"> • Topographic Map • Drawing Compass Set.
OHS hazards	<p>May include but not limited to:</p> <ul style="list-style-type: none"> • chemicals, • slippery or uneven surfaces, • moving machinery and vehicles, • snake, • spider and • Insect bites, • solar radiation • dust.

Evidence Guide	
Critical Aspects of Competence	<p>Must demonstrate skills and knowledge to:</p> <ul style="list-style-type: none"> • Plan, design and construct water harvesting structures • Identify proper site for water harvesting • Chose appropriate water harvesting technique based on applicability & adaptability • Identify type of construction materials and equipment considering criteria: such as availability, cost and applicability • Interpret lay out drawings and construction specifications using chosen surveying techniques in to physical marks on project site. • Selected appropriate shade & lining materials to reduce evaporation & seepage loss respectively
The required knowledge and attitude	<p>Demonstrates knowledge of:</p> <ul style="list-style-type: none"> • Surface and ground water hydrology, • Water harvesting design principles, • Catchment area delineation, • Bill of quantity preparation, • Basic Surveying techniques, • Engineering drawing related to the level • Environmental issues, guidelines and legislation

The required skills	<p>Demonstrates skills to:</p> <ul style="list-style-type: none"> • Plan water harvesting structures • Design water harvesting structures • Construct water harvesting structures • Interpret drawings and symbols • Use proper tools, materials and- equipment • Take the survey data • Delineate a catchment area • Chose appropriate water harvesting technique • Identify proper site for water harvesting • Conduct Land leveling activities
Resources Implication	Access is to real or appropriately simulated situations, including work areas, materials, and equipment, and to information on workplace practices and OHS practices.
Methods of Assessment	<p>Competence may be assessed through:</p> <ul style="list-style-type: none"> • Interview/Written Test • Observation/Demonstration with Oral Questioning
Context of Assessment	Competence may be assessed in the workplace or a simulated workplace setting.

Occupational Standard: Irrigation and Drainage Level III	
Unit Title	Apply Watershed Management Principles
Unit Code	AGR IRD3 16 0322
Unit Descriptor	This unit covers the knowledge, skills, and attitude to identify and describe basic watershed processes and their interrelated nature, apply the principles of long-term watershed management, and design appropriate benefit-sharing mechanisms among users.

Element	Performance Criteria
1. Identify and describe basic watershed processes and their interrelated nature	<p>1.1. Types and characteristics of watershed are identified.</p> <p>1.2. Critical and micro/sub-watersheds are delineated with the consent of the communities and other concerned parties involved</p> <p>1.3. <i>Natural processes</i> at work in the watershed area are identified and described fully</p> <p>1.4. <i>Human factors</i> at work in the watershed are identified and described in depth</p> <p>1.5. Size of the watershed, population, current land uses by percentages, kebeles in the watershed, etc. are enumerated and described</p> <p>1.6. Materials are selected to complete the proposed works.</p>
2. Apply the principles of long-term watershed management	<p>2.1. Multi-disciplinary activities over a management cycle are coordinated to address continuous watershed management needs</p> <p>2.1. <i>Watershed management principles</i> are identified following the watershed guideline.</p> <p>2.2. <i>Watershed management plan steps</i> are followed following the watershed guideline.</p> <p>2.3. Appropriate <i>data gathering</i> for watershed planning is carried out and analysed according to national watershed development guidelines.</p> <p>2.4. Major constraints and possible solutions are prioritized and targeted</p> <p>2.5. A workable watershed development <i>plan is developed</i> based on <i>assessment</i> results</p> <p>2.6. A strong watershed results framework conditions, facilitates for communication and partnerships is designed</p>

	<p>2.7. A strong watershed results framework conditions, facilitation for communication, and partnerships are designed</p> <p>2.8. Conditions for <i>implementation, monitoring, and evaluation</i> are sorted out</p>
1. Design appropriate benefit-sharing mechanisms among users	<p>3.1. Expected benefits of the watershed management are identified and listed</p> <p>3.2. Dynamic and continually re-adjustable benefit-sharing mechanism that allows accommodating changes are designed.</p>

Variable	Range
Natural processes	<p>May include but not limited to:</p> <ul style="list-style-type: none"> • Knowing watershed • community lives • Climate • Geology • Hydrology • Soils • vegetation cover
Human factors	<p>May include but not limited to:</p> <ul style="list-style-type: none"> • Upstream and downstream community • Communities located along streams and rivers
Watershed management principles	<p>May include but not limited to:</p> <ul style="list-style-type: none"> • Participatory • Gender-sensitive • Building upon local experience, knowledge • Realistic integrated, productive and manageable • Watershed logic and potential respected • The need for flexibility at different levels • Cost-sharing and empowerment/ownership building • Complementary to food security and rural development mainstream • Economical, environmental & social sustainability • Climate-smart

Watershed management plan steps	<p>May include but not limited to:</p> <ul style="list-style-type: none"> • Getting Started at Woreda Level • Getting Started at Community Level • Socio-Economic and Biophysical Survey • Gender and Social Development (GSD), nutrition and Integrated Risk Management • Identification and Prioritization of Interventions that Bring Change • General assembly • organizing community watershed plan • Implementation Strategies
Data gathering	<p>May include but not limited to:</p> <ul style="list-style-type: none"> • Biophysical • Socio-economic
Plan development	<p>May include but not limited to:</p> <ul style="list-style-type: none"> • Watershed management plan • Benefit-sharing plan
Assessment	<p>May include, but not limited to:</p> <ul style="list-style-type: none"> • Agro ecology (water, soil, slope, degradation level) • Environmental condition
Implementation Monitoring and evaluation	<p>May include, but not limited to:</p> <ul style="list-style-type: none"> • Stakeholders (users, community) • Regulators • technical support • experts

Evidence Guide	
Critical Aspects of Competence	<p>Must demonstrate knowledge and skills to:</p> <ul style="list-style-type: none"> • Describe watershed management plans • Apply watershed management principles • Apply watershed management principles to a range of work environments and contexts • Describe watershed management plan to a range of work environments and contexts • Design appropriate benefit-sharing mechanisms among users • Gather and analyse data for watershed planning • Develop watershed development plan based on assessment results

Required Knowledge and Attitude	<p>Demonstrate knowledge of:</p> <ul style="list-style-type: none"> • Watershed management planning steps • Principles of long-term watershed management • Soil and water conservation • Water harvesting • Forestry development to watershed management • Materials cartage & pollution control • The sequence of working and timing/duration • OHS issues relating to the site • equipment used • Construction/installation techniques for all measures on the plan • Basic watershed processes and their interrelated nature • Element of successful watershed management frameworks • Benefits of the watershed management approach
Required skills	<p>Demonstrate skills to:</p> <ul style="list-style-type: none"> • Apply watershed management plan steps according to watershed guidelines • Undertake socio-economic and biophysical survey • Prioritize problems • Apply Intervention measures • Apply watershed management principles to a range of work environments and contexts • Design appropriate benefit-sharing mechanisms among users • Gather and analyse data for watershed planning • Develop watershed development plan based on assessment results
Resource Implications	<p>Access is to real or appropriately simulated situations, including work areas, materials, and equipment, and to information on workplace practices and OHS practices.</p>
Methods of Assessment	<p>Competence may be assessed through:</p> <ul style="list-style-type: none"> • Interview/Written Test • Observation/Demonstration with Oral Questioning
Context of Assessment	<p>Competence may be assessed in the workplace or a simulated workplace setting.</p>

Occupational Standard: Animal production Level III	
Unit Title	Apply Digital Technology in Agriculture
Unit Code	AGR IRD3 17 0322
Unit Descriptor	This unit covers the knowledge, skills and attitude required to Understand the Concept of digital technology, apply Digital technologies among rural population and recording and documentation system.

Element	Performance Criteria
1. Understand the Concept of digital technology	1.1. <i>Digital technologies</i> are understood to apply digital technology. 1.2. <i>Importance of digital technologies</i> are understood in agricultural sector 1.3. <i>Role of digital technologies</i> in agriculture is identified to enhance agricultural development. 1.4. <i>Principles of Agricultural technology</i> are identified to apply in the agricultural sector 1.5 Mobile/Smart phones and template functions are understood to collect data and use in the reporting system
2. Apply Digital technologies among rural population and farmers	2.1. Require <i>tools and equipment</i> are identified and coordinated to apply digital technologies 2.2. Digital technology <i>infrastructures</i> are identified to implement in agricultural development 2.3. Digital technology skills are developed among the rural population 2.4. Digital <i>Agri-preneurial</i> skill is developed for agricultural transformation. 2.5. <i>Digital technology communication tools are</i> used to collect data and reporting system 2.6. Digital technologies, tools and <i>techniques</i> are used to deliver digital education 2.7. Implementation of digital technologies is promoted to enhance productivity
3. Recording and documentation	3.1. <i>Data collecting formats</i> are developed based on the needs 3.2. <i>Data collection methodologies</i> are identified and selected based on the intended objectives 3.3. Collected data are organized, analyzed and interpreted based on the intended objectives 3.4. Organized, analyzed and interpreted data are documented and reported 3.5. Feedbacks are collected from the relevant stakeholders

Variable	Range
Digital technologies	May include, but not limited to:

	<ul style="list-style-type: none"> • Internet • Computer • Smart phone • Tablet • GPS • Web browser
Importance of digital technologies	<p>May include, but not limited to:</p> <ul style="list-style-type: none"> • Sharing and searching information • Collect data • Enable storage of massive information • Time saving • Cost minimizing • Data accuracy and reliability • Data centralizing and administration • Improve collaboration • Enhance creativity • Enhances work accuracy
Role of digital technologies	<p>May include, but not limited to:</p> <ul style="list-style-type: none"> • Create connectivity between operations • Facilitate communication in agricultural sectors • Globalize communication • Strengthen market linkage
Principles of Agricultural technology	<p>May include, but not limited to:</p> <ul style="list-style-type: none"> • Design with user • Understand the existing ecosystem • Design for scale • Build for sustainability • Data driving • Reuse and improve • Address privacy and security • Collaborative
tools and equipment	<p>May include, but not limited to:</p> <ul style="list-style-type: none"> • Chargers • Computer • Smart phone • Tablet • I pad • GIS • Website • Online resources • Digital programs
infrastructures	<p>May include, but not limited to:</p> <ul style="list-style-type: none"> • Telecommunications utilities

	<ul style="list-style-type: none"> • Electricity power • Server • Information and communication Technologies • Mobiles Phones • Computers systems
Agri-preneurial	<p>May include, but not limited to:</p> <ul style="list-style-type: none"> • Online marketing • Online Learning
Digital technology communication tools	<p>May include, but not limited to:</p> <ul style="list-style-type: none"> • Smart phone • Cell phone • Email • Telegram • SMS • What's APP
technique	<p>May include, but not limited to:</p> <ul style="list-style-type: none"> • Video chat • Virtual meeting • E-learning • Email • Video conference
Data collecting formats	<p>May include, but not limited to:</p> <ul style="list-style-type: none"> • Google sheet • Templates • Ex-cell • Google drive storage
Data collection methodologies	<p>May include, but not limited to:</p> <ul style="list-style-type: none"> • Interview • Questionnaire • Surveying • Focus group discussion (FGD) • Case study

Evidence guide

Critical aspects of competence	<p>Demonstrate knowledge and skills on:</p> <ul style="list-style-type: none"> • Understand the basic digital technologies. • Use mobile/Smart phones and template to collect data and reporting the data • Understand the basic digital technology communication tools. • Identify the require tools and equipment to apply digital technologies • Apply digital technology
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	<ul style="list-style-type: none"> • Understand the basic virtual meeting.
Required knowledge and attitude	<p>Demonstrate knowledge on:</p> <ul style="list-style-type: none"> • Understand the basic digital technology communication tools. • Understand the basic digital technologies. • New or upgraded technology performance • Environmental considerations • Appropriate performance evaluation.
Required skills	<p>Demonstrate skills to:</p> <ul style="list-style-type: none"> • Use Digital technology communication to collect data and report system • Use digital technologies applications • Use software applications (word processing, spread sheets, data base management • Apply skills for accessing and using spreadsheets and databases • Literacy skills for data analysis and interpretation • Determine and confirm digital technology communication tools.
Resources implication	<p>Access is required to real or appropriately simulated situations, including work areas, materials and equipment, and to information on workplace practices and OHS practices.</p>
Methods of assessment	<p>Competence may be assessed through:</p> <ul style="list-style-type: none"> • Interview/written test • Observation/demonstration with oral questioning
Context of assessment	<p>Competence may be assessed in the work place or in a simulated work place setting.</p>

Level IV

Occupational Standard: Irrigation and Drainage Level IV	
Unit Title	Assess and design alternative Potential Water sources for irrigation
Unit Code	AGR IRD4 01 0322
Unit Descriptor	This unit of covers knowledge, skill and attitude to plan spring and well development, to design water harvesting structures and to construct water harvesting structures.

Elements	Performance Criteria
1. Plan spring and well development	1.1. Potential areas are identified using standard techniques 1.2. Water contributors are identified & maintained using standard technique 1.3. Soil moisture status & level of ground water are assessed using standard technique 1.4. Best type and species of trees for afforestation purpose of degraded land are planned to improve soil intake characteristics. 1.5. Soil and water conservation and water harvesting practices are identified to recharge underground water table
2. Design potential water sources for irrigation	2.1. Alternative potential water sources are identified. 2.2. Catchment area is delineated and characterized for climatic variables 2.3. Seasonal water ways are identified and characterized for flood water level using flood water routing techniques 2.4. Proper site for water harvesting is identified using standard technique in areas where there is no surface and ground water sources accessibility. 2.5. Appropriate water harvesting technique is chosen based on applicability & adaptability 2.6. Design principles for the chosen water harvesting techniques are selected. 2.7. Design drawings are prepared for different structures & lay outs using standard technique 2.8. Silt trap is designed to settle and clear off sediments before entering storage structures 2.9. Relevant OHS hazards and risk management procedures are monitored and implemented
3. Construct water harvesting structures	3.1. Type of construction materials and equipment are identified considering criteria: such as availability, cost and applicability. 3.2. Man power requirements are determined 3.3. All service and running cost are determined for the project life time. 3.4. Bill of quantity is prepared following standard procedures. 3.5. Land leveling activities are conducted using construction tools and

	<p>equipment.</p> <p>3.6. Lay out drawings and construction specifications are interpreted using chosen surveying techniques in to physical marks on project site.</p> <p>3.7. Appropriate shade & lining materials are selected to reduce evaporation & seepage loss respectively</p>
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Variable	Range
Alternative potential water sources	<p>May include but not limited to:</p> <ul style="list-style-type: none"> • Springs • Rivers • Lakes and reservoirs • Ground water
OHS Hazards	<p>May include but not limited to:</p> <ul style="list-style-type: none"> • Chemicals • Slippery or uneven surfaces • Moving machinery and vehicles • Snake • Spider and Insect bites • Solar radiation • Dust
Tools and equipment	<p>May include but not limited to:</p> <ul style="list-style-type: none"> • Planimeter • Tape meter • line level • Theodolite • Chaining pins • Ranging pole • Staff • Clinometers • Global positioning system • Compass • Auger • Core sampler • Spatula • Oven • Pressure apparatus • Sensitive balance • Sieve • Soil grinder

	<ul style="list-style-type: none"> • Hydro meter • Shaker and measuring cylinder • Thermometer • Stop watch • Flasks • Shovel • Rakes • Spades • Rope • Plumb bob • Hoe
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Evidence Guide	
Critical Aspects of Competence	<p>Must demonstrate skills and knowledge to:</p> <ul style="list-style-type: none"> • Identify alternative water sources • Plan spring and well development • Identify proper site for water harvesting • Choose appropriate alternative water harvesting technique based on applicability & adaptability • Identify type of construction materials and equipment considering criteria: such as availability, cost and applicability • Interpret lay out drawings and construction specifications using chosen surveying techniques in to physical marks on project site. • Select appropriate shade & lining materials to reduce evaporation & seepage loss respectively
The required Knowledge and Attitudes	<p>Must demonstrate knowledge and attitude of:</p> <ul style="list-style-type: none"> • Surface and ground water hydrology, • Water harvesting design principles, • Catchment area delineation, • SWC and afforestation techniques, • Bill of quantity preparation, • Surveying techniques, • Principle of Drawing, • Environmental issues, guidelines and legislation • understanding of work values and Ethics • accountable to work loyalty and honest to the work he/she being doing • dedication and commitment • respect and follow organizational rules and regulations
The required skills	Demonstrate skills to:

		<ul style="list-style-type: none"> • Drawing technique • Planning spring and well development • Designing water harvesting structures • Design, construct and maintain moisture harvesting technologies. • Undertake water harvesting activities on site by using appropriate tools and equipment with active participation of local community. • Integrate water harvesting techniques and making improvements in working techniques where necessary.
Resources Implication		Access is required to real or appropriately simulated situations, including work areas, materials and equipment, and to information on workplace practices and OHS practices.
Methods of Assessment	of	Competence may be accessed through: <ul style="list-style-type: none"> • Interview/Written Test • Observation/Demonstration with Oral Questioning
Context of Assessment	of	Competence may be assessed in the work place or in a simulated work place setting.

Elements	Performance Criteria
Unit Title	Plan and Organize Irrigation and drainage works
Unit Code	<u>AGR IRD4 02 0322</u>
Unit Descriptor	This unit covers the knowledge, skills and attitude required to develop team through learning and facilitating group discussion plan, develop team commitment and cooperation, organize, facility, set of objectives, schedule, implement work plan monitor work activities, evaluate and feedback in irrigation and drainage works.

2. Develop team through learning and facilitating group discussion	<p>1.1. Mechanisms which enhance effective group interaction are defined and implemented.</p> <p>1.2. Strategies which encourage all group members to participate are used routinely.</p> <p>1.3. Relevant information is provided to group to facilitate outcomes.</p> <p>1.4. Specific communication needs of individuals are identified and addressed.</p> <p>1.5. Learning and development needs are systematically identified and implemented in line with organizational requirements.</p> <p>1.6. Learning plan to meet individual and group training and developmental needs is collaboratively developed and implemented.</p> <p>1.7. Individuals are encouraged to self-evaluate performance and identify areas for improvement.</p>
3. Develop team commitment and cooperation	<p>2.1 Open communication processes to obtain and share information is used by team.</p> <p>2.2 Decisions are reached by the team in accordance with its agreed roles and responsibilities.</p> <p>2.3 Mutual concern and camaraderie (friendship) are developed in the team.</p>
3. Set objectives	<p>3.1 Objectives are planned consistent with and linked to irrigation and drainage activities in accordance with organizational aims.</p> <p>3.2 Objectives are stated as SMART measurable targets with clear time frames.</p> <p>3.3 Support and commitment of team members are reflected in the objectives.</p> <p>3.4 Realistic and attainable objectives are identified.</p>
4. Plan and schedule	<p>4.1 Irrigation and drainage tasks/work activities to be completed are identified and prioritized as directed.</p> <p>4.2 Irrigation and drainage tasks/work activities are broken down</p>

irrigation and drainage work activities	<p>into steps in accordance with set time frames and achievable components.</p> <p>4.3 Task/work activities are assigned to appropriate team or individuals in accordance with agreed functions.</p> <p>4.4 Resources are allocated as per requirements of the activity.</p> <p>4.5 Schedule of work activities is coordinated with personnel concerned.</p>
5. Implement work plans	<p>5.1 Work methods and practices are identified in consultation with personnel concerned.</p> <p>5.2 Work plans are implemented in accordance with set time frames, resources and standards.</p>
6. Monitor work activities	<p>6.1. Objectives and agenda are routinely set and followed for meetings and discussions.</p> <p>6.2. Work activities are monitored and compared with set objectives.</p> <p>6.3. Work performance is monitored.</p> <p>6.4. Deviations from work activities are reported and recommendations are coordinated with appropriate personnel and in accordance with set standards.</p> <p>6.5. Reporting requirements are complied with in accordance with recommended format.</p> <p>6.6. Timeliness of report is observed.</p> <p>6.7. Files are established and maintained in accordance with standard operating procedures.</p>
7. Review and evaluate irrigation and drainage work plans and activities	<p>7.1. Irrigation and drainage work plans, strategies and implementation are reviewed based on accurate, relevant and current information.</p> <p>7.2. Review is done based on comprehensive consultation with appropriate personnel on outcomes of work plans and reliable feedback.</p> <p>7.3. Results of review are provided to concerned parties and formed as the basis for adjustments/simplifications to be made to policies, processes and activities.</p> <p>7.4. Performance appraisal is conducted and reported in accordance with organization rules and regulations.</p> <p>7.5. Performance appraisal report is prepared and documented regularly as per organization requirements.</p> <p>7.6. Recommendations are prepared and presented to appropriate personnel/authorities.</p> <p>7.7. Feedback mechanisms are implemented in line with organization policies.</p>

Variable	Range
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Objectives	<p>May include but not limited to:</p> <ul style="list-style-type: none"> • General • Specific
Resources	<p>May include but not limited to:</p> <ul style="list-style-type: none"> • Personnel • Equipment and technology • Services • Supplies and materials • Sources for accessing specialist advice • Budget
Schedule of work activities	<p>May include but not limited to:</p> <ul style="list-style-type: none"> • Daily • Work-based • Contractual and Regular
Work methods and practices	<p>May include but not limited to:</p> <ul style="list-style-type: none"> • Legislated regulations and codes of practice • Industry regulations and codes of practice • Occupational health and safety practices
Work plans	<p>May include, but not limited to:</p> <p>Daily work plans</p> <ul style="list-style-type: none"> • Project plans • Program plans • Resource plans • Skills development plans • Management strategies and objectives
Standards	<p>May include but not limited to:</p> <ul style="list-style-type: none"> • Performance targets • Performance management and evaluation systems • Occupational standards • Employment contracts

	<ul style="list-style-type: none"> • Client contracts • Discipline procedures • Workplace assessment guidelines • Internal quality assurance • Internal and external accountability and auditing requirements • Training Regulation Standards and Safety Standards
Appropriate personnel/ authorities	<p>May include but not limited to:</p> <ul style="list-style-type: none"> • Management • Line Staff
Feedback mechanisms	<p>May include but not limited to:</p> <ul style="list-style-type: none"> • Verbal feedback • Informal feedback • Formal feedback • Questionnaire • Survey and Group discussion

Evidence Guide	
Critical Aspect of Competence	<p>Demonstrate knowledge and skills of:</p> <ul style="list-style-type: none"> • Set objectives • Plan and schedule work activities • Implement work plans • Monitor work activities • Review and evaluate work plans and activities
Required Knowledge and Attitudes	<p>Demonstrate knowledge of:</p> <ul style="list-style-type: none"> • Organization's strategic plan, policies rules and regulations, laws and objectives for work unit activities and priorities • Organization's policies, strategic plans, guidelines related to the role of the work unit • Team works and consultation strategies • Endangered species and habitat protection • Environmental impact assessment • Control procedures for environmental risks and incidents • Waste management

Required Skills	Must demonstrate skills to: <ul style="list-style-type: none"> • prepare Plan • Lead participants on the scheme • Organize users, participant and group leaders • Coordinate users • Communicate within the team • Inter-and intra-person/motivation skills • Present
Resource Implications	Access is required to real or appropriately simulated situations, including work areas, materials and equipment, and to information on workplace practices and OHS practices.
Methods of Assessment	Competence may be accessed through: <ul style="list-style-type: none"> • Interview/Written Test • Observation/Demonstration with Oral Questioning
Context of Assessment	Competence may be assessed in the work place or in a simulated work place setting.

Occupational Standard: Irrigation and Drainage Level IV	
Unit Title	Supervise Irrigation and Drainage Works
Unit Code	<u>AGR IRD4 03 0322</u>
Unit Descriptor	This unit covers the knowledge, skill and attitude to Plan Supervision of irrigation and drainage works, to perform supervision of irrigation systems, and to record and document the result.
Elements	Performance Criteria
1. Plan Supervision of irrigation and drainage works	1.1 Inventory of irrigation and drainage works are done. 1.2 Supervision items and indicators are developed. 1.3 Supervision schedule is developed.
2. Perform supervision of irrigation and drainage works	2.1. Supervision of irrigation and drainage works is conducted. 2.2 Supervision result are organized and categorized in thematic 2.3 Simple analysis and recommendation is conducted. 2.4 Relevant <i>OHS hazards</i> and risk management procedures are implemented and monitor.
3. Record and document the result	3.1 Internal and external reporting procedures are identified and implemented as required 3.2 Supervision data, analysis and recommendation records are accurately and legibly maintained and stored securely in a form accessible for reporting purposes 3.3 Information/records are monitored to identify trends that may require remedial action, and used to promote continuous improvement.
Variable	Range
OHS /Occupational Health & safety /	May include but not limited to: <ul style="list-style-type: none"> • Chemicals • slippery or uneven surfaces • moving machinery and vehicles, • snake, spider and insect bites, • solar radiation and dust. • Glove, safety wear, helmet and eye glass
Evidence Guide	

Critical Aspects of Competence	<p>Must demonstrate knowledge and skills of:</p> <ul style="list-style-type: none"> • Perform inventory of irrigation and drainage • Develop supervision schedule • Conduct supervision of irrigation and drainage works
The required knowledge and Attitudes	<p>Demonstrate knowledge of:</p> <ul style="list-style-type: none"> • Supervision procedures • Supervision items and indicators • Irrigation facilities • Water management • Crop management • understanding of work values and Ethics • accountable to work loyalty and honest to the work he/she being doing • dedication and commitment Respect and follow organizational rules and regulations
The required skills	<p>Demonstrate the skill to:</p> <ul style="list-style-type: none"> • Operate irrigation facility • Apply water management • Manage irrigated crop and pasture
Resources Implication	<p>Access is required to real or appropriately simulated situations, including work areas, materials and equipment, and to information on workplace practices and OHS practices.</p>
Methods of Assessment	<p>Competence may be accessed through:</p> <ul style="list-style-type: none"> • Interview/Written Test • Observation/Demonstration with Oral Questioning
Context of Assessment	<p>Competency may be assessed in the work place or in a simulated work place setting. This competency standard could be assessed on its own or in combination with other competencies relevant to the job function.</p>

Occupational Standard: Irrigation and Drainage Level IV	
Unit Title	Audit Irrigation System
Unit Code	<u>AGR IRD4 04 0322</u>
Unit Descriptor	This unit covers the knowledge, skills and attitude required to collect and collate all available data, to assess actual data against benchmarks, specifications and predictions, and to compile a report of system evaluation.

Elements	Performance Criteria
1. Collect and collate all available data	1.1 Data on system performance is collated using standard technique. 1.2 Data on environmental and <i>OHS</i> issues are collated using standard technique. 1.3 Data on equipment supply and usage is collated using standard technique. 1.4 Data on crop production is collated using standard technique. 1.5 Data on water use and quality is collated using standard technique. 1.6 Data on climatic trends is collated using standard technique. 1.7 Data on physical and chemical properties of soil is collated.
2. Assess actual data against benchmarks, specifications and predictions	2.1 System performance is compared to system specifications and performance predictions. 2.2 Supply and stock use is compared to previous and estimated usage and costs. 2.3 Crop production is compared to previous and predicted production. 2.4 Water usage and quality is compared to past and predicted usage and quality. 2.5 Climatic information is compared to predicted trends using standard technique. 2.6 Soil properties are compared to previous and predicted properties using standard technique. 2.7 Production costs related to irrigation systems are compared to previous and predicted costs. 2.8 Net profits are compared to past and predicted profits using standard technique.

3. Compile a report of system evaluation	<p>3.1 Report includes discussion of results of data analysis are isolated using standard technique.</p> <p>3.2 Indicators of good performance are isolated and discussed using standard technique.</p> <p>3.3 Indicators of poor performance are isolated and discussed using standard technique.</p> <p>3.4 Causes of deviations from performance specifications and requirements are examined.</p> <p>3.5 Conclusions about irrigation system performance in relation to crop production and business performance are clearly stated.</p> <p>3.6 Conclusions are supported by the data using standard technique.</p>
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Variable	Range
Occupational Health & safety (OHS)	<p>May include but not limited to:</p> <ul style="list-style-type: none"> • to health and safety, • risk assessment procedures • implementation of risk control measures • safe operation of machinery and equipment • safe manual handling procedures • selection, use and maintenance of relevant personal protective clothing and equipment • safe procedures for working at heights and for outdoor work • including protection from solar radiation, dust and noise.

Evidence Guide	
Critical Aspects of Competence	<p>Must demonstrate Knowledge and skill of:</p> <ul style="list-style-type: none"> • Collect and collated data • Assess actual data against benchmarks, specifications and predictions • compile a report of system evaluation • Recommend alterations to irrigation system to achieve performance improvement
The required Knowledge and Attitudes	<p>Demonstrate knowledge of:</p> <ul style="list-style-type: none"> • Evaluation procedures • Irrigation system performance indicators • Statistical data analysis procedures • Environmental impacts of irrigation systems using water from any source • understanding of work values and Ethics

	<ul style="list-style-type: none"> • accountable to work loyalty and honest to the work he/she being doing • dedication and commitment respect and follow organizational rules and regulations
The required skills	<p>Demonstrate Skills to:</p> <ul style="list-style-type: none"> • analyze and organize data • Solve performance problems and recommend solutions • Identify adverse environmental impacts of irrigation system activities and recommend appropriate remedial action • Use basic computer skills for irrigation auditing.
Resources Implication	Access is required to real or appropriately simulated situations, including work areas, materials and equipment, and to information on workplace practices and OHS practices.
Methods of Assessment	<p>Competence may be assessed through:</p> <ul style="list-style-type: none"> • Interview/Written Test • Observation/Demonstration with Oral Questioning
Context of Assessment	Competence may be assessed in the work place or in a simulated work place setting.

Occupational Standard: Irrigation Drainage Level IV	
Unit Title	Manage and improve irrigation practices and develop value chains
Unit Code	<u>AGR IRD4 05 0322</u>
Unit Descriptor	This unit covers the knowledge, skills and attitude required to promote Innovative irrigation practices; monitor water distribution plan; outline Irrigation patterns and future price rise; and build value addition producer groups' entrepreneurial and business planning capacities.

Elements	Performance Criteria
1.Promote Innovative irrigation practices	<p>1.1. Practical limitations of water-efficient irrigation technology are identified.</p> <p>1.2. Improved irrigation practices are applied by considering knowledge of farmers on current practices in relation to actual and potential crop water use</p> <p>1.3. Service-oriented irrigation schemes are designed, so that farmers can flexibly obtain water at their convenience.</p> <p>1.4. To evaluate potential innovative practices, <i>eco-efficiency indicators</i> are used including technology adoption and assess these processes and to avoid their adverse <i>environmental impacts</i> to deep percolation of pollutants from intensive farming activities.</p>
2. Monitor water distribution plan	<p>2.1 Monitoring system and performance evaluation of working team are agreed upon.</p> <p>2.2 Environmental and community factors affecting water distribution are considered in the plan in accordance to organizational protocols.</p> <p>2.3 Feedback mechanism is determined and agreed upon.</p> <p>2.4 Water distribution plan is prepared by incorporating all the necessary information and considerations.</p> <p>2.5 Water distribution plan is presented for approval.</p> <p>2.6 Changes are identified and evaluated to the plan.</p> <p>2.7 Water distribution plan is modified and finalized.</p>
3. Outline Irrigation patterns and future price rise	<p>3.1. Sustainable use of shared water resources are assessed and monitored in all</p> <p>3.2. Water prices are differentiated according to the pressure heads provided at farm-gate delivery</p> <p>3.3. Expert scientific knowledge of crops water needs, their yield-response to water and the actual on-farm versus attainable</p>

	<p>efficiency are identified,</p> <p>3.4. Links between farmers perspectives, innovative practices and their income benefits are analyzed</p> <p>3.5. Funds and earnings to lower resource burdens from inputs and pollutants are considered</p>
4. Build value addition producer groups' entrepreneurial and business planning capacities	<p>4.1. Training in the communication and delivery of entrepreneurial skills that is geared to cultivating the entrepreneurial spirit of business-oriented processors are engaged.</p> <p>4.2. Building capacities in business planning, administration, accounting, work organization, and human resource management are continued.</p> <p>4.3. Groups in the implementation of their business plans throughout the project to include regular coaching sessions and mentoring are assisted.</p> <p>4.4. Targeted <i>value adding</i> producer groups to existing finance schemes to access innovative financing facilities and services are linked.</p>

Variable	Range
eco-efficiency indicators	<p>May include but not limited to:</p> <ul style="list-style-type: none"> • Manufacturing products without environment harm • the ability to manufacture goods efficiently • at competitive prices without harming the environment
Environmental impact	<p>May include but not limited:</p> <ul style="list-style-type: none"> • Water logging • Salinization • Water born and water related disease
Irrigation patterns	<p>May include but not limited to:</p> <ul style="list-style-type: none"> • abstraction • conveyance • Storage • distribution • final water delivery to farm gates
value addition	<p>May include but no limited to:</p> <ul style="list-style-type: none"> • Increase in product value: the amount by which the value of a product increases as it proceeds through the various stages of its manufacture and distribution

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Critical Aspects of Competence	<p>Must demonstrate Knowledge and skill of:</p> <ul style="list-style-type: none"> • Identify improved irrigation practices • Set water distribution plan • Outline Irrigation patterns and future price rise • Build value addition producer groups' entrepreneurial and business planning capacities
The required Knowledge and Attitudes	<p>Demonstrate knowledge of :</p> <ul style="list-style-type: none"> • monitoring procedures for factors contributing to improved irrigation practices and value chains • positive and negative environmental impacts of improved irrigation practices and value chains • irrigation practices and value chain measures • water quality monitoring methods and techniques • Water authority standards and procedures enterprise policies and procedures • understanding of work values and Ethics • accountable to work loyalty and honest to the work he/she being doing • dedication and commitment • respect and follow organizational rules and regulations
The required skills	<p>Demonstrate Skills to:</p> <ul style="list-style-type: none"> • identify hazards and implement safe work procedures • build targeted value added producer groups in irrigation • identify adverse environmental impacts of irrigation systems and appropriate remedial action • implement and follow relevant enterprise OHS and environmental policies and procedures • use oral communication skills/language • use numeracy skills to estimate, calculate and record routine workplace measures • Use interpersonal skills to work with and relate to people from a range of cultural, social and religious backgrounds and with a range
Resources Implication	<p>Access is required to real or appropriately simulated situations, including work areas, materials and equipment, and to information on workplace practices and OHS practices.</p>
Methods of Assessment	<p>Competence may be assessed through:</p> <ul style="list-style-type: none"> • Interview/Written Test • Observation/Demonstration with Oral Questioning
Context of Assessment	<p>Competence may be assessed in the work place or in a simulated work place setting.</p>

Occupational Standard: Irrigation and Drainage Level IV	
Unit Title	Implement onsite irrigation installation work
Unit Code	<u>AGR IRD4 06 0322</u>
Unit Descriptor	This unit covers the knowledge, skills and attitude required to Implement effective communication, implement and monitor risk management and OHS procedures, organize the supply and installation of materials and equipment materials and equipment, supervising on-site operations, and administering progress claims/payments.

Elements	Performance Criteria
1. Implement effective communication	1.1. <i>Site instructions</i> for <i>irrigation installation</i> work are recorded to comply with quality management requirements. 1.2. Dates, times and personnel to attend site meetings are organized.
2. Implement and monitor risk management and OHS procedures	2.1 First aid facilities are established as necessary. 2.2 Plant and equipment requiring certificated operators are identified to comply with risk management procedures. 2.3 Likely OHS hazards are identified and precautions taken. 2.4 Documentation for safety reporting is instigated/ start.
3. Organize the supply and installation of materials and equipment	3.1 Material orders are placed according to appropriate schedule. 3.2 Equipment is prepared according to planned schedule. 3.3 Maintenance procedures are established for equipment.
4. Supervise on-site operations	4.1 Operations are implemented according to appropriate schedule and contract. 4.2 Problems and delays are addressed as they arise and action recorded. 4.3 Industrial relations are monitored continuously and issues resolved to minimize impact on job progress. 4.4 Revisions are made to project schedule, when required, and variations documented to comply with quality management procedures. 4.5 Quality management procedures are applied continuously as per adopted standards for job. 4.6 Safety procedures are monitored continuously, reports analyzed and procedures reviewed as required. 4.7 Reports on current project status are prepared for management.

	4.8 Supervision of multiple projects is planned.
5. Administer progress claims/payments	5.1 Summary records are prepared for progress claims. 5.2 Actual expenditure and earnings are checked against scheduled projected costs.

Variable	Range
Irrigation installation	These may include but not limit to: <ul style="list-style-type: none"> • Gravity systems • pressurized systems
Site instructions	These may include but not limit to: <ul style="list-style-type: none"> • Instructions may be recorded using a <ul style="list-style-type: none"> ➤ Diary ➤ Telephone log and/or ➤ Memos.

Evidence Guide	
Critical Aspects of Competence	Must Demonstrate knowledge and skills of: <ul style="list-style-type: none"> • Organize the supply and installation of materials and equipment, supervise on-site operations, • Monitor Administer progress claims/payments • Communicate effectively with on-site labor, suppliers and the client • Implement and monitor relevant OHS and risk management procedures
Require knowledge and Attitudes	Demonstrates knowledge of: <ul style="list-style-type: none"> • Communication procedures for onsite labor and authorities • Follow Safety procedures and quality assurance programs • Local government regulations • On-site contract provisions • Projected costs • Environmental impacts of irrigation system • Use water from any ground or underground source • Use Relevant enterprise OHS procedures. • wore value and ethics • Dedication and commitment • organizational rules and regulation
The required skills	Demonstrate skills to: <ul style="list-style-type: none"> • Read plans and specifications • Order materials and equipment to meet schedule

		<ul style="list-style-type: none"> • Monitor Administer the contract, claims/payments on site • Supervise installation operations in the most efficient sequence • Identify adverse environmental impacts of irrigation installation activities and take appropriate remedial action • Comply with statutory requirements • Implement and monitor OHS and risk management procedures Organize the supply and <i>installation</i> of materials and equipment Supervise on-site operations
Resources Implication		Access is required to real or appropriately simulated situations, including work areas, materials and equipment, and to information on workplace practices and OHS practices.
Methods of Assessment	of	Competence may be assessed through: <ul style="list-style-type: none"> • Interview/Written Test • Observation/Demonstration with Oral Questioning
Context Assessment	of	Competence may be assessed in the work place or in a simulated work place setting.

Occupational Title: Irrigation and Drainage Level IV	
Unit of Competence:	Manage Salinity of irrigated land
Unit Code	AGR IRD4 07 0322
Unit Descriptor	This unit covers the knowledge, skills and attitude required to investigate salinity prone areas, monitor and Implement OHS and risk management procedures, and Practice techniques for management of salt affected irrigated lands.

Elements of competence	Performance criteria
1. Investigate salinity prone areas	1.1. Soils are checked for primary salinity following standard soil survey techniques. 1.2. Quality of water source for irrigation is checked using guidelines. 1.3. Ground water level of project area is investigated and salt content checked using appropriate methods or techniques.
2. Monitor and Implement OHS and risk management procedures	2.1 <i>Personal protective equipment (PPE)</i> is selected, used, maintained and stored according to the type of work site activities to be undertaken 2.2 <i>OHS hazards</i> are identified, risks assessed and reported to the supervisor and precautions taken 2.3 First aid facilities are established as necessary. 2.4 Plant and equipment requiring certificated operators are identified to comply with risk management procedures. 2.5 Documentation for safety reporting is instigated
3. Practice salinity prevention techniques	3.1 Ground water rise is periodically monitored and controlled using standard technique 3.2 Application of water is optimized based on crop, soil and application time. 3.3 Irrigation water quality is assessed and tested based on published guidelines using standard technique. 3.4 Appropriate field water distribution is planned to avoid field water detentions 3.5 Periodical soil test for salinity is performed using standard technique. 3.6 Deep rooted perennial crops are intercropped using standard technique. 3.7 Excess seepage from canals is avoided using standard technique.
4. Practice techniques for management of salt affected irrigated lands.	4.1 Leaching requirement is estimated and excess salt is leached from root zone. 4.2 Appropriate drainage facility is planned and installed using standard technique.

	4.3 Irrigation scheduling for crops on the saline land is determined using standard technique.
	4.4 Salt loving crops are identified and cropped using standard technique.
	4.5 Chemical amendment is recommended for sodic, saline and saline- sodic soils
	4.6 Optimal soil and water management practices are needed

Variables	Range statement
Personal protective equipment (PPE)	May include but not limited to: <ul style="list-style-type: none"> • Work boot • Glove • Safety wear • Sun hat • Eye • Face mask
OHS Hazards	May include but not limited to: <ul style="list-style-type: none"> • Chemicals • Slippery or uneven surfaces • Moving machinery and vehicles • Snake • Spider and Insect bites • Solar radiation and dust

Evidence Guide		
Critical Aspects of competence	Must demonstrate knowledge and skills of: <ul style="list-style-type: none"> • Monitor ground water level • Check irrigation water quality • Check soil salt content • Determine irrigation scheduling for crops on the saline land • Identify and plant salt loving crops • recommend chemical amendment for sodic, saline and saline- sodic soils • Install and plan appropriate drainage facility 	
Required Knowledge and Attitudes	Demonstrate knowledge to: <ul style="list-style-type: none"> • Principles of soil and water quality analysis • Irrigation water requirement and scheduling • Environmental issues, guide lines and legislations • Agro-forestry practices 	

	<ul style="list-style-type: none"> • Laboratory techniques • Understand work values and Ethics • Accountable to work loyalty and honest to the work he/she being doing • Dedication and commitment • Respect and follow organizational rules and regulations
Required Skills	<p>Demonstrate skills to:</p> <ul style="list-style-type: none"> • Collect, organize and analyze data and information • Plan management and prevention techniques. • Test soil sample • Identify salinity land • Test water quality • Identified Cropped salt loving crops • Determine irrigation water requirement and schedule
Resource Implication	Access is required to real or appropriately simulated situations, including work areas, materials and equipment, and to information on workplace practices and OHS practices.
Method of Assessment	<p>Competence may be assessed through:</p> <ul style="list-style-type: none"> • Interview/Written Test • Observation/Demonstration with Oral Questioning
Context of Assessment	Competence may be assessed in the work place or in a simulated work place setting.

Occupational Standard: Irrigation and Drainage Level V	
Unit Title	Apply Geographic Information System tools
Unit Code	AGR IRD4 08 0322
Unit Descriptor	This unit covers the knowledge, skill and attitude required to prepare for data collection, gather GIS data sources and database managements, store spatial data, access, retrieve, collate spatial data, back up spatial data, and query and interpret data.

Elements	Performance Criteria
1. Prepare for data collection	<p>1.1. Key activities and timelines are scheduled with full consideration given to specification, available resources and organizational requirements.</p> <p>1.2. <i>Administrative and legal requirements</i> for data collection are complied with and recorded.</p> <p>1.3. <i>Appropriate persons or relevant personnel</i> are informed about the project.</p> <p>1.4. <i>Appropriate components</i> are informed about the project.</p> <p>1.5. <i>Equipment, supplies and Spatial Information Services (SIS) technologies</i> are selected according to the task requirements.</p> <p>1.6. Designated responsibilities are communicated to staff to ensure clarity of understanding of the work and provide a basis for ongoing assessment.</p> <p>1.7. Skills and knowledge are updated to accommodate changes in data capture techniques.</p>
2. Gather GIS Data Sources and Database Managements	<p>2.1. Equipment is operated according to <i>manufacturers' specifications</i>, and statutory and organizational guidelines.</p> <p>2.2. <i>Entities</i> are related to a <i>reference system</i> based on the specifications.</p> <p>2.3. <i>Spatial</i> and <i>attribute data</i> are collected and linked using methodologies detailed in the <i>data capture methodology</i>.</p> <p>2.4. Coordinate System and Map Projection identified and applied</p> <p>2.5. <i>Metadata</i> is documented according to accepted industry standards considering geo-database data models</p> <p>2.6. Any discrepancies between specifications and actual</p>

	<p>activities are identified, recorded and reported.</p> <p>2.7. Administrative and legal requirements for data collection are complied with and recorded.</p> <p>2.8. Guidance is given to staff assisting in the data collection process.</p> <p>2.9. Building Topology activities conducted</p>
3. Store spatial data	<p>3.1. Data index is created to assist in retrieval and storage according to organizational spatial data and legal requirements.</p> <p>3.2. Administrative and legal requirements are complied with and recorded for data storage.</p> <p>3.3. Data are recorded in index according to organizational guidelines.</p>
4. Access, retrieve, collate and back up spatial data	<p>4.1. Indexing system is used to locate spatial data source.</p> <p>4.2. Spatial data are translated or converted into required format where necessary such raster to vector/ vector to raster. Spatial and <i>spatial requirements</i> are collated to meet organizational needs.</p> <p>4.3. Most appropriate format and database are selected according to organizational requirements.</p> <p>4.4. Legal and ethical requirements are addressed.</p> <p>4.5. Spatial data are backed up according to organizational guidelines.</p> <p>4.6. <i>Method of spatial data storage</i> is selected according to organizational guidelines.</p> <p>4.7. Distribution method is determined to ensure that the most current data is available.</p> <p>4.8. Skills and knowledge are updated to accommodate changes in data storage and retrieval processes.</p>
5. Query and interpret data	<p>5.1. Relevant sources and data are identified and accessed.</p> <p>5.2. Data are queried and interpreted using appropriate equipment or software package according to client requirements.</p> <p>5.3. Data are verified for relevance using descriptive and analytical techniques.</p> <p>5.4. Irregularities are resolved using initiative.</p> <p>5.5. Skills and knowledge are updated to accommodate changes in data.</p>

	<p>5.6.Results are recorded and documented according to organizational and client requirements.</p> <p>5.7.OHS requirements are planned for and adhered to.</p>
6. Test and validate collated spatial data	<p>6.1.Tools for testing the <i>validity</i> of the information and data are identified and accessed or developed.</p> <p>6.2.Links with <i>other functional areas and management systems</i> are identified and facilitated to ensure comprehensive information and data collection.</p> <p>6.3.Quality and use ability of data are ensured according to organizational guidelines.</p>
7. GIS analysis functions, operations, visualization and presentation	<p>7.1.Measurement, retrieval, classification functions identified and accessed or developed</p> <p>7.2.Overlay functions identified and accessed or developed identified and accessed or developed</p> <p>7.3.Proximity (Neighborhood, Buffer etc.) identified and accessed or developed</p> <p>7.4.Spatial analyst tool identified and accessed to conduct surface analysis of Digital Elevation Model</p> <p>7.5.Map layout and Map Components are collated to meet organizational needs.</p>

Variable	Range
Administrative and legal requirements	<p>May include, but not limited to:</p> <ul style="list-style-type: none"> • Access protocols and obligations • Ethiopia standards, quality assurance and certification requirements • Award and enterprise agreements • Licensing arrangements • Organizational protocols for accessing physical, financial and human resources • Reimbursements • Indigenous considerations • Relevant codes of practice • Relevant state, territory and federal legislation affecting organizational operations, including: <ul style="list-style-type: none"> • Anti-discrimination and diversity • Copyright and digital copyright • Equal Employment Opportunity (EEO) • Industrial relations • Royalty obligations • Title search processes • Understanding of company OHS guidelines

Appropriate persons or relevant personnel	<p>May include, but not limited to:</p> <ul style="list-style-type: none"> • Administrative staff • Assessors • Colleagues • Contractors • Field survey staff • Land occupiers • Land owners • Managers • Supervisors • Technicians • Trainers
Appropriate components	<p>May include, but not limited to:</p> <ul style="list-style-type: none"> • hardware • software • data • data management and analysis procedures • personnel/staff
SIS technologies	<p>May include, but not limited to:</p> <ul style="list-style-type: none"> • Data logger or other mobile computing device • Data recording equipment • Digital imagery • Electronic theodolites • Handheld Global Positioning System (GPS) • Levels • Arc GIS • Maps (digital or hard copy) • Measuring instruments • Non-navigational aids relevant to duties, including: <ul style="list-style-type: none"> ➤ Compass ➤ Clinometers ➤ Distance measuring wheel ➤ Personal digital assistant ➤ Personal computer-based digitizing boards ➤ Sonar ➤ Tide gauge ➤ Tools ➤ Total station ➤ Ultra High Frequency (UHF) radio ➤ Vehicles
Manufacturers'	<p>May include, but not limited to:</p>

specifications	<ul style="list-style-type: none"> • Electronic format • Equipment specifications • Operator manuals • Printed product instructions and information • Spatial database • Warranty documents
Entities	<p>May include, but not limited to:</p> <ul style="list-style-type: none"> • Event • Object
Reference system	<p>May include, but not limited to:</p> <ul style="list-style-type: none"> • Global • Local • Regional
Spatial data	<p>May include, but not limited to:</p> <ul style="list-style-type: none"> • Location of entities shows coordinate system
Attribute data	<p>May include, but not limited to:</p> <ul style="list-style-type: none"> • Condition • Date • Size • Type • Quantity
Data capture methodology	<p>May include, but not limited to:</p> <ul style="list-style-type: none"> • Aerial • Conversion or translation from existing information (hard copy or digital) • conversion from raster to vector • conversion from vector to raster • Data dogging • Digitizing theodolite • Direct or indirect • Field • GPS scanning • Manual entry • Photogrammetric • Remote sensing • Sonar • Survey • Total station
Metadata	<p>May include, but not limited to</p> <ul style="list-style-type: none"> • Conditions of use • Coordinate system

	<ul style="list-style-type: none"> • Currency • Date of acquisition • Quality • Source • Spatial data acquisition methodologies
Spatial requirements	<p>May include, but not limited to</p> <ul style="list-style-type: none"> • Broad analytical studies to determine estimates of risk • Making comparisons using basic tests of significance • Mean, standard deviation, regression analysis and percentage change
Method of spatial data storage	<p>May include, but not limited to:</p> <ul style="list-style-type: none"> • Digital • Hard copy
Tools	<p>May include, but not limited to:</p> <ul style="list-style-type: none"> • Model of questions with known answers • Pilot program • Prototype dataset • Survey (staff in client organization)
Validity	<p>May include, but not limited to:</p> <ul style="list-style-type: none"> • Confounding bias • Information/data bias • Observational bias • Recall bias • Selection bias
Other functional areas and management systems	<p>May include, but not limited to:</p> <ul style="list-style-type: none"> • Engineering and maintenance • Environmental management • Finance and auditing • Information, data and records management • Human resource, industrial relations and personnel management, including payroll • Logistics • Purchasing, procuring and contracting • Quality management • Strategic planning
Map Components	<p>May include, but not limited to:</p> <ul style="list-style-type: none"> • Legend • Scale • Direction • Grid • Map description

	<ul style="list-style-type: none"> • Map title
Sources of data	<p>Sources of data:</p> <ul style="list-style-type: none"> • Existing data • Field surveying • Remote sensing

Evidence Guide	
Critical Aspects of Competence	<p>Must demonstrate to knowledge and skill to:</p> <ul style="list-style-type: none"> • Apply operational knowledge in a broad range of areas relating to linking datasets and knowledge management • Apply data security and backup measures • Apply a defined range of skills • Apply known solutions to a range of problems • Apply organizational skills and prioritizing activity • Apply solutions to a range of problems • Advise and implementing a cost-effective functional solution • Examine suitability of existing arrangements • Keep records accurately • Measure outcomes against specifications • Perform a range of tasks where choice between substantial ranges of options is required • Create a workable index system • Manage contingencies • Retrieve spatial data • Assess and recording information from varied sources • Demonstrate operational knowledge in relevant data capture and validation methodologies • Perform a range of tasks where choice between a range of options is required • Take responsibility for own and team outputs in work and learning
Required Knowledge and Attitudes	<p>Demonstrates knowledge of:</p> <ul style="list-style-type: none"> • Characteristics, capabilities and limitations of tools,

	<p>technology and equipment used</p> <ul style="list-style-type: none"> • Customer relations guidelines • Data collection methods using electronic equipment • Information management • Legislation as it applies to the spatial industry sector • OHS requirements • Organizational policies and guidelines • Performance evaluation • Process improvement methods • Quality assurance principles • Quality improvement tools • Reference systems and their relationship to each other • Relevant federal, state and local government laws which are applicable to the spatial data capture methodology used • Risk assessment principles • Safe work practices • Spatial data formats, handling and structure • Spatial information principles and their application • Sis project contingencies • Spatial technologies. • Spatial analysis • Spatial Modeling • Image classification
Required Skills	<p>Demonstrates skills of:</p> <ul style="list-style-type: none"> • Ability to analyze theory, concepts and statistics (high level) • Ability to relate to people from a range of social, cultural and ethnic backgrounds and with a range of physical and mental abilities • Change management • Communication skills to: <ul style="list-style-type: none"> ➤ Consult effectively with clients and colleagues ➤ Impart knowledge and ideas through oral, written and

	<ul style="list-style-type: none"> visual means ➤ Provide customer service • Computer skills (high technical user level) to complete business documentation • Functional application of data capture techniques • Literacy skills to: <ul style="list-style-type: none"> ➤ Asses and use workplace information ➤ Locate and interpret legislation and other written documentation ➤ Prepare and manage documentation ➤ Read and write technical reports ➤ Research and evaluate • Negotiation skills • Numeracy skills to: <ul style="list-style-type: none"> ➤ Analyze errors ➤ Conduct image analysis ➤ Perform mental calculations ➤ Interpret and analyse statistics ➤ Record with accuracy and precision ➤ Undertake computations • Organizational skills to: <ul style="list-style-type: none"> ➤ Coordinate technical and human resource inputs to research activities ➤ Prioritize activities to meet contractual requirements • Planning • Spatial analysis • Spatial Modelling • Image classification • Project management skills • Spatial skills to: <ul style="list-style-type: none"> ➤ Display proficiency in the operation of spatial data capture equipment ➤ Exercise precision and accuracy in relation to spatial and a spatial data acquisition and the use of electronic equipment ➤ Perform spatial data archival and retrieval and train others in this task ➤ Perform spatial data management and manipulation and train others in this task ➤ Perform file management and train others in this task ➤ Solve problems relating to height, depth, breadth, dimension, direction and position in actual operational
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	<p>activity and virtual representation</p> <ul style="list-style-type: none"> ➤ Understand implications of height, depth, breadth, dimension and position to actual operational activity and virtual representation • Team leadership • Work effectively as part of a team
Resource Implication	Access is required to real or appropriately simulated situations, including work areas, materials and equipment, and to information on workplace practices and OHS practices.
Method of Assessment	Competence may be assessed through: <ul style="list-style-type: none"> • Interview/Written Test • Observation/Demonstration with Oral Questioning
Context of Assessment	Competence may be assessed in the work place or in a simulated work place setting.

Occupational Standard: Irrigation and Drainage Level IV	
Unit Title	Prepare Bill of Quantity and Specification of Irrigation
Unit Code	AGR IRD4 09 0322
Unit Descriptor	This unit covers the knowledge, skills and attitude required to gather information, estimate volume of work, materials, labor and time, calculate costs and document and verify details.

Elements	Performance Criteria
1. Gather information.	<p>1.1. Details of requirements are obtained and understood through discussion with customer or from information supplied.</p> <p>1.2. <i>Plans and specifications</i> are accessed and site is inspected to confirm full requirements.</p> <p>1.3. Details of products and services to be provided are developed and checked for availability and as fit for purpose.</p> <p>1.4. Delivery point and methods of transportation are determined where necessary.</p> <p>1.5. Details are accurately recorded and checked in accordance with workplace procedures.</p>
2. Estimate volume of work, materials, labor, equipment and time.	<p>2.1. The volume of works is estimated according to organizational requirement</p> <p>2.2. Work, including preparatory tasks, is planned and sequenced to cover all necessary activity.</p> <p>2.3. <i>Types of materials, equipment and quantities</i> required for product work are estimated based on availability, fitness for purpose and current costs.</p> <p>2.4. Labour requirements to perform work are estimated to complete the work activity.</p> <p>2.5. Time requirements to perform work are accurately estimated and checked with appropriate personnel.</p>
3. Calculate costs.	<p>3.1. Total materials, <i>labour and overhead costs</i> are calculated in accordance with workplace procedures and statutory requirements.</p>

	<p>3.2. Total work cost is calculated, including overheads and mark-up percentages set by appropriate personnel.</p> <p>3.3. Final cost for work is calculated and checked for accuracy.</p>
4. Document and verify details.	<p>4.1. Details of costs and charges are clearly and accurately documented in accordance with workplace procedures.</p> <p>4.2. Costs, calculations or other details are verified in accordance with workplace procedures and current costing data.</p> <p>4.3. Bill of quantity and specifications is prepared and verified.</p> <p>4.3. Quotation/tender documentation is prepared and verified.</p> <p>4.4. <i>Costing documents</i> are accurately completed and documented for future reference in accordance with workplace procedures.</p>

Variable	Range
Plans and specifications	<p>May include but not limited to:</p> <ul style="list-style-type: none"> • Sketches or drawings • Statements of requirements, including environmental requirements relating to the acquisition, use and disposal of materials • Materials lists and quantity schedules • Building codes • Materials specifications, including specifications of material reuse and recycling.
Types of materials and equipment	<p>May include but not limited to:</p> <ul style="list-style-type: none"> • Aluminum and steel framing and steel reinforcing • Bricks, masonry blocks and pavers • Cement, sand, aggregates and bonding agents • Decorative finishing materials, such as wallpaper, laminates, gilding materials, lacquers and polishes • Fixings, fastenings and adhesives • Fuel and lubricants • Paint, solvents and cleaning agents • Tiles and glass • Timber, plywoods, fiber board and composites • Wall and ceiling lining materials, plaster and platters products and external claddings. • Mixer • Vibrator

	<ul style="list-style-type: none"> • Excavator • Spade • Tamper
Labour and overhead costs	<p>May include but not limited to:</p> <ul style="list-style-type: none"> • Labor costs, such as: • Personal protective equipment • Site facilities • Wages and on-costs • Overhead costs, such as: • Administration • Insurance • Local government fees and charges • Plant and equipment hire • Transport • Use of communication technology • Waste removal fees.
Costing documents	<p>May include but not limited to:</p> <ul style="list-style-type: none"> • Job sheets • Materials list and estimates • Quotations and tenders • Work schedules.

Evidence Guide	
Critical Aspect of Competence	<p>Must demonstrate knowledge and skills of:</p> <ul style="list-style-type: none"> • Locate, interpret and apply relevant information, standards and specifications to the estimation and costing of work • Estimate quantities of material required • Determine the types and amount of labor required to complete the work • Estimate time required to complete the work • Estimate overheads associated with the job • Written quotation/tender for each of the work requirements.
Required Knowledge and Attitudes	<p>Demonstrate knowledge of:</p> <ul style="list-style-type: none"> • Application of GST • Construction terminology • Environmental and sustainability requirements • Estimating and calculating processes • Impact of time on wages and other costs • International System of units (SI) system of measurements relevant to the construction industry

	<ul style="list-style-type: none"> • Process of estimating and costing construction work • Quality requirements of construction projects • Relevant statutory and authority requirements related to estimating and costing work • Estimating cost and volume of work • Relevant tendering and contracting documentation • Safe work method statements • Sources of information and the processes for calculating material requirements • Standards applicable to the work to be undertaken,
Required Skills	<p>Demonstrate skills to:</p> <ul style="list-style-type: none"> • Access current costing data • Accurately calculate labour costs • Accurately calculate material quantities and cost • Produce accurate written costing information • Read and interpreting drawings and material specifications.
Resource Implications	Access is required to real or appropriately simulated situations, including work areas, materials and equipment, and to information on workplace practices and OHS practices.
Methods of Assessment	<p>Competence may be accessed through:</p> <ul style="list-style-type: none"> • Interview/Written Test • Observation/Demonstration with Oral Questioning
Context of Assessment	Competence may be assessed in the work place or in a simulated work place setting.

Occupational Standard: Irrigation and Drainage Level IV	
Unit Title	Coordinate work site activities
Unit Code	AGR IRD4 10 0322
Unit Descriptor	This unit covers knowledge, skills and attitude required to prepare for work site activities, organize resources, coordinate and report on activities for small-scale projects.

Elements	Performance Criteria
1. Prepare for work site activities	<p>1.1 Requirements of the work are clarified.</p> <p>1.2 Personnel, equipment and material requirements are identified.</p> <p>1.3 Order of activities and time allocation is identified, documented and presented.</p> <p>1.4 The <i>environmental implications</i> of the proposed work site activities are identified and the likely outcomes assessed and reported.</p> <p>1.5 <i>OHS hazards</i> are identified, risks assessed and reported to the supervisor.</p> <p>1.6 <i>Personal protective equipment</i> (PPE) is selected, used, maintained and stored according to the type of work site activities to be undertaken.</p>
2. Organize resources	<p>2.1 Materials are purchased and/or <i>equipment/machinery</i> is leased.</p> <p>2.2 <i>Agency permits</i> are gained in the correct order.</p> <p>2.4 Delivery of materials and equipment/machinery to site is organized.</p> <p>2.5 Personnel are organized.</p>
3. Coordinate and report on activities	<p>3.1 All resources are coordinated and timed to suit the scope of the project and order of activities.</p> <p>3.2 Personnel are directed in activities for each period of work.</p> <p>3.3 Personnel, activities, timelines and resource usage are monitored and documented according to enterprise guidelines.</p> <p>3.4 <i>Contingency situations</i> are recognized and reported to the supervisor, and corrective actions taken.</p> <p>3.5 <i>Work site report</i> is written to inform management of work site activities undertaken and completed.</p>

Variable	Range
Environmental implications	<p>May include but not limited to:</p> <ul style="list-style-type: none"> • risk of contamination of soils, • water or adjoining property through fertilizers • chemicals flowing into drains and water sources.

	<ul style="list-style-type: none"> • chemical residues in the soil, • spray drift, • contaminated run-off water, • run off from over-watering, • diseased plant material, • waste plant material, • physical damage such as soil compaction from machinery.
<i>OHS hazards</i>	<p>May include but not limited to:</p> <ul style="list-style-type: none"> • disturbance of services, • solar radiation • dust • noise through traffic • uneven surfaces and holes • moving machinery and machinery parts • powered equipment and hand tools • confined spaces • hazards from use of hired equipment (untrained staff) • overhead hazards including power lines.
<i>PPE</i>	<p>May include but not limited to:</p> <ul style="list-style-type: none"> • work boots • gloves • Overalls • sun hat and sunscreen lotion • safety harness • hard hat • hearing or eye protection • respirator or face mask.
<i>Equipment/ machinery</i>	<p>May include but not limited to:</p> <ul style="list-style-type: none"> • hand tools • tractors • vehicles • watering equipment and personal protective equipment.
<i>Agency permits</i>	<p>May include but not limited to:</p> <ul style="list-style-type: none"> • pruning or removal of large trees • connecting to water systems, • application and disposal of chemicals and polluted waters • operating specialised machinery (e.g., chainsaws, skid steer loaders, forklifts) • working outside normal hours, • setting up traffic and pedestrian barriers\ • digging near services (phone, gas, power, water, sewerage)

	and drains).
Contingency situations	<p>May include but not limited to:</p> <ul style="list-style-type: none"> • the delay in delivery and • breakdowns with equipment and machinery • poor weather conditions • poor quality materials and unforeseen soil problems
Work site report	<p>May include but not limited to:</p> <ul style="list-style-type: none"> • the project name • authors name and date • project description • progress of activities of major issues • OHS issues • expenditure • future activities that may need to be planned.

Evidence Guide	
Critical Aspects of Competence	<p>Must demonstrate skills and knowledge to:</p> <ul style="list-style-type: none"> • Prepare and plan for activities, organize all resources required, and monitor and report on activities undertaken. • Work schedule programming. • Calculate material and resource requirements. • Coordinate a team to achieve optimum performance. • Communicate with personnel at all levels. • Document results clearly and concisely. • Perform an OHS risk assessment. • Communicate ideas and information • Collect, analyze and organize information • Plan and organize activities
Underpinning Knowledge and Attitudes	<p>Demonstrates knowledge of:</p> <ul style="list-style-type: none"> • Environmental awareness associated with undertaking project works to ensure the impact on the environment is minimal. • Work schedule programming. • Hiring and subcontracting of labour. • Possible causes of disruption to work activities and their effect on quality and time schedules. • Responsibilities and requirements for obtaining agency permits as necessary. • The range, use and availability of materials, equipment and

		<p>machinery that may be required for the project.</p> <ul style="list-style-type: none"> • OHS issues, legislative requirements and Codes of Practice.
The required skills		<p>Demonstrate skills to:</p> <ul style="list-style-type: none"> • Read and interpret documentation associated with work site activities. • Calculate material and resource requirements. • Coordinate a team to achieve optimum performance. • Communicate with personnel at all levels. • Document results clearly and concisely. • Perform an OHS risk assessment. • Communicate ideas and information • Collect, analyze and organize information • Plan and organize activities • Use mathematical ideas and techniques • Solve problems on site contingencies, personnel difficulties, timeline failures, and assessing hazards and identifying controls may require problem-solving skills.
Resources Implication		<p>The following resources MUST be provided Access is required to real or appropriately simulated situations, including work areas, materials and equipment, and to information on workplace practices and OHS practices.</p>
Methods of Assessment	of	<p>Competence may be accessed through:</p> <ul style="list-style-type: none"> • Interview/Written Test • Observation/Demonstration with Oral Questioning
Context of Assessment	of	<p>Competence may be assessed in the work place or in a simulated work place setting.</p>

Occupational Standard: Small Scale Irrigation Development Level IV	
Unit Title	Manage Construction of Irrigation Schemes
Unit Code	<u>AGR IRD4 11 0322</u>
Unit Descriptor	This unit covers knowledge, skills and attitude required to Conduct land surveying and leveling, prepare quantity surveying bill of quantity and interpret specifications, and manage construction site activities.

Elements	Performance Criteria
1. Conduct land surveying and leveling	1.1. All required tools and equipment are selected and organized using standard technique 1.2. Construction support is provided according to <i>Occupational Health and Safety hazards (OHS) requirements</i> 1.2. Surveying and leveling activities carried out. 1.3. Bench mark is located using standard geo positioning tool. 1.4. Manage construction site activities 1.5. Lay out drawings is interpreted using chosen surveying and technique in to physical marks on project site.
2. Prepare quantity surveying bill of quantity and interpret specifications	2.1. Type of construction <i>material and equipment</i> are identified considering criterion; such as availability, cost and applicability. 2.2. Construction specification are interpreted using standard technique 2.3. Man power requirement are determined using standard technique. 2.4. All service and running cost are determined for the project life time. 2.5. <i>Quantity surveying</i> is conducted 2.6. <i>Bill of quantity</i> is prepared following standard procedure.
3. Manage construction site activities	3.1. Availability and workability of all machinery and equipment are checked throughout construction period. 3.2. Resources are allocated and budgeted considering time schedule and work load. 3.3. Practical challenges and difficulties are solved during construction processes. 3.4. Smooth working environment is created.

Variable	Range
Occupational Health and Safety hazards (OHS) requirements	May include but not limited to: <ul style="list-style-type: none"> • Chemicals, • slippery or uneven surfaces

	<ul style="list-style-type: none"> • moving machinery and vehicles • snake, spider and Insect bites • solar radiation • dust. • Glove • safety wear • helmet • eye glass
Materials and equipment	<p>May include but not limited to:</p> <ul style="list-style-type: none"> • Planimeter • Tape meter • line level • theodolite (stadia) • chaining pins • ranging pole • staff • clinometers • Global positioning system • Compass • Auger • core sampler • spatula • oven • pressure apparatus • sensitive balance • sieve • soil grinder • hydro meter • shaker and measuring cylinder • thermometer • stop watch • flasks • shovel • rakes • spades • rope • plumb bob • hoe • tracing paper • pencil • graph paper

	<ul style="list-style-type: none"> • fixer
Quantity surveying	<p>May include but not limited to:</p> <ul style="list-style-type: none"> • assessment materials • labor • time and cost requirements to accomplish the irrigation project
Bill of quantity	<p>May include but not limited to:</p> <ul style="list-style-type: none"> • includes assessment materials • labor requirements to accomplish the irrigation project

Evidence guide	
Critical Aspects of Competence	<p>Must demonstrate skills and knowledge to:</p> <ul style="list-style-type: none"> • Conduct land surveying and leveling • Prepare quantity surveying, bill of quantity and interpreted specifications • Check availability and workability of all machinery and equipment throughout construction period. • Manage construction site
The required Knowledge and Attitudes	<p>Demonstrate knowledge of:</p> <ul style="list-style-type: none"> • operating surveying materials • Surveying technique, technical drawing • quantity survey • Communication • developments in related technology • Environmental issues in related to construction works • Respect and follow organizational rules and regulations
The required skills	<p>Demonstrate skill to:</p> <ul style="list-style-type: none"> • interpret lay out and drawing • Operate surveying materials • Survey and leveling works • Prepare bill of quantity and budget • Allocate resources • Apply and coordinate construction activities
Resources Implication	<p>The following resources MUST be provided Access is required to real or appropriately simulated situations, including work areas, materials and equipment, and to information on workplace practices and OHS practices.</p>
Methods of Assessment	<p>Competence may be accessed through:</p> <ul style="list-style-type: none"> • Interview/Written Test • Observation/Demonstration with Oral Questioning

Context Assessment	of	Competence may be assessed in the work place or in a simulated work place setting.
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Occupational Standard: Irrigation and Drainage Level IV	
Unit Title	Rehabilitate irrigation and drainage infrastructures
Unit Code	AGR IRD4 12 0322
Unit Descriptor	This unit covers knowledge, skills and attitude required to plan and prepare for asset rehabilitation construction and maintenance, undertake rehabilitation construction and work site maintenance, Test and commission work. test and commission work, and conduct post-maintenance and rehabilitation activities.

Elements	Performance Criteria
1. Plan and prepare for asset rehabilitation construction and maintenance.	<p>1.1. Work requirements are determined according to the planned asset, maintenance history, components, maintenance schedules and known logistics.</p> <p>1.2. Rehabilitation construction and maintenance plan is confirmed, prioritized and work scheduled.</p> <p>1.3. Authorisations and communication are confirmed with stakeholders.</p> <p>1.4. Stakeholders' issues that impact on construction or maintenance are identified and addressed.</p> <p>1.5. Site inspections are conducted according to organizational procedures and risk management guidelines.</p>
2. Undertake rehabilitation construction work site maintenance.	<p>2.1. Material handling procedures are monitored according to organizational requirements.</p> <p>2.2. Construction activities are monitored to ensure compliance with occupational health and safety and environmental regulations.</p> <p>2.3. Maintenance requirements by detailed diagnosis of problems and conditions at the site are confirmed.</p> <p>2.4. Maintenance tasks are carried out according to the condition of the equipment and organizational requirements.</p> <p>2.5. Equipment, tools and technology are used safely, effectively and productively.</p>
3. Test and commission work.	<p>3.1. Tests are conducted and defined commissioning programs applied according to organizational and manufacturers' requirements.</p> <p>3.2. Test results are monitored to ensure that the assets function within agreed specifications.</p> <p>3.3. Inspections are conducted and recorded according to commissioning and stakeholders requirements.</p>
4. Conduct post-maintenance activities.	<p>4.1. Work site inspections and rehabilitation are coordinated and monitored.</p> <p>4.2. A review of the construction or installation is undertaken and asset</p>

	<p>performance monitored.</p> <p>4.3. Defects are identified and arrangements made to rectify them.</p> <p>4.4. Reports and documentation required by the organization are completed.</p> <p>4.5. Reports are stored and secured according to information and data management system.</p>
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Variable	Range
Work requirements	<p>May include but not limited to:</p> <ul style="list-style-type: none"> • Purpose and history of site and its assets • Maintenance plans and specifications • Site location and conditions • Risk and hazard management procedures • Communication methods and equipment • Authorisations, permits and restrictions • Environmental and heritage conditions • Recording and reporting asset condition and maintenance • Preparing and coordinating the availability and transporting of: <ul style="list-style-type: none"> ➤ Maintenance and construction support ➤ Equipment and tools ➤ Replacement assets ➤ Safety and protective equipment ➤ Communication equipment ➤ Technical expertise ➤ Surveying equipment ➤ Camping and survival resources ➤ Rescue and retrieval resources
Authorizations	<p>May include but not limited to:</p> <ul style="list-style-type: none"> • Federal, state and local government • Quarantine controls • Legal access • Traffic management • Blue Card

Stakeholders	<p>May include but not limited to:</p> <ul style="list-style-type: none"> • Contractors • Government and regulatory authorities • Property owners • Utility organisations • Specialised work teams • General public and Asset users
Site inspections	<p>May include but not limited to:</p> <ul style="list-style-type: none"> • Confirmation of: <ul style="list-style-type: none"> ➤ Plans ➤ Contracts ➤ Purpose ➤ Asset history ➤ Fault reports ➤ Components ➤ Risk factors ➤ Inspection of preparation work • Assessment of compliance with specifications and manufacturers' guidelines • Assessment of compliance with procedures and legislation including: <ul style="list-style-type: none"> ➤ Occupational health and safety requirements ➤ Environmental ➤ Natural resource management ➤ Water quality
Occupational health and safety and environmental requirements	<p>May include but not limited to:</p> <ul style="list-style-type: none"> • Working with, near and in: <ul style="list-style-type: none"> ➤ Confined spaces ➤ Heights ➤ Water ➤ Forests • Equipment operation

	<ul style="list-style-type: none"> • Plant operation • Contamination issues • Weather exposure • Herbicides • Pesticides • Solvents • Fuels • PPE requirements • Onsite communication and procedures for working remotely. • Equipment: <ul style="list-style-type: none"> ➤ Ladders ➤ Harness ➤ Trailer • Personnel safety: <ul style="list-style-type: none"> ➤ Medical constraints and conditions ➤ First Aid ➤ Water survival ➤ Bush survival ➤ Self rescue ➤ Traffic management authority
Maintenance tasks	<p>May include but not limited to:</p> <ul style="list-style-type: none"> • Performance benchmarks • Reference marks • Relevant section: <ul style="list-style-type: none"> ➤ Control ➤ Approach ➤ Inlet ➤ Tail water ➤ Dm • Long survey • Staff gauges • Peak level indicators

	<ul style="list-style-type: none"> • Power supplies • Instrument circuits • Lightning protection • Banks • Site access • Transducer exposure
Organisational and manufacturers' requirements	<p>May include but not limited to:</p> <ul style="list-style-type: none"> • General and special conditions of contract and site specifications • Plans, maps and drawings • Authorisations and permits • Operational manuals • Manufacturers' manuals and specifications • Maintenance manuals • Plans of other authorities, services and utilities • Hazard and response reports • Project plans • Maintenance checklists

Evidence Guide	
Critical Aspect of Competence	<p>Must demonstrate knowledge and skills of:</p> <ul style="list-style-type: none"> • Analyze work requirements • Prioritize and scheduling work • Liaise and negotiate with all relevant stakeholders and work teams • Plan construction or maintenance activities • Monitor work performance for compliance with OHS and other organizational and statutory requirements • Provide technical advice on maintenance methods • Conduct risk and hazard assessments • Report recommendations for risk and hazard prevention • Conduct or supervising asset tests • Implement commissioning programs and post commissioning inspections • Coordinate and monitor the rehabilitation of the worksite • Review the construction or installation and monitoring performance • Identify and report defects

<p>Required Knowledge and Attitudes</p>	<p>Demonstrate knowledge of:</p> <ul style="list-style-type: none"> • Organization contract conditions and compliance • Site inspection and investigation procedures • Organizational policies, procedures, guidelines and requirements for asset monitoring and maintenance • System layout, integrity, design and performance • Evaluation and investigation requirements • Organization auditing and recording procedures and reporting requirements • Characteristics, technical capabilities and limitations of materials and equipment according to manufacturers' specifications • Occupational health and safety policies and procedures including material handling procedures, use of protective equipment, safe driving in hazardous conditions, bush and water survival, working in the location of power supplies, working in confined spaces • Relevant environmental and natural resource management legislation • Risk factors and potential hazards involved with water pressures and flows
<p>Required Skills</p>	<p>Demonstrate skills of:</p> <ul style="list-style-type: none"> • Interpret and make adjustments to asset maintenance plan • Monitor work progress against a plan • Apply relevant organizational procedures based on legislation, risk management, manufacturers guidelines, site conditions and quality standards • Conduct site inspections and investigations • Communicate with supervisors, team members, contractors and the public using clear and direct communication • Prepare reports for management on asset monitoring and maintenance in organization proformas • Interpret and apply a range of organization documents • Liaise and negotiate with local and internal stakeholders • Detect and solve operational problems within area of authority and delegation • Work within safety requirements, identify hazards and use equipment and processes safely • Use safety and personal protective equipment • Interpret policies, standard operating procedures and standards related to monitoring and maintenance of water services assets • Control system operations, processes, failure and rectification • Use required forms of transport including marine craft, 4 wheel drive vehicles, aircraft, snow mobiles based on site location and conditions and safety and equipment management procedures

	<ul style="list-style-type: none"> • Use organization equipment, tools and technology
Resource Implications	<p>The following resources MUST be provided</p> <p>Access is required to real or appropriately simulated situations, including work areas, materials and equipment, and to information on workplace practices and OHS practices.</p>
Methods of Assessment	<p>Competence may be accessed through:</p> <ul style="list-style-type: none"> • Interview/Written Test • Observation/Demonstration with Oral Questioning
Context of Assessment	<p>Competence may be assessed in the work place or in a simulated work place setting.</p>

Occupational Title: Irrigation and Draining Level IV	
Unit of Competence	Monitor and control irrigation drainage systems
Unit Code	AGR IRD4 13 0322
Unit Descriptor	This Unit covers the knowledge, skill and attitude to Assess irrigation drainage and collection systems, regulate flows, Control and operate drainage system structures and processes and Record and report system performance status.

Elements of competence	Performance criteria
1. Assess irrigation drainage and collection systems	<p>1.1 <i>Irrigation drainage and collection systems</i> are assessed.</p> <p>1.2. Measurements are taken with appropriate equipment to determine drainage performance</p> <p>1.3 Drainage/tail water quality is measured in accordance with OHS and organization policy and procedures</p> <p>1.4 Water table depth is measured where required in accordance with OHS and organization policy and procedures</p> <p>1.5 Soil salinity is measured where required in accordance with OHS and organization policy and procedures</p> <p>1.6 Factors external to the system, which may cause interference, are identified and recorded in accordance with OHS and organization policy and procedures</p> <p>1.7 Drainage system data is analyzed and compared to the indicators performance specified in the irrigation drainage plan</p>
2. Regulate flows	<p>2.1 Flow regulating systems are inspected and adjustments are applied if necessary to achieve discharge requirements specified</p> <p>2.2 Discharge flows are monitored and diversions applied to facilitate repair or emergency</p>
3. Control and operate drainage system structures and processes	<p>3.1 Processes are controlled to maintain performance specified in the irrigation drainage plan</p> <p>3.2 Maintenance procedures for <i>drainage system structures</i> are developed and implemented</p>

	<p>3.3 Operational conditions of the drainage system are identified, addressed and reported according to organizational requirements</p> <p>3.4 Processes are integrated to improve drainage network performance</p>
4. Record and report system performance status	<p>4.1 Water quality is recorded in accordance with organization procedures</p> <p>4.2 Water table depth, soil moisture and salinity are recorded in accordance with organization procedures</p> <p>4.3 Strategies that minimize the negative environmental impacts and maximize the positive impacts of the drainage system, are documented</p>

Variables	Range statement
Irrigation drainage systems	<p>May include but not limited to:</p> <ul style="list-style-type: none"> • Both surface and sub-surface drainage installed to handle water which is excess to plant requirements in an irrigated area.
Drainage system structures	<p>May include but not limited to:</p> <ul style="list-style-type: none"> • Surface drains • Culverts • Mole drains • Sand slit • Sub-surface traps • Pit and trap systems • Dune and swale systems • Reed beds • Water-recycling pumps and baffles.

Evidence Guide	
Critical Aspects of competence	<p>Must demonstrate knowledge and skill to:</p> <ul style="list-style-type: none"> • Identify and correcting system problems • Measure, record and report soil moisture, salinity and water table depth • Apply measuring and testing techniques • Regulate drainage flows and clear blockages • Record and report system performance.
The required	Demonstrate knowledge of :

Knowledge	<ul style="list-style-type: none"> • Measuring and monitoring procedures for factors contributing to drainage system performance • Water table and salinity measures • Water quality monitoring methods and techniques • Soil moisture measurement procedures • Environmental role of drainage systems. • Drainage appliances/fixtures/fittings and related • Level and align site • Types and operational parameters of drains • Components used in drainage systems • Isolation processes and procedures • Leveling and alignment processes
The required attitudes	<p>Demonstrate attitudes of:</p> <ul style="list-style-type: none"> • Understanding of work values and Ethics • Accountable to work loyalty and honest to the work he/she being doing • Dedication and commitment • organizational rules and regulations
The required skills	<p>Demonstrate skill to:</p> <ul style="list-style-type: none"> • Identify hazards and implement safe work procedures • Apply soil moisture testing techniques • Calculate water volumes from rate and depth • Measure water table depth, soil moisture and salinity • Clear and refill drainage lines • Isolate drainage lines • Clear blockages from drainage systems • Identify adverse environmental impacts of drainage systems and appropriate remedial action • Implement and follow relevant enterprise OHS and environmental policies and procedures • Use oral communication skills/language competence to fulfill the job role as specified by the organization, including questioning techniques, active listening, clarifying information and consulting with supervisors as required • Use numeracy skills to estimate, calculate and record routine workplace measures • Use interpersonal skills to work with and relate to people from a range of cultural, social and religious backgrounds and with a range of physical and mental abilities.
Resource Implication	<p>Access is required to real or appropriately simulated situations, including work areas, materials and equipment, and to information</p>

		on workplace practices and OHS practices.
Method Assessment	of	Competence may be accessed through: <ul style="list-style-type: none"> • Interview/Written Test • Observation/Demonstration with Oral Questioning
Context Assessment	of	Competence may be assessed in the work place or in a simulated work place setting.

Occupational Standard: Irrigation and Drainage Level IV	
Unit Title	Monitor Hydrometric Stream Discharge Gauging
Unit Code	AGR IRD4 14 0322
Unit Descriptor	This unit covers the knowledge, skills and attitude required to identify flow gauging, collect depth and velocity data, calculate discharge, and report discharge readings.

Elements	Performance criteria
1 Identify flow gauging.	<p>1.1. Stream discharge and <i>factors affecting accuracy</i> are identified.</p> <p>1.2. The purposes of gauging and <i>gauging methodologies</i> are identified.</p> <p>1.3. The <i>area velocity methods</i> are identified for calculating discharge.</p> <p>1.4. <i>Hazards</i> and hazard management principles are identified according to <i>occupational health and safety requirements</i>.</p>
2 Collect depth and velocity data	<p>2.1 Measurements are taken during gauging following occupational health and safety procedures.</p> <p>2.2 Verticals are selected for measurement of velocity.</p> <p>2.3 Suitable <i>gauging equipment</i> are selected according to the conditions of the location, assignment and client requirements and <i>gauging site conditions</i>.</p> <p>2.4 The equipment and gauging site are prepared.</p> <p>2.5 A range of suitable and <i>alternative methods</i> are applied for obtaining the mean velocity in a vertical.</p> <p>2.6 The mid section and mean section methods are applied</p> <p>2.7 The current meter is positioned according to guidelines.</p> <p>2.8 The appropriate discharge measurement method is selected.</p> <p>2.9 The depth settings and point velocity are calculated using <i>required mathematical techniques</i>.</p>
3 Calculate discharge	<p>3.1 Corrections are applied for oblique flows and drift angles.</p> <p>3.2 The mean velocity is calculated for each vertical.</p> <p>3.3 The area and discharge corresponding to each sub-section are calculated.</p> <p>3.4 The discharge is calculated using the mid-section and mean section method.</p> <p>3.5 The mean stage and rate of change are calculated and recorded.</p> <p>3.6 The channel storage and time of travel effects are calculated.</p>
4 Report discharge readings	<p>4.1. The discharge measurements are compared with the current rating.</p> <p>4.2. The <i>percentage deviation</i> from the rating is recorded.</p> <p>4.3. The gauging quality is graded and recorded with interpretation</p>
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	<p>comments.</p> <p>4.4. Supporting information is gathered from the site and document accurately according to organisation requirements.</p> <p>4.5. Gauging is entered into ratings database according to organisation requirements.</p>
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Variable	Range
Factors affecting accuracy	<p>May include, but not limited to:</p> <ul style="list-style-type: none"> • Laminar flow • Turbulent flow • Critical states • Sensitivity • Pulsing • Backwater
Gauging methodologies	<p>May include, but not limited to:</p> <ul style="list-style-type: none"> • Wading • Traveller way • Cableway • Boat • Bridge • Portable flume • Float • Acoustic profiler
Area velocity method	<p>May include, but not limited to:</p> <ul style="list-style-type: none"> • Measurement of Water Flow in Open Channels: • Velocity-area methods • Measurement by current-meters and floats • Operating procedures for discharge measuring equipment and calibration
Hazards	<p>May include, but not limited to:</p> <ul style="list-style-type: none"> • Boat handling

	<ul style="list-style-type: none"> • Bed stability • Winch operation • Tag line setting • Traffic management • Working at heights • Manual handling • Personal Protective Equipment (PPE)
Occupational health and safety requirements	<p>May include, but not limited to:</p> <ul style="list-style-type: none"> • Hazard recognition: <ul style="list-style-type: none"> ➤ Working on and near water ➤ Safe working depth ➤ Bank and bed stability ➤ Rising stage ➤ Snags ➤ Floating debris ➤ Water temperature ➤ Water contamination ➤ Weather exposure ➤ Rescue procedures • PPE requirements: <ul style="list-style-type: none"> ➤ Onsite communication and procedures for working remotely ➤ Equipment ➤ Storage ➤ Assembly ➤ Cleaning ➤ Handling, transport • Personal welfare and safety: <ul style="list-style-type: none"> ➤ Medical constraints ➤ CPR ➤ First Aid ➤ Water survival and rescue

	<ul style="list-style-type: none"> ➤ Self rescue ➤ Bush survival ➤ 4WD driving and recovery ➤ Defensive driving ➤ Boat handling ➤ Traffic management authority regulations
Gauging equipment	<p>May include, but not limited to:</p> <ul style="list-style-type: none"> • Winch • Traveller way • Cableway • Boat • Vehicle • Trolley mount • Mechanical & acoustic meters • Oil change • Calibration
Gauging site conditions	<p>May include, but not limited to:</p> <ul style="list-style-type: none"> • Hazards • Obstructions • Climatic • Sufficient depth • Sufficient velocity • Flow angle • Laminar flow • Bank condition • Anabranches and multiple channels • Pre-season maintenance
Alternative methods	<p>May include, but not limited to:</p> <ul style="list-style-type: none"> • Volumetric • Flumes • Slope/area techniques

	<ul style="list-style-type: none"> • Dilution
Required mathematical techniques	<p>May include, but not limited to:</p> <ul style="list-style-type: none"> • Area • Volume • Mean • Suitable formulae • Trigonometry
Percentage deviation	<p>May include, but not limited to:</p> <ul style="list-style-type: none"> • Calculations • Equipment • Control and Recording equipment • Repeat measurement
Supporting information	<p>May include, but not limited to:</p> <ul style="list-style-type: none"> • Gauging section location and access maps • Photographic records • Site preparation undertaken • Comments on issues encountered
Organisational requirements	<p>May include, but not limited to:</p> <ul style="list-style-type: none"> • Data management and reporting • Worksite procedures • Occupational health and safety procedures • Operating procedures

Evidence Guide		
Critical Aspects of Competence	Must demonstrate knowledge and skills to:	<ul style="list-style-type: none"> • Measure and calculate readings • Interpret and report data for a range of clients and stakeholders • Gather data related to client requirements • Interpret complex documentation and applying it to the specification of hydrometric data collection and reporting procedures • Sample accurately and consistently with client requirements

	<ul style="list-style-type: none"> Analyse and verifying data using standard procedures, software and databases Prepare clear and accurate reports Store and archive data Identify, report and (within scope of job function) solving potential or current problems
The required Knowledge and Attitudes	<p>Demonstrate knowledge of:</p> <ul style="list-style-type: none"> Principles of discharge measurement Methods for calculating mean velocity in a vertical Methods for determining the cross-sectional area at a site Alternative methods of discharge measurement The organisation's operating procedures for hydrometric stream discharge measurement The timing, location and number of verticals for stage readings The characteristics of a suitable section for wading and boat gauging and how to make modifications Requirements for surface, single and multipoint floats Basic mathematical principles for area and velocity measurements Correction procedures for horizontal angles Correction procedures for suspension measurements Techniques for monitoring stage changes during discharge measurement Weighted mean stage calculations Discharge and mean stage adjustment Factors impacting on discharge measurements and the quality of the discharge Formulae to adjust gauging Potential impacts of modifications of site, method or equipment on discharge accuracy Confidence limits Function of each field on the measurement forms The organisation's registration procedures Calibration procedures OHS procedures, safe operation of equipment and identification of potential hazards Technical components in calculating discharge
The required skills	<p>Demonstrate skills to:</p> <ul style="list-style-type: none"> Use area velocity method Assess hazards and apply relevant precautions and

	<p>action</p> <ul style="list-style-type: none"> • Estimate and explain the anticipated vertical distribution • Make calculations on depth and velocity • Maintain the integrity of measurements • Use a range of suitable techniques to accurately determine mean stage in rapidly changing situations
Resource Implications	Access is required to real or appropriately simulated situations, including work areas, materials and equipment, and to information on workplace practices and OHS practices.
Methods of Assessment	Competence may be assessed through: <ul style="list-style-type: none"> • Interview/Written Test • Observation/Demonstration with Oral Questioning
Context of Assessment	Competence may be assessed in the work place or in a simulated work place setting.

Occupational Standard: Irrigation and Drainage Level IV	
Unit Title	Monitor Environmental Policies Implementation
Unit Code	<u>AGR IRD4 15 0322</u>
Unit Descriptor	This unit covers the knowledge, skill and attitude require providing information to the work team, to implement and monitor operational procedures, to implement and monitor change and continuous improvement, to Implement and monitor an environmental management training program.

Elements	Performance Criteria
1. Provide information to the work team	<p>1.1. Information provided to the work team is explained in a clear and concise manner and is readily accessible by all employees</p> <p>1.2. Organization's activities performance in regard to environmental management and business sustainability are conveyed to work team where required</p> <p>1.3. Links between environmental, financial, safety and other risk areas and how these are integrated in organizational policies and practices are explained</p> <p>1.4. Information on environmental systems and procedures and other risk areas within the area of management responsibility is provided</p>
2. Implement and monitor operational procedures	<p>2.1 Existing and potential environmental risks are identified and <i>assessed</i></p> <p>2.2 Prioritized recommendations from the assessments are carried out as part of the organization's operational procedures</p> <p>2.3 Organizational environmental policies and procedures are implemented</p> <p>2.4 Tasks are allocated and outcomes are monitored in accordance with organizational policies and targets</p> <p>2.5 Contingency plan is implemented promptly when incidents occur</p>
3. Implement and monitor change and continuous improvement	<p>3.1 Environmental improvement plans are implemented for own work group and integrated with other operational activities</p> <p>3.2 Best practice approaches to improving environmental performance by reducing environmental risk and waste are identified, implemented and monitored</p> <p>3.3 Suggestions and ideas about environmental management are sought from the work team and acted upon where appropriate</p>

4. Implement and monitor recording procedures	<p>4.1 Internal and external reporting procedures are identified and implemented as required</p> <p>4.2 Environmental records are accurately and legibly maintained and stored securely in a form accessible for reporting purposes</p> <p>4.3 Information/records are monitored to identify trends that may require remedial action, and used to promote continuous improvement of environment performance</p>
5. Implement and monitor an environmental management training program	<p>5.1 <i>Environmental training</i> needs are identified based on specified gaps.</p> <p>5.2 Arrangements are made for fulfilling identified training needs.</p>

Variable	Range
Information	<p>May include but not limited to :</p> <ul style="list-style-type: none"> • organizational policies and procedures • relevant environmental legislation requirements • voluntary environmental agreements entered into with external organizations • continuous improvement policies and processes for the organization environmental data
performance	<p>May include but not limited to :</p> <ul style="list-style-type: none"> • measure of an organization’s impact on the environment and of their ability to manage that impact
Environmental management and business sustainability	<ul style="list-style-type: none"> • May include but not limited to : • environmental load reduction and waste minimization • tenders for the provision of goods and services that specify environmentally preferred selection criteria • protection of land and habitat • environmentally sustainable work practices • continuous improvement policies
Environmental risks	<p>May include but not limited to:</p> <ul style="list-style-type: none"> • actual and potential sources of waste • poll hazardous waste) • planned or unplanned emissions or • any aspect of the business operation which may have an impact on environmental performance and may be assessed: • on an ongoing basis with regard to probability, scale and likely impact on business and environmental performance

Environmental improvement plans	<ul style="list-style-type: none"> • May include but not limited to: • measuring, monitoring and recording environmental performance, and continually setting targets for measurable improvements • all aspects of environmental performance including energy use, waste minimization, recycling, transport use etc
Best practice approaches	<p>May include but not limited to :</p> <ul style="list-style-type: none"> • preventing and minimizing the production of pollution (e.g. discharges to air, land and water, hazardous waste) • improving housekeeping (e.g. using a broom instead of a hose, using old rags for cleaning instead of toxic cleaners or water) • substituting materials (e.g. replacing toxic solvent based coatings with water based ones) • changing processes (e.g. mechanical cleaning, re-design of products/ procedures so that materials are used more efficiently)
Environmental training	<p>May include but not limited to :</p> <ul style="list-style-type: none"> • integrated into the organization's existing training arrangements

Evidence guide	
Critical Aspects of Competence	<p>Must demonstrate Knowledge and skill to:</p> <ul style="list-style-type: none"> • describe relevant legislation from all levels of government that affects business operation • communicate with others to ensure information • comprehend documentation • plan and organize activities
The required Knowledge and Attitudes	<p>Demonstrates knowledge of:</p> <ul style="list-style-type: none"> • relevant legislation from all levels of government that affects business operation, • Occupational Health and Safety and environmental issues, • relevant environmental systems and procedures • knowledge of best practice approaches relevant to own work area • strategies to maximize opportunities and minimize impacts relevant to own work area issues especially in regard to water catchments, air, noise, ecosystems, habitat, waste minimization relevant to own work area • understanding of work values and Ethics

	<ul style="list-style-type: none"> • accountable to work loyalty and honest to the work he/she being doing • dedication and commitment • respect and follow organizational rules and regulations
The required skills	<p>Demonstrates skills to:</p> <ul style="list-style-type: none"> • communication skills to ensure information is supplied to the work team • consultation skills to assist in workplace negotiations • literacy skills for comprehending documentation and interpreting environment requirements • ability to relate to people from a range of social, cultural and ethnic backgrounds and physical and mental abilities • Collect, analyze and organize information to provide information and advice • Communicate ideas and information to resolve environmental issues with the work team and external contacts • Plan and organize activities to plan training and to implement change and improvement
Resources Implication	Access is required to real or appropriately simulated situations, including work areas, materials and equipment, and to information on workplace practices and OHS practices.
Methods of Assessment	<p>Competence may be assessed through:</p> <ul style="list-style-type: none"> • Interview / Written Test • Observation / Demonstration with Oral Questioning
Context of Assessment	Competence may be assessed in the work place or in a simulated work place setting.

Occupational standard : Animal Production Level IV	
Unit Title	Develop value chain analysis
Unit Code	AGR IRD4 16 0322
Unit Descriptor	This unit covers the knowledge, skills, and attitude needed to Understand value chain ,Identify concepts of value chain ideas Develop the value chain and Upgraded value addition

Elements	Performance Criteria
1. Understand concepts of value chain	1.1 <i>Concept of value chain</i> are understood. 1.2 Value chain scopes are understood and identified. 1.3 <i>Principle of value chain</i> are understood and identified. 1.4 Value chain <i>characteristic</i> are understood and identified. 1.5 Value chain <i>Importance</i> are discussed and understood. 1.6 <i>Concept of value addition</i> are understood and determined.
2. Identify Value chain analysis	2.1 <i>Dimension</i> and <i>structures</i> of Value chain are identified and interpreted 2.2 <i>Value chain actors</i> are identified according to the objective and interest or need of chain actors 2.3 <i>Value chain maps</i> are illustrated for different <i>agricultural products</i> 2.4 Value chain techniques for value addition are identified and analyzed 2.5 <i>Contract farming</i> system is established to promote value chain.
3. Develop value chain	3.1 Value chain <i>parameters</i> are analyzed to compare the gaps between the existing and the benchmark. 3.2 <i>Constraints and gaps</i> are collected, analyzed and ranked according to the priority used to develop value chain 3.3 <i>Steps of value chain</i> development are identified 3.4 Value Chain <i>selection techniques</i> are identified to develop value chain 3.5 Potential <i>interventions</i> for value chain development are identified
4. Upgrade value addition	4.1 <i>Environmental considerations</i> are understood to upgrade value addition development 4.2 Value chain actors are identified for <i>Value addition</i> 4.3 Value chain is <i>upgraded</i> for agricultural products to measure performance of value chain development 4.4 Customer feedbacks are collected, organized and documented to improve Customer satisfaction

Variable	Range
Concept value chain	May include, but not limited to <ul style="list-style-type: none"> • Market oriented products • General Principle • Value chain actor • Mapping • Value addition
Principles of value chain	May include, but not limited to <ul style="list-style-type: none"> • Value chain mapping • Identifying the distribution of benefits of actors • Examining the role of upgrading • Governance in the value chain
Characteristic	May include, but not limited to <ul style="list-style-type: none"> • Inbound logistic • Operation • Out bound logistic • Marketing • Sales • Services
Importance	May include, but not limited to <ul style="list-style-type: none"> • Simple and better way to identify gaps and technologies. • Increases efficiency and systemic competitiveness of local enterprise • Primary targets involvement between local sector and sub sector • Reduces production costs and improves profitability • Improves customer satisfaction by providing quality product and service
Dimension	May include, but not limited to <ul style="list-style-type: none"> • Sourcing of Inputs and supplies • Production capacity and technology • End-markets and trade • Governance of value chains
Structures	May include, but not limited to <ul style="list-style-type: none"> • Input sector: • Farm/production sector: • Product sector
Value chain actors	May include, but not limited to <ul style="list-style-type: none"> • Farmers, • Traders, • Processors, • Transporters

	<ul style="list-style-type: none"> • Wholesalers • Retailers and final consumers
Agricultural sectors	<p>May include, but not limited to</p> <ul style="list-style-type: none"> • Crop farming • Forestry • Livestock • Fisher and aquaculture • Agricultural cooperative • Agricultural extension service
Parameters	<p>May include, but not limited to</p> <ul style="list-style-type: none"> • Yield • Quality • Cost • Time
Technology constraints	<p>May include, but not limited to</p> <ul style="list-style-type: none"> • Marketability • Profitability • Capability and Usefulness • Functionality • Import Substitution • Feasibility • Adaptability • Potential Impact to the MSE • Woman Empowerment • Employment
Steps of value chain	<p>May include, but not limited to</p> <ul style="list-style-type: none"> • Value chain selection • Data collection • Value chain mapping • Value analysis • Gap identification • Prioritizing constraints • Technology identification & categorization
Selection technique	<p>May include, but not limited to</p> <ul style="list-style-type: none"> • Integration economic • Environmental • Social • Institutional

Environmental considerations	<p>May include , but not limited to:</p> <ul style="list-style-type: none"> • Sustainability of the land use system for production and processing • Sources of energy • Efficiency of energy use • Greenhouse gas emissions • Water use efficiency and possibilities of contamination • Quantity and character of chemicals being used • Waste production and management
Value addition	<p>May include, but are not limited to:</p> <ul style="list-style-type: none"> • measured against its contribution to the customer • Technical benefits/features • Location benefits/features • Aesthetic benefits/features • Information benefits/features
Contract farming	<p>May include, but are not limited to:</p> <ul style="list-style-type: none"> • Agreement between buyer and seller • Farmer and processing making firm for production • Supple of agricultural product
Upgraded	<p>May include, but are not limited to:</p> <ul style="list-style-type: none"> • Farm crop • Milk and Milk Products • Meat and Meat Products • Poultry Products • Fish and Fish Products • Honey and Honey Products

Evidence Guide	
Critical Aspects of Competence	<p>A Candidate must demonstrate the ability to:</p> <ul style="list-style-type: none"> • Understand concept of value chain • Identify Value chain actors • Apply techniques for value addition • Understand selection technique to develop value chain • Identify potential interventions to value chain analysis • Evaluate value chain addition • Contract farming system is established to promote value chain • Describe value chain upgraded and identify environmental issues for value chain development
Required Knowledge and Attitude	<p>A candidate must demonstrate the knowledge and attitude to :</p> <ul style="list-style-type: none"> • Understand concepts of value chain • Understand and Recognize characteristic of value chain • Understand dimension and structures of value chain • Identify principles of value chain for agricultural production

	<ul style="list-style-type: none"> • Identify value chain actors and Illustrate value chain mapping in agricultural product • Identify value chain analysis improve vale chain development • Understand the Bench mark analyze to develop value chain analysis • Observe environmental issue to upgrade Value chain • Determine value chain upgrade and focus on Value chain addition
Required Skills	<p>A candidate must demonstrate the Skills to :</p> <ul style="list-style-type: none"> • Identify concepts of value chain • Recognize and describe characteristic of value chain • Describe dimension and structures of value chain • Apply principles of value chain for agricultural production • Classify value chain actors and Illustrate value chain mapping in agricultural sector • Analyze the Bench mark to develop value chain analysis • Apply value addition and determine value chain upgrade development value chain analysis • Contract farming system is established to promote value chain • Describe value chain upgraded and identify environmental issues for value chain development
Resources Implication	Access is required to real or appropriately simulated situations, including work areas, materials and equipment, and to information on workplace practices and OHS practices.
Methods of Assessment	<p>Competence may be assessed through:</p> <ul style="list-style-type: none"> • Interview/Written Test • Observation/Demonstration with Oral Questioning
Context of Assessment	Competence may be assessed in the work place or in a simulated work place setting.

Sector: Agriculture
Occupational map: Irrigation and Drainage

