



NQF Level: 4

US No: 116309

Learner Guide

Primary Agriculture

Farm layout and Site selection

My name:

Company:

Commodity: Date:

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agriculture

Department:
Agriculture
REPUBLIC OF SOUTH AFRICA



Before we start...

Dear Learner - This Learner Guide contains all the information to acquire all the knowledge and skills leading to the unit standard:

Title: Implement Integrated Farm Layout and Site Selection

US No: 116309

NQF Level: 4

Credits: 3

The full unit standard will be handed to you by your facilitator. Please read the unit standard at your own time. Whilst reading the unit standard, make a note of your questions and aspects that you do not understand, and discuss it with your facilitator.

This unit standard is one of the building blocks in the qualifications listed below. Please mark the qualification you are currently doing:

Title	ID Number	NQF Level	Credits	Mark
National Certificate in Animal Production	48979	4	120	ρ
National Certificate in Plant Production	49009	4	120	ρ

Please mark the learning program you are enrolled in:

Your facilitator should explain the above concepts to you.

Are you enrolled in a:	Y	N
Learnership?	ρ	ρ
Skills Program?	ρ	ρ
Short Course?	ρ	ρ

This Learner Guide contains all the information, and more, as well as the activities that you will be expected to do during the course of your study. Please keep the activities that you have completed and include it in your **Portfolio of Evidence**. Your PoE will be required during your final assessment.

What is assessment all about?

You will be assessed during the course of your study. This is called *formative assessment*. You will also be assessed on completion of this unit standard. This is called *summative assessment*. Before your assessment, your assessor will discuss the unit standard with you.

Assessment takes place at different intervals of the learning process and includes various activities. Some activities will be done before the commencement of the program whilst others will be done during programme delivery and other after completion of the program.

The assessment experience should be user friendly, transparent and fair. Should you feel that you have been treated unfairly, you have the right to appeal. Please ask your facilitator about the appeals process and make your own notes.

Your activities must be handed in from time to time on request of the facilitator for the following purposes:

- ♥ The activities that follow are designed to help you gain the skills, knowledge and attitudes that you need in order to become competent in this learning module.
- ♥ It is important that you complete all the activities, as directed in the learner guide and at the time indicated by the facilitator.
- ♥ It is important that you ask questions and participate as much as possible in order to play an active role in reaching competence.
- ♥ When you have completed all the activities hand this in to the assessor who will mark it and guide you in areas where additional learning might be required.
- ♥ You should not move on to the next step in the assessment process until this step is completed, marked and you have received feedback from the assessor.
- ♥ Sources of information to complete these activities should be identified by your facilitator.
- ♥ **Please note** that all completed activities, tasks and other items on which you were assessed must be kept in good order as it becomes part of your **Portfolio of Evidence** for final assessment.

Enjoy this learning experience!

How to use this guide ...

Throughout this guide, you will come across certain re-occurring “boxes”. These boxes each represent a certain aspect of the learning process, containing information, which would help you with the identification and understanding of these aspects. The following is a list of these boxes and what they represent:



What does it mean? Each learning field is characterized by unique terms and **definitions** – it is important to know and use these terms and definitions correctly. These terms and definitions are highlighted throughout the guide in this manner.



You will be requested to complete **activities**, which could be group activities, or individual activities. Please remember to complete the activities, as the facilitator will assess it and these will become part of your portfolio of evidence. Activities, whether group or individual activities, will be described in this box.



Examples of certain concepts or principles to help you contextualise them easier, will be shown in this box.



The following box indicates a **summary** of concepts that we have covered, and offers you an opportunity to ask questions to your facilitator if you are still feeling unsure of the concepts listed.

My Notes ...

You can use this box to jot down questions you might have, words that you do not understand, instructions given by the facilitator or explanations given by the facilitator or any other remarks that will help you to understand the work better.

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What will I be able to do?

When you have achieved this unit standard, you will be able to:

- ♥ A learner achieving this unit standard will be able to contribute to the natural resource data gathering process, assist in determining the most appropriate and sustainable land-use for different parts of the land, supervise the implementation and maintenance of the selected infrastructure and maintain the most appropriate land-use on a farm by continuously assessing the natural resource base.

Learning Outcomes

At the end of this learning module, you must be able to demonstrate a basic knowledge and understanding of:

- ♥ The person is able to demonstrate a basic knowledge of:
- ♥ The different options applied in land use.
- ♥ Intermediate Knowledge
- ♥ The person is able to demonstrate a basic knowledge of:
- ♥ The differentiations between high and low yield aspects of a landscape.
- ♥ Methods of data gathering and information presentation (e.g. graphs, etc.).
- ♥ The sustainable use of natural resources in an agricultural environment.
- ♥ The causes and consequences of soil erosion.

What do I need to know?

It is expected of the learner attempting this unit standard to demonstrate competence against the unit standard

- ♥ It is assumed that a learner attempting this unit standard will demonstrate competence against the unit standards or equivalent:
- ♥ NQF 3: Assist in farm planning and layout for conservation and rainwater harvesting.
- ♥ NQF 3: Monitor and supervise a food safety and quality management system in the agricultural supply chain.

My Notes ...

Introduction

Life, as a whole, is complicated as it is influenced by job opportunities, economy, crime, politics, etc. These factors must be arranged in such a way that we can create an atmosphere in which our families may live a sensible life.

The same can be said of a farming unit, although, in this case, it is influenced by factors such as:

- Topography: Is it suitable (flats) for crop production and cattle grazing or (hilly) for tree plantations, orchards and vineyards?
- Availability of natural resources: Sufficient running water for cattle and sheep; what about a river for irrigation purposes?
- Location of the farm: How far is it from a market (fresh fruit and vegetables) or silo (maize, sunflower and wheat crops)?
- Farming practices: The availability of workers must also be taken into account as fresh fruit, vegetables, citrus and vines need more labourers (handpicking) than cattle farming.
- Different enterprise possibilities: Sufficient rainfall, soil type, daylight hours and temperature to yield crops, or rather cattle breeding (Bushveld) where it is too dry and warm for crops?
- The availability of capital: Aid from the government, Bank loans or Contract based?
- The preference\experience of the farmer/owner (in a lesser degree) will also influence decision-making.

Do not forget factors such as:-

- Intensity and direction of the wind,
- Average monthly minimum and maximum temperatures
- What time does the sun rise and set through the seasons?
- What is average annual vapour-transpiration rate of an area?
- What is the average humidity throughout the year?

These factors must therefore be integrated in such a way to ensure a sustained farming enterprise. To accomplish this task, the farmer will have to do some planning at first. Planning though, can not be done without knowledge.....and that is what this guide is all about!

Session

1 Information to support infrastructure development

After completing this session, you should be able to:

SO 1: Prepare and categorise collected and recorded information in an agricultural environment to support the infrastructure development of an agricultural enterprise.

In this session we explore the following concepts:

- ♥ Compile data basis of service providers and information
- ♥ Use info on soil, climate, slope of land to develop a land use plan

1.1 Integrated farm planning

According to Allan Rosenberg and Thomas Landers, integrated farm planning, can be defined as:

"To determine the existing and/or available resources on the farm, which resources will still be needed to maintain future goals and also to have an unmistakable objective of where you are aiming to?"



Integrated farm planning: Integrated farm planning (whole farm planning) thus, is a tool for developing a sustainable farming system.



Sustainable agriculture: Sustainable agriculture can be seen as a philosophy as well as a farming system as it has its roots in a set of values that reflects a state of awareness of ecological and social realities and one's ability to take preventative action. It also involves the design and management processes that work with natural processes to conserve all resources, minimize waste and environmental impact while maintaining or improving productivity.

It is therefore necessary to plan the layout of the infra structure that is needed for the production of the various crops as well as the production systems that will be complementary to the natural resources on the farm.



Farm Layout: A Farm layout refers to the compiling of physical structures such as homesteads, outbuildings, waterways, contours, camps, water supply roads and the layout of orchards, vineyards or lands. However, the area where the farm is situated, the topography, the availability of natural resources, the farming practices, the different enterprises, the availability of capital and the preference of the farmer/owner will also affect the farm layout.

v The principles of Integrated Farm planning are

- ♥ Whole farm planning is a process that assist farmers to analyse the farming operation
- ♥ Each production system must be planned and combined with the other systems
- ♥ Both the physical infrastructure and the economical and management inputs must be planed
- ♥ Accurate information need to be obtained to ensure proper planning

What role does Integrated Farm planning play in the success of a farming business?

Integrated farm planning is one on the components that will contribute to the success of the farming business. There must be proper planning of the production system, marketing, quality of products and financial planning.

v Steps involved in whole farm or integrated farm planning

The following steps are involved in whole farm planning

1. Setting of goals
2. Making an inventory and assessment of existing farm resources
3. Developing and implementing an action plan
4. Monitoring on-farm processes towards the goal

Step:	Action	Comment
1	Setting of goals	Whole farm planning begins with the development of a long-term goal or vision for the farming business. The farmer needs to determine the following: The quality of life expectancy for his family and himself What is his vision or aim for the future of the farming business The amount of income needed from the farming business to ensure an atmosphere in which his family, his workers and their families may live a sensible life. The farming business need to determine long term goals e.g. the reduction of debt, the improving of soil fertility, etc. Short term goals e.g. the planning of tillage methods, diversification of crops or enterprises and the improving the marketing of products.

v Step 1: Setting of goals

Whole farm planning begins with the development of a long-term goal or vision for the farming business. The farmer needs to determine the following:

- The quality of life expectancy for his family and himself
- What is his vision or aim for the future of the farming business
- The amount of income needed from the farming business to ensure an atmosphere in which his family, his workers and their families may live a sensible life.
- The farming business need to determine long term goals e.g. the reduction of debt, the improving of soil fertility, etc. Short term goals e.g. the planning of tillage methods, diversification of crops or enterprises and the improving the marketing of products.
- Human and social resources which include the manpower available, the skills level and training of the different farm workers.
- Environmental resources
- Economic and financial resources

v **Step 2: Inventory and assessment**

These goals should relate to the following resource areas to be able to properly plan an inventory of resources which include natural resources, human resources and financial resources.

- **Natural resources** can be determined by using a farm map, soil maps, soil testing, and availability of water, veld types and vegetation. It can be obtained through the study of the maps and other documentation or by conducting a natural resource audit where the person collects the necessary data from the source.
- **Human resources** including manpower availability, the skills level and training of the different farm workers.
- **The financial assets or resources** are the capital available or the collateral the farmer has to secure a loan from financial institutions.

With this step in the planning process the farmer determined (stock take) which sources are available, how these can be used and the means of getting to the goals.

v **Step 3: Action plan**

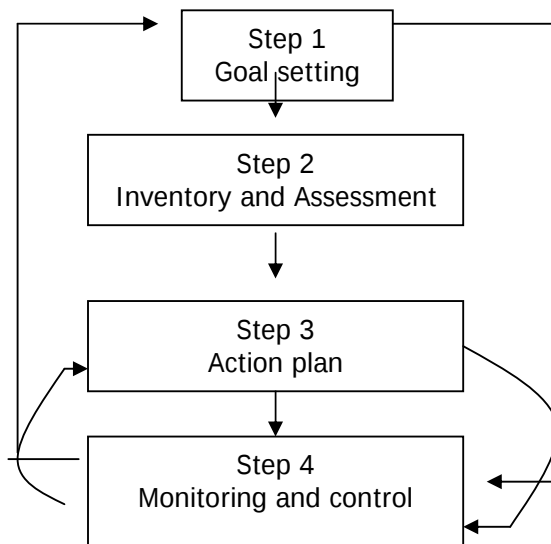
The planning that was done in the previous steps needs to be put in action. The management alternatives need to be identified and evaluated and then be used to develop an action plan.

The action plan must fit in with the goals set in the first step and must make use of all existing positive resources as it can influence future planning.

v **Step 4: Monitoring and control**

Management alternatives must be evaluated separately to determine which plan suits the farming business best.

As the whole farm plan is implemented, you need to evaluate the different options and plans to determine if it works. It might be necessary to make minor adjustments to the plan as time goes on. Keep accurate records and evaluate to see if the farming business is still on the right track and achieving the goals set out.



1.2 What role does integrated farm planning play regarding the conservation of natural resources?

Whole farm planning assesses the physical aspects of the farm with regards to soil, vegetation and topography. This physical stocktaking of the farm is then the basis of farm design and layout.

This may include soil conservation structures, water supply, irrigation and the improvement of natural vegetation or the eradication of alien plants.

- The implications of integrated farm planning.
- The implications of whole farm planning enables the farmer or the manager to consider the natural resources and take all the internal and external factors into account when decisions are made concerning the production systems, type of products produced and the marketing of the products
- The importance of integrated farm layout.
- The focus of integrated farm planning is to consider the entire production of possible agricultural products and to plan the farm infrastructure in such a way that it complements the production process; it also ensures the sustainable use of the natural resources.
- The main considerations when doing Integrated Farm Layout.

- The main consideration of whole farm planning is to ensure sustainability and balanced management of the whole property in the long term and to encourage the farmer or manager to develop risk management and drought management strategies as a means of increasing his self- confidence and viability.



Please complete Activity **1.1**:

Work as a group

Explain the four steps of whole farm planning to your group and apply these to a small broiler farm that produces 300 chickens per week. Illustrate how the four steps will be applied in this situation.

1.3 *Selecting an enterprise and production site*

v **What are the principles of site selection?**

To evaluate the farm in its whole, it will be necessary to draw a map indicating the farm's topography, boundaries as well as soil and water resources. This is essential information needed in the planning process when selecting a site for a specific purpose, e.g. building a dam or waterway; the lay out of a new land etc. North – eastern slopes are preferred for maximum sunlight, warmth and protection from winds. Slopes do have a tendency to erosion and need to be cultivated with care. Soil erosion can be prevented by not using slopes with a gradient of more than 7° when cultivating for crops.

Pay attention to the following when production sites are selected

- Soil types, soil depth and fertility
- Drainage of the soil
- Availability of water
- the natural vegetation
- Access to the area

During the process of selecting an enterprise on the farm one will also take into account the information regarding natural resources and the specific needs for the different enterprises. The natural resource base must be able to sustain the selected enterprise. The following should be taken into account:

- Water flow onto and off the farm.
- Terrestrial (land) and aquatic (water) living organisms found on the farm.
- Expected biomass to be removed from farm and required inputs to replace the loss.

- Establishing of natural resources like thatching grass or reeds that can be harvested at a sustainable rate.

Site selection is important to ensure that cost is kept at a minimum. Correct drainage can take place, runoff water can be controlled. In the case of feedlots or dairies where a large amount of animals are kept in camps the drainage and runoff of water is very important. The site for animals and animal products must also be away from water sources to prevent pollution of the underground water. In the case of certain fruit trees the slope of the hill and the amount of sunlight and heat units will play a role in the quality of the fruit or product.

To assist with site selection the land type maps and memoirs from the Department of Agriculture can be used to give detail about the following

- Soil and terrain data
- Climatic data for the given land type
- Climatic data according to climate zone
- Land type inventory and description of soil, soil depth and the presence or absence of structures that effect the infiltration of water.
- These Land type Maps and memoirs can be ordered from the department of Agriculture. Division of Agricultural information. Private bag x 144 Pretoria.

When a Land type Map is ordered for e.g. 2623 Vryburg, then request for a 1:250 000 LAND TYPE SERIES 2623 VRYBURG with accompanied memoirs. The Land type maps and information is also available at www.agis.agric.za .

The land type inventory is compiled by the Department of Agriculture and provides information regarding the following

- Terrain – a profile sketch indicating the highest and lowest point as well as the different slopes
- Percentage level land is estimated
- The local relief is also estimated
- Terrain units are also indicated
- The Geology
- Soil depth, soil series (soil with slopes of less than 12 % and no mechanical limitations are indicated as plough-able soil)
- Climate zones are indicated
- Rainfall indicated
- Evaporation as measured in class A- evaporation pan
- Temperature – heat units, highest and lowest temperature
- Frost – the first day and the last day and the duration of the frost period.

v **What role does site selection play regarding the conservation of natural resources?**

With the selection of a production site the various internal factors such as topography, soil and climatic factors need to be considered. One must also keep in mind the natural vegetation and the ecology of the area, determine (by means of ecological studies) if this area is not an ecological sensitive area where cultivation is prohibited e.g. vleis or where the slopes are too steep.

The Land use inventory describes the soil as follows

- Soil series present
- Soil –rock complex
- Solid rock
- Rivers and streams
- Pans
- Erosion
- Swamps
- Shifting dunes
- Coarse deposits

Mechanical limitations associated with each class of land are described in terms of the classes set out below. The limitations are due to the size and quantity of stones and/or depth or shallowness of tillable soil.

MB0	No mechanical limitations
MB1	Many stones, but plough able
MB2	Large stones and boulders, un-plough able
MB3	Very shallow soils on rock
MB4	Lack of soil

My Notes ...

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♥ **The profile description method:**

This method is based on the Soil Survey Manual (1951) and describes the following:

- Stone size and quantity:

Stones larger than 250 mm in diameter and rock projections are grouped together since both of them have an effect on soil use, e.g. interfering with the use of agricultural machinery and dilute the soil mass.

Class 0	No stones or bedrock or too few stones to interfere with tillage
Class 1	Sufficient stones or bedrock to interfere with tillage, but not to make inter-tilled crops impracticable
Class 2	Sufficient stones or bedrock to make tillage of inter-tilled crops impracticable, but soils can be worked for hay crops or improve pasture if other soil characteristics are favourable
Class 3	Use of all but very light machinery and hand tools impracticable, forestry and grazing possible
Class 4	Use of all machinery impracticable, forestry and grazing possible
Class 5	More than 90% of the land surface covered by stones or exposed bedrock.

- Erosion

The different kinds of erosion can be described as follows:

Sheet erosion	The uniform removal of the topsoil from an area without the development of conspicuous water channels
Ribbed (rill) erosion	Removal of soil through the cutting of numerous small but conspicuous water channels
Gully erosion	Removal of soil giving rise to deep channels or gullies
Wind erosion	Removal of topsoil by wind
Different classes of erosion	
Class 1	None apparent or slight
Class 2	Moderate loss of topsoil and/or some slight dissection by runoff channels or gullies
Class 3	Severe loss of topsoil and/or marked dissection by runoff channels or gullies
Class 4	Total loss of topsoil and exposure of subsoil and /or deep intricate dissection by gullies



Please complete Activity 1.2:

Work in groups of five

You and your group want to establish a farming enterprise of your choice or as given to you by the facilitator.

Determine the criteria for site selection that you would use to select a site and the layout you would use for the enterprise.

Also indicate where you obtained the information needed to make this decision.

My Notes ...

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1.4 Basic infrastructure layout requirements

The layout of a farm is planned according to the activities that will be implemented, the structures and infrastructure required by these activities, also the natural resources and natural landscape of the area. Health regulations and the Occupational Health and Safety Act (OHS Act) must also be taken into consideration with the planning of Agricultural facilities. The list below provides a few examples of structures and infrastructure that could form part of a farm. It is impossible to provide a list that is applicable to every farming enterprise.

Layout requirements and considerations	
Access / transport	Farm produce must be transported from the farm to markets and silos while inputs are brought onto the farm. Consider the distance that must be travelled and the condition of the roads. Make sure access roads can be used in wet weather conditions to prevent damage to vehicles and produce.
Beehives	Keep away from people. Must be close to forage and water sources. Needs sheltered areas; protection from wind.
Borehole	Situated at underground water source – consider how water will be pumped to where it is needed.
Bridges	Make sure these do not interfere with wetlands. Take maximum flood levels into account. Make provision for water to flow underneath without blockage.
Compost heaps	Close to material and water source. Ease the transportation of end-product to where it will be used or sold. Facility to sieve and do the packaging.
Cattle handling facilities	Close the other cattle facilities (kraal). Ensure safe handling and movement for animals and handlers during a working (e.g. selection) process.
Dams	Preferably higher than the area to where water will be used so that water can be gravity fed. Ideal sites for catching excess rain water and to block up streams or rivers.
Electrical generator	Consider noise and length of cables. Alternative sources for electricity or heating –solar heating
Farm house	In an unproductive area, but centrally located on the farm to save on transport costs. Ideally also placed for good visibility, such as to look out for fires.
Fencing	Separating specific activities on the farm, different grazing camps and security.
Fields\lands	In areas with high productive possibilities, but consider access routes, slopes and soil types, contours and water ways
Firebreak	On the boundary where fire is likely to come from. Take legal requirements into account
Food stores	Closest to where the animals are fed. Safe from fires
Grazing	Consider the suitability of grazing areas. Divide into camps based on herds and carrying capacity. In areas where tilling (ploughing) is impossible.
Input stores	Closest to where it will be used. Consider storage requirements of materials, e.g. temperature, humidity, etc. OHS act in handling of chemicals and flammable products
Intensive food garden	If appropriate, nearest the farmhouse.
Irrigation	Access to water is crucial for success of any farm. To save on

Layout requirements and considerations

	installation costs, the use of gravity-fed systems should be exploited to the maximum to keep the need for pumps to a minimum
Milk sheds / milking parlour	Consider input requirements; electricity and water. Consider walking distance for cows to-and-from the milk sheds. Transportation of milk to dairies (e.g. Clover, Dairy Bell). Health regulations need to be obeyed
Nursery / greenhouse	Access to water, inputs, electricity. Consider transport of produce to market. Keep wind direction and temperature in mind. Bio-security
Orchard	Access to water and pack house. Consider theft and pollination. Climatic conditions need to be taken into account with some fruit cultivars. Bio-security
Pack house	Consider proximity to fields, orchards and place of production. Consider condition of the road (bruised fruit, etc.).
Poultry shed	Access to water and proximity to feed. What about slaughter options; if on site, then electricity and storage must be considered. Theft - security. Bio- very important. Health requirements
Water reservoir	How is water pumped, and how far? The longer the distance, the higher the capital and maintenance costs.
Windbreak	At right angles to the prevailing wind.
Woodlot	Keep away from fire hazards.
Workshop	Closest to where vehicles are stored. Enough space to work on farm machines. Layout and neatness according to OHS Act

v The following can influence farm layout

- ♥ The financial position of the owner
- ♥ The different farming enterprises
- ♥ The production systems used to produce a product.
- ♥ The topography of the farm
- ♥ The intensity of the system
- ♥ The climatic conditions of the farm
- ♥ The product produced
- ♥ Rules and regulations applicable to agricultural sector.

Infrastructure influence productivity, yield, cost, quality and other agricultural inputs in the following ways:

- Better infrastructure will ensure a better quality product.
- Yields can be enlarged due to the better management and application of the necessary inputs.
- The cost can be controlled as the damage to products is reduced and better infrastructure make it easier to achieve the production goals



Please complete Activity 1.3:

Work in a group

The group must assist a professional person who bought a small farm with an existing piggery and a few dairy cows close to the city.

The farm is situated on the southern slope of a hill and a small consistent stream is running through the property.

The summer rainfall is 600 mm per annum and frost occur from mid April to mid September.

A strong borehole provides water to the animals.

The arable lands are planted to kikuyu pastures and irrigated with the cleaning water from the dairy and the piggery.

Because of his love for flowers he wants to start an intensive Horticulture enterprise that produces carnations in green houses for the local flower market.

Advice him on the following

- The financial cost of the infrastructure.
- The interaction between different farming enterprises.
- The production systems used to produce cut flowers.
- The topography of the farm.
- The intensity of the system.
- The climatic conditions of the farm.
- The product that can be produced.
- Health rules and regulations applicable to the different enterprises.

1.5 Intensive or extensive and other farming systems

Intensive crop and animal systems can be defined as



Intensive farming system: An intensive farming system can be described as an integrated production enterprise where environmental conditions are controlled, feed and water is plentiful, rations are carefully balanced, excellent health control measures are in place and programs are carefully monitored and temperature, humidity and other weather influences are controlled. Large production forms a small area of land.



Examples of intensive animal production: systems are integrated poultry enterprise, integrated pig farming and large dairy operations, cattle and sheep feedlots

My Notes ...

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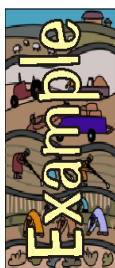


managed extensively and the animals are adapted to harsh climatic and feeding conditions.

The following is an indication of the difference between intensive and extensive system:

	Intensive system	Extensive system
The management input	Very high management input	Low management input
Area of operation	Small area	Large area
Production levels	Very high	Moderate to low
Cost	High costs High Capital investment	Less costs Low capital investment

The following are examples of extensive farming systems:



Crop farming	Animal production
Subsistent maize or sorghum production	Beef cattle on natural grazing
Dry land maize in the dryer areas of the RSA	Sheep farming in the Karoo
	Farming with goats in rural areas
	Subsistent poultry farming

v **Factors that need to be considered for intensive crop or animal production are the following:**

♥ Intensive crop farming:

Are there natural resources available e.g. water for irrigation or high rainfall

What is the condition of the soil, will it sustain intensive agricultural production

The climate of the specific area. Does the climate suit the product or must adjustments be made

Soil cultivation for optimal production, aim is to provide ideal environment for germination and growth

Choice of the correct cultivar that is capable of high production

Plant density and planting method

Scientific fertiliser program or foliar feed program

Weed and pest control programs and the use of technology to determine insect infestation or pheromones to attract pests

Precision farming with records via satellite technology

Harvesting of the product to ensure quality

Value adding to the product – washing and grading of potatoes before packing

The availability of human resources – skills of the workers

Market for the products and distance from the market

Input costs and cost of implements and equipment

♥ Animal systems:

Feeding of the animals, well balanced rations are needed to ensure fast growth

Feeding system, Total Mixed Ration (TMR) or grazing with additional concentrate feeding or intensive grazing system under irrigation.

Climate control – provision of heat or cooling

Inoculation and disease prevention

Scientific selection and breeding

Breeding system - AI or natural breeding. Cross breeding or pure breeds

Choice of the breed for the specific production

Handling facilities

Housing system and climate control

Waste disposal

Availability of water – will there be enough water for the animals?

Availability of human resources and skills level

Distance from the market and size of the market

Input cost and cost of equipment

Bio security measures

v **With extensive crop and animal production systems you need to consider the following:**

♥ Crop production

Climate and rainfall - to adjust plant density, row spacing and choice of crop

Cultivation methods to conserve moisture and to build up organic material

Cultivars choice

Inputs in relation to the expected yield

Methods to reduce the runoff of rain water and water harvesting

♥ Animal production systems

Natural resources – soil, vegetation and water

Facilities such as camps, water provision and fire breaks

Roads and other infrastructure- handling facilities at cattle or sheep posts needed to reduce the distance animals must walk to the handling facilities.

Human resources and skills level of the workers

Fences to protect the animals from predators

The use of natural shade and wind breaks for animal protection against climatic conditions

♥ Layout of the farm can influence the following:

Productivity	Poor layout can effect production negatively as it can lead to waste of energy that could be used for production. Waste of time and additional work from the labourers due to poor layout can also lead to lower productivity. Poor facilities or inadequate facilities can slow down the production process or effect it negatively
Yield	Animal comfort can effect the yield of production positively or negatively if animals experience discomfort Poor facilities can cause diseases such as mastitis and foot-rot - dairy cattle Cannibalism can develop in chicken runs and pigsties where animals are stressed
Costs	To cure foot-rot and mastitis is an additional cost Mortalities due to cannibalism or poor housing facilities cause a loss of income Animals that are not housed in correct facilities use more feed and energy and produce less
Quality of the product	Poor facilities or layout can result in damage to the products and it lowers the quality of the products Bad roads can damage fruit or vegetables Cooling facilities can improve the quality of the product The lack of electricity can effect the quality of the product if it cannot be cooled for a long period
Input costs	Input costs increase due to waste if the feeding facilities are not functioning correctly. Incorrect planters or facilities can also increase the input cost The provisioning of infrastructure is a cost that must be recovered from the product produced

My Notes ...

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Definition of aquaculture production systems



Aquaculture production systems: Aquaculture is the production of fish and other seafood products in either fresh or salt water. Aquaculture can also be defined as the growing of animals that normally lives in water. This production is done mainly in dams, either earthen or

dams constructed specifically for the purpose. The seawater production is normally done on platforms in the sea.

v **The following should be considered for the layout for an aquaculture system:**

- ♥ Stable water supply and how the oxygen level of the water will be kept at the required level
- ♥ Dams for breeding and growth of the water animals
- ♥ Slaughtering and packaging facilities for the processing of the products on the farm.
- ♥ Cold storage where processed products can be stored and the cold chain need to be maintained through the delivery process,
- ♥ Breeding dams or facility for breeding stock
- ♥ Hatchery where the eggs can be hatched and the fingerlings can grow for the first few days
- ♥ Equipment to catch the fish
- ♥ Market for the product and the type of product the market prefers.

The aquaculture systems can be very intensive or it can be done expensively in the farm dam. Aquaculture can be divided between fresh and saltwater systems.

Fresh water system	Saltwater system
Catfish farming	Avalon farming
Trout farming	Muscle farming
Koi fish farming	Scrimp farming
Crocodile farming	Ouster farming
Frog farming	
Tilapia fish farming	

Fish farming can also be used for recreation and Agric tourism, for the anglers to catch fish such as Bass, trout and other sport fish. Crocodile farms are usually a tourist's attraction.

v **Horticultural production systems:**

Horticulture is the practice of science of growing flowers, fruit and vegetables. This can be done extensively or intensively in greenhouses. Most of the fruit production areas are intensive farming systems. Systems that can be used for horticulture production are hydroponics system, rock bed systems or NTF systems, micro irrigation systems and drip irrigation systems.

The latest trend is to produce organic fruits and vegetables where only organic fertiliser is used and pest and weeds are controlled organically or biologically.

The following are some examples of products that can be produced in horticultural production systems



Flowers	Vegetables	Fruit
Roses	Tomatoes	Deciduous fruit
Carnations	Peppers	Citrus fruit
Tulips	Egg plant	Sub tropical fruit
Other Cut-flowers	Water melons, melons	
	Butternuts and other pumpkins, baby marrows, Cucumbers	
	Cabbage, Cauliflower, Broccoli and Brussels sprouts	

♥ The following need to be considered for horticultural production

Climatic conditions – warm and cold temperatures

Soil – suitability for production

Availability of water

Combination of products

Production system and production facilities needed

Market for the product and type of product required by the market

Disease and pest control



Please complete Activity 1.4:

This activity must be done on your own.

- 1) Explain the following concepts in your own words
 - Intensive production system
 - Extensive production system
 - Aquaculture
 - Horticulture
- 2) Make a poster or a mind map to illustrate the difference between intensive and extensive production systems

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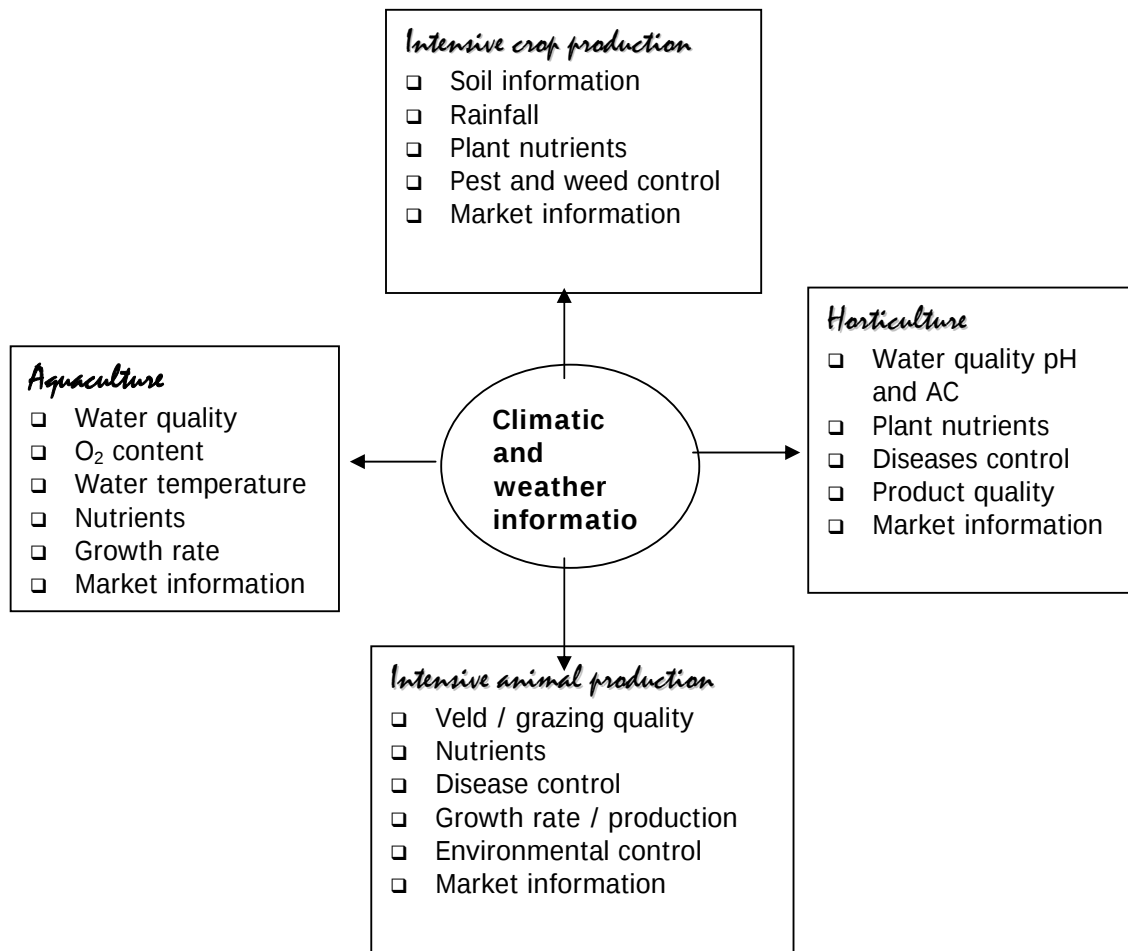
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1.6 Data collection

v Data needed for successful farm and production layout

To produce quality products it is necessary to ensure that a production system is planned, the farm-layout is suitable and that every thing possible is done to ensure a quality product.

The following data can assist with the layout and the production planning



Data is needed by management for planning and to make correct decisions. It is therefore important that the available information is correct and complete.



Please complete Activity **1.5.1**:

By using the diagram above, solve the following problems.

- How will you use data regarding the condition of natural grazing when planning the grazing camps or the camp rotation system?
- How can you use the data regarding the farm topography in planning the layout of lands and contours?
- Indicate how climatic information can influence the decision to plant horticultural crops in the eastern Free State.
- Indicate why climatic information is important for the cultivation process in the production of cash crops.
- How will water quality affect the layout of a fish farm?

v Data collection

♥ Data collection must

be accurate, guesstimates are not scientific collected data

be collected at the same intervals

be relevant

be over a specified period (a year, growth season)

use the same units

be collected at the right time (daily, weekly etc)

♥ Data can be collected using various methods

collect it yourself

use instruments e.g. Weather station, tensio-meters,

Information can be collected from the internet and satellite information

Send samples away for analysis

observations

♥ Data collection is done with various instruments

- **Thermometer** – measure temperature on a specific scale; we use Celsius as the scale with 0°C as freezing point and 100°C as boiling point, A minimum and maximum thermometer is normally used to indicate the minimum and maximum temperature of the day

A alcohol wet ball thermometer is used to determine the temperature of a fluid
Soil temperature can also be determine

- **Rain gauge** - is available in various forms; the most common one for use is a plastic cone that is erected in an area where there is no obstacles to influence the measurements

- **Tensio-meters** – measures water tension in the soil, indicating when to irrigate or not and what the water status in the soil is.

- **pH and EC meters** – this instrument is used to determine the pH – level of acidity of fluids and the electro conductivity of the fluids
- **Evaporation pan.** The evaporation pan is used to determine the daily evaporation rate of water from an open surface. This instrument is used in the scheduling of irrigation

Data collection is the recording of data on a regular basis and at the same interval to determine any changes. This recording must be accurate. In most cases the collection of data involves the writing down of information e.g. temperature and rainfall quantities.

Data collection also involves the taking of samples that need to be analysed or send away for analysis e.g., soil, water or milk samples. The purpose of this is quality control and to find information.

Parts of the plants can also be used to collect data e.g. leave analysis to determine whether the plant received enough nutrients; or fruit analysis to determine whether the product is ready for harvesting.

Animal products can be analysed to determine quality, or to determine disease infection, e.g. mastitis test in milk before milking and Somatic cell counts. Blood smears can also be taken to be observed under a microscope or blood samples send away for analysis.



Please complete Activity **1.5.2:**

Identify the following instruments and state their use

- Tensio-meter
- Rain gauge
- pH meter

Which instruments can be used to measure the following?

- The electro conductivity of water (EC)
- The compaction of soil
- The sugar level of fruit
- Evaporation

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Please complete Activity 1.5.3:

Preparation of Data relating to infrastructure development

The following data can be used to develop infrastructure, ensuring that infrastructure development is functional and that money is not wasted.

Infrastructure	Information needed
Buildings	Soil type to adjust the foundation to support the building. Movement of the soil for the foundation and to prevent the building from cracking. Daily Temperature – to design the building in such a way to neutralise extreme temperatures or make provision for heating or cooling. Type of building material to be used. Purpose of the building.
Fences	What is the purpose of the fence – Security, boundary or the fencing off of grazing camps? What must the fence control - Sheep, goats, game or cattle? Soil type - for the supports of corner posts.
Water provision	Distance to water point. Strength of the water source. Booster pumps or gravity feed? Depth of the bore hole, strength of water supply, distance it needs to be pumped - to determine the pump size. The water needs of the animals or plants.
Irrigation	Evaporation, precipitation (rainfall), transpiration from the plant, wind speed, heat, readings from tensio-meters and temperature - all this information is needed for scheduling the programme. The required quantity of water needed (per irrigation interval).
Financial information	Cost of fuel, fertiliser, herbicides and pesticides Application rate – soil fertility Hours worked and fuel consumption Repair and maintenance cost Other inputs Plant population and quantity of seed used Stock holding
Production information	Plant population and row width to make yield estimation. Calibration of planters and spraying equipment. Products harvested from specific area, land or orchard.
Roads	Ensure good quality products without bruises. Repair and maintenance cost for vehicles will be lower. The construction of access roads to production areas. To prevent erosion and should be build along the contours.



Please complete Activity 1.5.4:

Categorised Data related to infrastructure development:

Data needed for infrastructure development can be categorised as follows

Category	Data needed
Weather /climate information	Wind speed and wind direction. Temperature - minimum and maximum. Rainfall. Evaporation. Sunlight hours.
Soil information	Soil type Soil structure Organic or humus content Soil fertility Slope of the soil Topography Soil profile
Natural vegetation	Different types of vegetation Grass coverage, the quality, and the use thereof Trees and scrubs Different biomes
Land	Land type Area of land Topography
Financial data	Input costs and consumption Fuel Cultivation Fertiliser Seed Herbicides Pesticides Spraying Harvest Land preparation
Animals	Feeding cost Housing cost Breeding cost Production cost Carrying capacity Feed conversion ration (FCR), Average daily gain (ADG) Daily production per animal

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Please complete Activity 1.6:

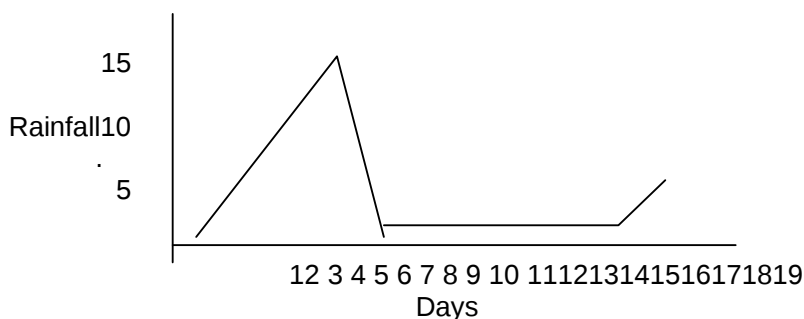
Work in a group

- Select a farming enterprise and list the data you would need to create or improve the infrastructure that can assist with the sustainability of the enterprise.
- Which data will you collect that will provide the necessary information as how to improve the quality of your product?

v Data presentation

Data must be presented in an uncomplicated and understandable way to ease management's decision-making process.

Rainfall information will be captured daily on a monthly or weekly rainfall recording sheet and can be presented in the form of a graph.



Data collected must be used to make decisions and not only collected for the sake of data collection.

Data can be presented in different formats

Format	Description	Examples
Table	Tables are used for comparisons and to show information clearly	Weekly egg production
Graph	Graphs are used to show tendencies and movement of information. Assist in conspicuous changes that might occur. Different types of graphs can be used	Daily sales of milk or daily production of cupflowers
Spread sheet	Spread sheets are used to gather large quantities of information and to record it in an orderly way.	The quantities of oranges harvested from different orchards
Poster	Provide information to everybody that want to look at the data – used for training and information.	Packing or grading % of fruit or potatoes in pack shed
Data Sheets	To be completed when data is collected - the aim is to organise the information	Recording of the quantity of fruit picked by the workers



Please complete Activity 1.7:

Farmer Baloyi employs 10 casual workers to pick his 10 ha of cotton. They agreed to work for 30c per kg picked. The workers worked for 12 days and the weight of the cotton they picked is as follows:

55 % of the cotton is clean hand picked cotton, weeds contaminated 15 % of the cotton and the rest was second grade cotton. The previous year the yield was 1200kg per ha.

Days harvested

Workers	1	2	3	4	5	6	7	8	9	10	11	12	Total
1	30	40	35	40	35	30	20	35	40	25	40	35	
2	10	15	15	15	10	15	12	15	12	10	15	15	
3	15	20	25	30	30	30	25	15	20	25	20	25	
4	25	30	25	20	15	20	20	25	20	25	25	20	
5	40	45	35	40	30	35	40	35	20	30	35	40	
6	30	40	35	40	35	30	20	35	40	25	40	35	
7	10	15	15	15	10	15	12	15	12	10	15	15	
8	15	20	25	30	30	30	25	15	20	25	20	25	
9	25	30	25	20	15	20	20	25	20	25	25	20	
10	40	45	35	40	30	35	40	35	20	30	35	40	

- Draw a line graph to show the total of the daily harvest
- Rank the workers according to their total kg's they harvested (Tabulate your answer)
- Draw a pie graph to show the grading of the cotton
- Draw a bar graph to indicate the cost of harvest and the last two years yield

Data can be processed by hand or it can be captured on a computer where it is stored and used to present information. Various new data lodgers are available to assist with the electronic capturing of data to eliminate the human factor.

This is an example of the use of data in a Piggery where an AI (Artificial Insemination) program is implemented.



The sow's inseminated date is recorded in a computer program. The following information will now be available;

Next heat date.

Possible farrowing date (giving birth).

Inoculation Program for this sow.

Feeding program.

Date when she must be prepared for farrowing.

Ubuntu farming company					
Sow no	Next heat	Possible farrowing date	Inoculations	Feeding program	Date to be prepared
06/22	22/11/07	25/02/08	E-coli – 02/02/08	2kg per day extra from 2/02/08	23/02/08

The manager of the dry sow unit can use this data to observe the sow and prepare her for farrowing; this will ease management and increase productivity and production.

The School for Bio Resources Engineering and Environmental Hydrology of the KZN University developed the ACRU model that can be used to determine the effect of water on the soil and crops. www.beeh.unp.ac.za

Other computer models are available for e.g. irrigation scheduling.



Please complete Activity 1.8:

Use your own farming enterprise (where you work) as an example and indicate

- The type of data that is collected on a daily, weekly or monthly basis
- Why is the data collected?
- How is the data collected and presented? Name the instruments used.
- How does this data assist with management? - give examples.

1.7 Service providers

Service providers, in the context of infrastructure, farm layout and enterprise selection, are people that can supply the farmer with information, services or material to provide, maintain and develop infra structure on the farm.

v Service providers can be

- ♥ Consultants that provide the farmer with advice on the lay out of the farm or enterprise selection as well as the use of different products.
- ♥ Trained agricultural engineers, or soil technicians can assist with the measuring of the farm, the planning and design of structures such as dam, roads, contours and waterways
- ♥ Technical staff to advise the farmer on irrigation design, methods and planning of the systems
- ♥ Representatives from seed, fertiliser, herbicide and pesticide companies
- ♥ Extension officers from the department of Agriculture or the Co-ops can also assist the farmer with the planning and enterprise selection
- ♥ Suppliers of material for the developing of the infra structure
- ♥ Inspectors from the department of health
- ♥ Buyers from different commodity brokers
- ♥ People that do repair and maintenance work on the farm buildings, equipment and other infra structure.

v The role of service providers

Service providers play a supportive role to support the farmer or manager in the planning of the infrastructure. They can also assist with the whole farm planning and advice on financial and marketing matters.

- ♥ What kind of information can be obtained from service providers?
 - Advice on financial matters
 - Advice on labour matters
 - Advice on mechanisation and equipment needed
 - Latest development in the production field
 - Marketing advice and quality control
 - Advice on pest and disease control with animals
 - Advice on weed and pest control in plants
 - Advice on feeding and care for animals
 - Advice on fertiliser and cultivation methods

♥ Information that should be in a database

The following information should be captured in a database of service providers.

Name of the company	
Contact details	Phone number Fax no Postal Address Physical address e-mail address web site
Name of Representative	
Contact details of rep.	Phone number Fax no Postal Address Physical address e-mail address
Products /services provided	
Previous dealings with the supplier	
Map how to get there	



Please complete Activity 1.9:

Use the small advertisements in an Agricultural weekly and complete the following activities: (Minimum of five service suppliers)

- Set up a data basis of sheep breeders
- Compile a data basis of tractor and implement suppliers
- Find 5 service suppliers that can assist you with the purchase of a standby generator
- Compile a data base of different products that can be used to control internal parasites in cattle or sheep.



Concept (SO 1)	I understand this concept	Questions that I still would like to ask
A useable and relevant database of service providers and information is compiled.		
The contribution of information on soil, climate and slope to land capability analysis and the development of a land use plan is explained.		

My Notes ...

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Session 2 Use of the land

After completing this session, you should be able to:

SO 2: Demonstrate the ability to identify high and low yield potential areas according to a range of land use options and criteria.

In this session we explore the following concepts:

- ♥ Land use plan
- ♥ Natural resources are used in a sustainable way
- ♥ Soil and water conservation included in planning process.

2.1 Land use options intensive and extensive

Intensive farming produces large quantities of food or products from a small piece of land, but need much more inputs such as water, fertiliser, facilities and management; e.g. producing vegetables in tunnels or net houses, dairy farming, piggery and feedlots. A small piece of land is thus used to achieve maximum production.

Extensive farming produces products over a large area e.g. beef cattle, sheep farming or game farming where animals are kept on natural grazing at the determined carrying capacity. Fewer inputs are needed, but so will the income also be.

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The following example can be used to explain the concept:



		Intensive	Extensive
	Grazing	Cultivated pasture under irrigation	Natural veld depending on rain water
	Camp sizes	Small with large amount of animals	Large with a relative small amount of animals
	Carrying capacity	25 sheep /ha	1 sheep on ½ ha
	Animals on 10 ha	250	20
	Input costs	Fertiliser Electricity for irrigation Irrigation equipment Fences Internal parasite control	Fences Water provision - wind mill and dam Control of predators Less control of parasites
	Income	Higher due to larger number of animals and higher lambing %	Less due to lower number of animals
	Profit	High Income less high expenses = Ave profit	Lower income less lower expenses = Ave profit (lower than intensive due to lower numbers)



Please complete Activity 2.1.

Use the following criteria to differentiate between the different farming systems

Farming system	Intensive	Extensive	Subsistent
Management inputs			
2) Capital			
3) Facilities			
4) Area used			
5) Production			

2.2 Land use plan

A land use plan is part of the production planning that must be made either for a short term (1 year) or for a long term (5 years). The farmer, with the aid of service providers or the extension officer of the DoA, can compile the land use plan. The following information must be included in the land use plan:

General Information - Where the area is situated, the name and registration no of the farm

Physical information - size of the land, history of previous crops, soil detail record of cultivation and treatments

1. Crop rotation to prevent the building up of diseases – planning how this can be implemented
2. Seed and cultivars to be planted – to keep record and to determine the best cultivars for the specific area
3. Different crops need different nutrients and should complement each other – fertiliser needed
4. Nutritional and organic material status of the soil –obtained from soil analysis and if it is done on a yearly basis the nutritional situation in the soil can be monitored.
5. Water and wind erosion – How it can be prevented and if it is present, how can the area be rehabilitated
6. Economical factors such as price of crops - supply and demand will be needed to decide which crop can be produced
7. Input costs – what is the cost of cultivation - how can the costs be reduced etc.
8. 2.10 Record keeping - records must be kept to assist with decision making process.

v **What kind of data is found in a land use plan?**

- ♥ The land use plan will contain
 - climatic or weather data
 - production data
 - financial data
 - present and historic data

v **Why is a land use plan so important in farm planning and farm layout?**

- ♥ The land use plan assists the farmer or manager with
 - The planning and budgeting - inputs that will be needed in the production process.
 - estimation of the income
 - record activities that took place - now the farmer can see what or when the different activities must be repeated
 - Planning - the correct cultivars and quantity of fertiliser.

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An example of a land use plan:



Primary Agriculture
Department of Agriculture
REPUBLIC OF SOUTH AFRICA

Version: 01

Version Date: July 2006



Land use plan - Cultivated lands 2008								
	Land 1		Land 2		Land 3		Land 4	
Land size (ha)	45.57		39.08		39.9		11.9	
Soil								
Soil Type								
- Classification								
- Depth								
- Clay %								
Sub soil								
Soil Fertility								
Organic material content								
Nutritional status								
N								
P								
K								
pH level								
Slope								
Production History	Crop	Yield	Crop	Yield	Crop	Yield	Crop	Yield
2004								
2005								
2006								
2007								
AVE yield								
Crop to be planted								
Cultivar								
Cultivation								
Primary cultivation								
Land use plan - 2008								
Page 2 of 2								
Secondary cultivation	Land 1		Land 2		Land 3		Land 4	
Planting date								
Seed used (kg)								
Row width								
Space between seed								
Plant depth								
Germination %								
Weed control								
Herbicide used								
Date	Product	Appl ic	Product	Appl	Product	Ap pl	Produ ct	Appl

[illegible]

v **How is a land use plan interpreted?**

The completed land use plan is a source document for the production planning for the next season

- It assist with crop rotation
- It assist with cultivar selection and also crop selection
- It keeps record of all activities on the land
- Assist with planning for the next season
- Assist the farmer or manager to be more effective and to save on costs

The farmer, his manager and other advisors can use the land use plan to obtain the correct information to ensure that the production process is aimed at achieving the highest yield and the best quality products at the lowest cost.



Please complete Activity 2.2

Use the farming business (where you are working) and indicate the availability of the information needed to establish a land use plan.

Use the example in the notes and see what information you can supply concerning your own or work situation.

Map or diagram of the different land areas:

Land A 20 ha	Land B 40 ha
Land C 55ha	Land D 10 ha

Crop rotation plan of UBUNTU farms
(Land utilisation for summer crops)

	Land A	Land B	Land C	Land D
Year 1	Maize	Maize	Sunflower	Sugar beans
Year 2	Maize	Sunflower	Sugar beans	Maize
Year 3	Sunflower	Sugar beans	Maize	Maize
Year 4	Sugar beans	Maize	Maize	Sunflower
Year 5	Maize	Maize	Sunflower	Sugar beans

The land use plan assists the farmer in

- Planning for cultivation
- Planning for production inputs –budget
- Planning income



Please complete Activity 2.3.

Use the information of your farming situation and

1. draw a map of the farm
2. indicate the different lands or grazing camps and other facilities
3. indicate the size of each of the areas (if the map is already available use a copy of that)
4. Indicate on the map the present use of the lands.
5. Plan for the next production season (1 year) and the next 5 years

2.3 Natural resources

Natural resources in agriculture are the soil, water, vegetation, sunlight and rainfall.

These are natural resources and can not be replaced once it is destroyed.

v Soil

Soil is the basis on which every thing is build; it is also the growth medium for plants, trees and scrubs to grow in. It is the solid part of the earth.

Soil can be divided into three main groups: sand, loam and clay soils - each with its own characteristics and qualities.

It is important to know these characteristics will influence the production process and erecting buildings on the farm.

(Look up session 2 of unit 116172 (Level 1) for further information regarding soil characteristics).

v Water and rainfall

Rainfall is the main source of water – nothing will survive without it.

Water, thus the main role-player, will ensure the success of crop production or vegetative growth.

Soil water - rainwater captured deep underneath the soil surface - is another source of water (boreholes).

Harvesting of rainwater in dams can be used to strengthen the under ground water level and can also be used for irrigation or drinking water for livestock.

Water from rivers and large dams (e.g. Loskopdam Scheme) is used for irrigation of crops.

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Harvesting of rain water

(Refer to unit 116274 for information on water harvesting.)

v **Vegetation**

Natural vegetation is the cheapest source of roughage for livestock and game. This natural vegetation must be managed with care - prevent soil erosion, do not allow over grazing - these will lead to veld deterioration and lower production. The lower production of vegetation will have a negative impact on animal production.

Veld management - one of the most important management tasks of a livestock farmer.

The farmer must know

- the composition of the veld ,
- if it is improving or deteriorating
- indicator plant species - that can indicate the condition of the veld
- the growth patterns and value of the different plants
- the grazing habits of the livestock

(Refer to unit 116303 for more detail on veld management.)

v **Sunlight and temperature**

Sunlight is necessary in the photosynthesis process and to provide the correct temperature for plants to germinate and grow.

Sunlight can be used to generate energy through solar heating and photocells. Pollution can be minimised by making more use of sunlight energy and less fossil fuels which have a negative effect on the environment.



Please complete Activity 2.4.

Make a study of your local environment and determine the following

1. Soil type, depth of the soil and the organic material content
2. The annual rainfall of the area over a period of 5 –10 years
3. The vegetation of the area
4. Indicate how the natural resources can be used to advance the agricultural production of the farm or areas



Please complete Activity 2.5.

Monitor and maintain a sustainability-based farm layout regarding innovations that have been implemented in an agricultural environment as part of a land use plan.

Work as a group and evaluate the layout of an agricultural enterprise (or the one that you are involved with) in terms of the following:

- The layout of infra structure
- The effect of the layout on the production process
- Improvements that can assist with the sustainability of the enterprise.



Concept (SO 2)	I understand this concept	Questions that I still would like to ask
Land use plans are implemented.		
The use of natural resources in a sustainable way is planned.		
Soil and water conservation processes is incorporated in a planning process.		

My Notes ...

Session 3 Maintaining the infrastructure on the farm

After completing this session, you should be able to:

SO 3: Organise and plan infrastructure maintenance tasks related to the natural resource base of a farm, including the supervision of other workers.

In this session we explore the following concepts:

- ♥ The correct tools required to execute the task and ensure that these are in a good working order, is identified.
- ♥ The necessary repairs in order of the infra structure to be working efficiently, is identified
- ♥ Clear instructions are given to supervising staff and workers - execution of instructions are monitored
- ♥ The basic requirements of a quality management system is explained

v **Tools needed for routine repair work**

Routine repair work will depend on the type of farming activities that is taking place on the farm.

Repair work can be divided into the following	
Routine repair and maintenance	The service of a tractor at regular intervals. Lubrication of equipment before and during use. Replacement of components before it can break and cause long delays.
Preventative maintenance	Before and after the production season the equipment is serviced and inspected to ensure that it is still in a good working condition.
Corrective maintenance	The immediate repair of something that broke down or replacing worn implement parts before it is used the next production season.

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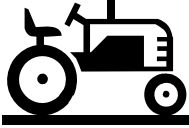
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Each of the production activities will require different tools and it will depend on the situation. A few examples can be given

Farming system	Tools needed	Use of the tools
Cattle / sheep farming 	Pair of Pliers Wire strainer Wire Plastic pipe Pipe fittings Ball valve Sheep shear Spade	To fix fences and water pipes To fix fences To fix fences and water pipes Fix water leaks Fix water leaks Replace faulty valves To cut wool in case of worm infestation or injuries To open water pipes
Crop farmer 	Spanners, hammer, screwdrivers Grease gun Welder Gas welding equipment Grinder Wheel spanner and jack Tire repair kit and equipment Compressor Oil , grease and filters	To do minor repairs Daily lubrication Repair equipment Cutting and repair of equipment Repair flat tires Lubrication and service
Irrigation	Spanners Piece of wire Spare sprayer heads ,drippers or micro-sprayers Pumps Fan belts or drive cup-links Clamps	To replace sprayer heads To open blocked sprayers To replace broken sprayers Service pumps and motors Service centre pivots, gearboxes and electric motors Fix burst main lines
Tunnel farming	Extra plastic Tape or glue Drippers Clips	Repair damaged plastic before it becomes bigger Replace drippers not working To provide stability to plants
General 	Spades Ladders Wheelbarrows Buckets Welder Angle grinder Other electric hand tools Building equipment Wood saw Picks	Moving soil or other products Repair broken equipment Building new structures

Emergency	Fire fighters, fire swatters Water carts + pump First aid box	To combat veld fires or fire in buildings
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Please complete Activity 3.1

Use your farming activity as example.

Tabulate the repairs and maintenance that need to be done and state the tools you will need to carry out routine maintenance and repairs.

3.1 Repair and maintenance schedule

It is important to follow a maintenance schedule ensuring that equipment is kept in a good running order. Service intervals must be according to the manufacturer's specifications. Remember to alter the service and maintenance intervals according to working (dusty, stony) conditions.

Pre season maintenance	Make sure the equipment is ready for use - replace worn parts, test it to ensure all components are working Service and lubricate all moving points - grease nipples Calibrate sprayers for correct application.
Maintenance during use	Daily – Lubricate, check water and oil levels , before commencement of work and after lunch break Fill with fuel at the end of the day Check tire pressure, clean air filter Clean the equipment Weekly – Check for worn parts, lubricate when it reached the required no of hours. Replace - oil and oil-, fuel- or air filters. Wash after use before parked away for the weekend or when moving from one land to the other - prevent the spreading of weeds or diseases.
Post season maintenances	Replace all worn parts Clean thoroughly Wash after use Service and lubricate before parking Store in place where it cannot be damaged Disinfect facilities such as shearing sheds or packing facilities



Please complete Activity 3.2

Use one of the activities on your farm and compile a maintenance schedule for the specific activity.

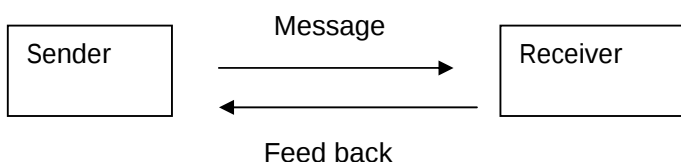
State very clearly all the actions that need to be taken.

3.2 Communication in work place

Communication is the sending of a message to a recipient that must receive, understand and act upon it.

Communication can be verbal or non verbal; uncomplicated and clear.

Ensure that the recipient receive the message correctly - avoid faulty execution of a task.



The communication system on a farm must be simple (for the sake of unskilled workers) to ensure that the activities will take place.

The communication can come about as:

- Meeting to discuss activities on daily, weekly, two weekly or monthly intervals.
- Written memos.
- Daily instructions.
- Pre-planned schedule.
- Direct communication.
- Written reports.

My Notes ...

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v **The elements of good communication**

The message must be clear and unambiguous to avoid misinterpretation.

Feedback – it is important that the “receiver” will report back to the “sender” to give account on completion of the “message”.

After inspecting the job (do-over or well done), the farmer can communicate another task to the worker – via the supervisor or directly.



Please complete Activity 3.3

Group work

As a group, play the telephone game; The first person whispers a short sentence to the next person who passes it on to the next until it is passed on to the last person in the group. The last person then informs the group what the message was that he received. The first one gives the group the original message and compare the two messages. You will be surprised!!!!

Each person must tell the group about an embarrassing situation he/ she experienced in the work place. Study the body language of the presenter and indicate how body language is a way of communicating.

3.3 *Quality-management system*

There are various models available to use and each company will develop its own system or adapt a system to suit their needs. The following is necessary in a quality management system.

- Knowledge of the product
- Performance or quality standards
- Corrective action if the standards are met
- SOP's – standard operational procedures
- Quality control
- Team work - everybody in the production line is responsible for the product's quality.

v **Knowledge of the product**

Everybody involved in the production process must be informed and aware of what exactly is expected for a product's quality. It should be a team effort and everybody involved in the process must get feedback regarding the achievement of their goals.

Every worker in the process must thus take ownership of his\her work, knowing what their contribution will be in achieving a desired product.

v **Performance or quality standards**

Every worker in an agricultural enterprise / business must know exactly what is expected from him\her and what standard of performance is required from them. To achieve this, the workers must have a clear job description and will be evaluated

according to performance standards set for a specific job. They must receive feedback on areas of improvement and/or achievement.

The workers must be informed about the consequences – a reward for good achievements or the 'backdoor' for poor performance.

♥ Corrective action if the standards are met

If the staff member do not achieve the required standards of performance a counselling or retraining activity should be put in place where the staff member is informed of his /her short comings and how it should be corrected. The person must be given a time limit for the required improvement of standards and if that is not achieved a decision about further employment must be made.

♥ SOP's – standard operational procedures

There are standard operational procedures in every business that must in place to ensure that the product produced will be of the required quality and standards. The person in charge of these procedures must be aware of these activities and must ensure that they are done timely and without fail.

The following example can be used to illustrate the concept



Activity	SOP
Cultivation of Vegetables.	Correct seedbed preparation Planting of plants or seeds Irrigation – scheduling, cleaning of filters Fertilisation Testing of water quality Disease control - preventative program Picking and treatment of products
Raising of calves	Take away from mother after 12 hours Make sure it took in sufficient colostrums in first 12 hours Daily feeding according to program Inoculations according to program Cleaning of the pens on daily basis Protection against colds or drafts

v **Quality control**

It is the duty of the manager or the supervisor to control the quality of work and the quality of the product produced. In some instances a person will be appointed with the main function of quality control and must then ensure that the desired quality is produced and standards are maintained

Some quality control systems start with the individual worker to control him\her and aim at improvement of his work. This can be achieved with recognition of excellent work. The supervisors, at different levels, are responsible for the quality control to ensure that the agreed desired outcome is achieved within the funds limits and at the lowest cost.

v Team work

Everybody in the production line, from the worker on the land to the manager or the farmer, is responsible for the quality product needed. Everybody must understand the concept of quality control and the part they play in achieving this goal.

The workers, as a team must get regular feedback (e.g. Monday morning meeting) on successes – ‘worker-of-week\month – or shortcoming and where improvements are needed. A worker must get credit for work well done to either boost his\her ego or urge them to keep on with the good work.

The team will also share in the success if the goals are achieved. It is very important that every body involved in the process feel that their contribution, how small it may be, is appreciated and valued.

Workers should also be encouraged to make suggestions or proposals to improve the production process or quality to let them feel important and part of the team. Corporate clothing, brand name and team building activities at the start or the end of the production cycle can contribute to team building

The end result - the farming unit as a whole will benefit by establishing a name or brand name on the market, resulting into higher demand and thus higher prices.



Please complete Activity 3.4

Work in a group

1. Explain to your group members how you will go about to ensure quality control in the agricultural production you are involved in.
2. How will you explain quality control to the workers on the lowest level?
3. What will you use to measure quality?
4. Compile a set of quality standards for your production enterprise.



Concept (SO 3)	I understand this concept	Questions that I still would like to ask
The correct tools required to execute tasks and ensure that these are in good working order is identified.		
The necessary repairs in order for infrastructure to be working efficiently are identified.		
Clear instructions are given to supervised staff and workers` execution of instructions is monitored.		
The basic requirements of a quality management system are explained.		

Session

4 Sustainable farm layout innovations as part of the land use program

After completing this session, you should be able to:

SO 4: Demonstrate the ability to monitor and maintain sustainability-based farm layout innovations that have been implemented in an agricultural environment as part of a land use plan.

In this session we explore the following concepts:

- ♥ Constructed infrastructure such as earth works are either repair or reported faults is monitored, as appropriate
- ♥ Accurate record of information using, but not limited to, computers, pen paper, peg board, etc, is compiled and entered in formats such as tables, graphs, simple markings.

4.1 Repair and maintenance to constructed infrastructure

Constructed infrastructure normally has a long productive period and routine maintenance must be done to prevent deterioration.

These facilities must thus be inspected on a regular basis and the founding recorded. A scheduled inspection program must be in place to ensure that maintenance and/or repairs are done in good time.

Ubuntu farms maintenance schedule of infrastructure							
	2007	2008	2009	2010	2011	2012	2013
1) Roads grade and repair	X	X	X	X	X	X	X
2) Roads re-gravel and build up.			X				X
3) Paint farm buildings outside	X						X
4) Paint pack shed and equipment		X				X	
5) Maintain contours and waterways			X				X

v Prevention of erosion

Water and wind erosion can be prevented in various ways. Wind erosion can be prevented by leaving vegetative matter as a ground cover on the soil's surface. Windbreaks can also be used to prevent wind erosion. Natural wind breaks such as trees, scrubs and tall grass or a constructed windbreak from wooden poles and shade netting can be used. Lands that are compacted by heavy rain can also be loosened with a tine implement and it will stop the wind erosion.

Grazing must not be over utilised leaving bare areas where the top soil can be blown away with strong winds - always leaving some plant material for protection.

♥ Water erosion

Water erosion occurs in lands, along roads and waterways. The force of strong running water initially washes the topsoil away and if no preventing measures are taken, it will end up in a donga. Precautionary measures to prevent erosion:

- Water must flow in the natural direction with the contours of the land.
- The contour ridges in the lands must rectify the slope angles to slow down the water flow.
- The lands must be planned in such a way that the contours deposit the water into a water way (with grass covering) to take the water out of the lands.
- Contours, roads and water ways must be maintained and ensure that there is good grass covering to slow down the water flow.

4.2 Structures to prevent erosion

v **Bare areas**

Areas without natural vegetation need to be camped off to prevent activities, other than precautionary measures, to occur.

Use a single tine ripper and rip across the bare patch to break the flow of water.

Implant seed or seedling in the loosened rows to regain a ground jacket.

v **Steep slopes**

Strips of grass or other vegetation can be planted and make small erosion barriers with shade cloth\nets to assist with keeping the vegetation in place.

v **Waterways**

Silt dams can be constructed to slow down the water and allow the silt to be deposited; eventually the dam will fill up and stop the erosion.

Reeds or bamboo can also be used to slow down the water flow.

Wire baskets can be filled with rocks and placed as an embankment to create a weir that will slow down the water and allow silt to be deposited.

Run-off water from the catch-up areas can be embanked in a small dam and the overflow running into another small dam etc.

A large dam, if allowed by topography, can be build and the water used for irrigation.



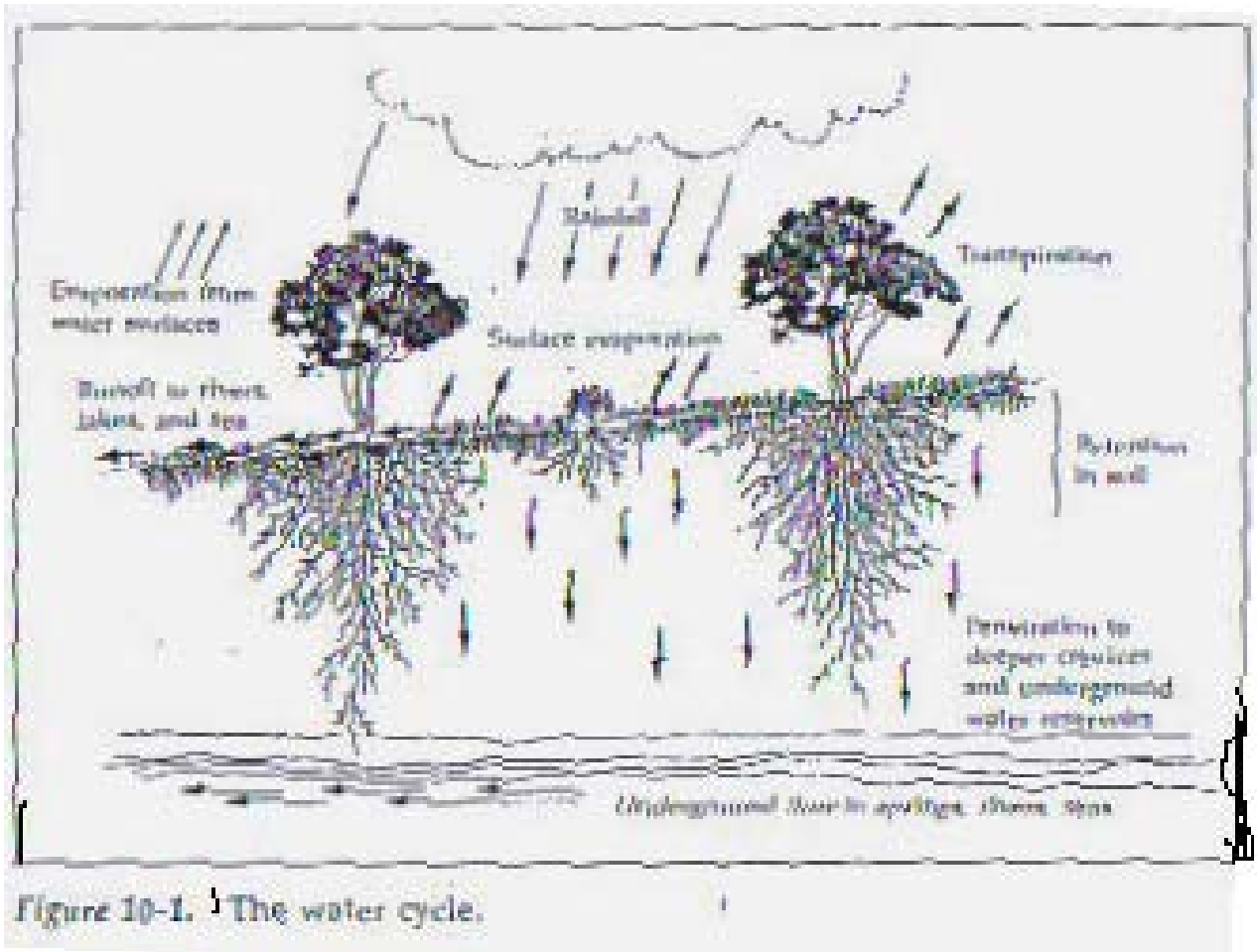
Please complete Activity 4.1.

1. Investigate the different possibilities of harvesting rain water at your farm and can it be done at the workers houses?
2. Present your proposal to the group.
3. Combine all the proposals and work out a master plan for the farm to harvest the rainwater and use it to produce vegetables and flower gardens.

4.3 Improvement of water absorption of the soil

The availability of water to soil can be increased by taking steps to increase the water absorption and retention of soil.

- Increase the organic material content of the soil - it improves the water holding capacity
- Leave Stover or plant material on the soil to prevent the run off of rain water.
- Certain cultivation practices assists with the water absorption and the prevention of evaporation.
- Make contours to slow down run off water, allowing more time for water absorption.
- Plant covering - assist soil to minimise evaporation.



4.4 Eradication of alien plants

Alien plants such as blue gum and black wattle trees use a tremendous quantity of water. The abolition of these plants along streams and in the catchments areas of rivers and dams will reduce the competition and the use of water.

A plant's water-need will vary in different seasons, production stages of the plant and the soil type. The crop farmer must ensure that he chooses the correct cultivars for his area and that he keeps the drought resistance of the cultivars or type of plant in mind.



Please complete Activity 4.2.



Concept (SO 4)	I understand this concept	Questions that I still would like to ask
Constructed infrastructure such as earth works and either repair or report faults is monitored, as appropriate.		
Accurate record of information using, but not limited to, computers, pen and paper, peg board, etc., is compiled and entered in formats such as tables, graphs, simple markings, etc.		

My Notes ...

Am I ready for my test?

- ♥ Check your plan carefully to make sure that you **prepare in good time**.
- ♥ You have to be found **competent** by a qualified **assessor** to be declared competent.
- ♥ Inform the assessor if you have any **special needs** or requirements **before** the agreed date for the test to be completed. You might, for example, require an interpreter to translate the questions to your mother tongue, or you might need to take this test orally.
- ♥ Use this worksheet to help you prepare for the test. These are **examples of possible questions** that might appear in the test. All the information you need was taught in the classroom and can be found in the learner guide that you received.

1. ***I am sure** of this and understand it well*
2. ***I am unsure** of this and need to ask the Facilitator or Assessor to explain what it means*

Questions	1. I am sure	2. I am unsure
Identify the following situations on the farming business where you are working and propose suggestions on how these problems can be solved; • Areas where water erosion can occur or is occurring. • Areas where alien plants are affecting the water flow. • The effect of wind erosion on the crops and soil.		

Checklist for practical assessment ...

Use the **checklist** below to help you prepare for the part of the practical assessment when you are observed on the **attitudes** and **attributes** that you need to have to be found competent for this learning module.

Observations	Answer Yes or No	Motivate your Answer (Give examples, reasons, etc.)
Can you identify problems and deficiencies correctly?		
Are you able to work well in a team?		
Do you work in an organised and systematic way while performing all tasks and tests?		
Are you able to collect the correct and appropriate information and / or samples as per the instructions and procedures that you were taught?		
Are you able to communicate your knowledge orally and in writing, in such a way that you show what knowledge you have gained?		
Can you base your tasks and answers on scientific knowledge that you have learnt?		
Are you able to show and perform the tasks required correctly?		
Are you able to link the knowledge, skills and attitudes that you have learnt in this module of learning to specific duties in your job or in the community where you live?		

- ♥ The assessor will complete a checklist that gives details of the points that are checked and assessed by the assessor.
- ♥ The assessor will write commentary and feedback on that checklist. They will discuss all commentary and feedback with you.
- ♥ You will be asked to give your own feedback and to sign this document.
- ♥ **It will be placed together with this completed guide in a file as part of your portfolio of evidence.**
- ♥ The assessor will give you feedback on the test and guide you if there are areas in which you still need further development.

Paperwork to be done ...

Please assist the assessor by filling in this form and then sign as instructed.

Learner Information Form				
Unit Standard	116309			
Program Date(s)				
Assessment Date(s)				
Surname				
First Name				
Learner ID / SETA Registration Number				
Job / Role Title				
Home Language				
Gender:	Male:		Female:	
Race:	African:	Coloured:	Indian/Asian:	White:
Employment:	Permanent:		Non-permanent:	
Disabled	Yes:		No:	
Date of Birth				
ID Number				
Contact Telephone Numbers				
Email Address				
Postal Address			Signature:	

Bibliography

v World Wide Web:

www.beeh.unp.ac.za

www.agis.agric.za

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SOUTH AFRICAN QUALIFICATIONS AUTHORITY REGISTERED UNIT STANDARD:

Implement integrated farm layout and site selection

SAQA US ID	UNIT STANDARD TITLE		
116309	Implement integrated farm layout and site selection		
SGB NAME	NSB	PROVIDER NAME	
SGB Primary Agriculture	NSB 01-Agriculture and Nature Conservation		
FIELD		SUBFIELD	
Agriculture and Nature Conservation		Primary Agriculture	
ABET BAND	UNIT STANDARD TYPE	NQF LEVEL	CREDITS
Undefined	Regular	Level 4	3
REGISTRATION STATUS	REGISTRATION START DATE	REGISTRATION END DATE	SAQA DECISION NUMBER
Registered	2004-10-13	2007-10-13	SAQA 0156/04

PURPOSE OF THE UNIT STANDARD

A learner achieving this unit standard will be able to contribute to the natural resource data gathering process, assist in determining the most appropriate and sustainable land-use for different parts of the land, supervise the implementation and maintenance of the selected infrastructure and maintain the most appropriate land-use on a farm by continuously assessing the natural resource base.

LEARNING ASSUMED TO BE IN PLACE AND RECOGNITION OF PRIOR LEARNING

It is assumed that a learner attempting this unit standard will demonstrate competence against the unit standards or equivalent:

- NQF 3: Assist in farm planning and layout for conservation and rainwater harvesting.
- NQF 3: Monitor and supervise a food safety and quality management system in the agricultural supply chain.

UNIT STANDARD RANGE

Whilst range statements have been defined generically to include as wide a set of alternatives as possible, all range statements should be interpreted within the specific context of application.

Range statements are neither comprehensive nor necessarily appropriate to all contexts. Alternatives must however be comparable in scope and complexity. These are only as a general guide to scope and complexity of what is required.

UNIT STANDARD OUTCOME HEADER

N/A

Specific Outcomes and Assessment Criteria:**SPECIFIC OUTCOME 1**

Prepare and categorise collected and recorded information in an agricultural environment to support the infrastructure development of an agricultural enterprise.

OUTCOME RANGE

Infrastructure development may refer to intensive or extensive crop and animal systems, as well as aquaculture and/or horticultural production systems. Data could be collected in a range of forms that include computer, pen and paper, peg board, diagrams, comprehensive farm plans, etc. and can be entered in formats such as tables, graphs, simple markings, maps, etc. Service providers in the agricultural environment include government, non-government, parastatal or other organisations, which render services related to the sustainable use of natural resources.

ASSESSMENT CRITERIA**ASSESSMENT CRITERION 1**

A useable and relevant database of service providers and information is compiled.

ASSESSMENT CRITERION 2

The contribution of information on soil, climate and slope to land capability analysis and the development of a land use plan is explained.

SPECIFIC OUTCOME 2

Demonstrate the ability to identify high and low yield potential areas according to a range of land use options and criteria.

OUTCOME RANGE

The land use options may refer to intensive or extensive crop and animal systems, as well as aquaculture and/or horticultural production systems.

ASSESSMENT CRITERIA**ASSESSMENT CRITERION 1**

Land use plans are implemented.

ASSESSMENT CRITERION 2

The use of natural resources in a sustainable way is planned.

ASSESSMENT CRITERION 3

Soil and water conservation processes is incorporated in a planning process.

SPECIFIC OUTCOME 3

Organise and plan infrastructure maintenance tasks related to the natural resource base of a farm, including the supervision of other workers.

OUTCOME RANGE

Routine tasks may include the repair of items such as roads, fencing, rainwater harvesting structures, and the equipment required to execute such tasks. It may also include the supervision of staff and the setting

up of monitoring systems.

ASSESSMENT CRITERIA**ASSESSMENT CRITERION 1**

The correct tools required to execute tasks and ensure that these are in good working order is identified.

ASSESSMENT CRITERION 2

The necessary repairs in order for infrastructure to be working efficiently is identified.

ASSESSMENT CRITERION 3

Clear instructions are given to supervised staff and workers` execution of instructions are monitored.

ASSESSMENT CRITERION 4

The basic requirements of a quality management system is explained.

SPECIFIC OUTCOME 4

Demonstrate the ability to monitor and maintain sustainability-based farm layout innovations that have been implemented in an agricultural environment as part of a land use plan.

OUTCOME RANGE

The maintenance and monitoring includes but is not restricted to soil erosion prevention measures, soil management strategies and rainwater harvesting and management innovations.

ASSESSMENT CRITERIA**ASSESSMENT CRITERION 1**

Constructed infrastructure such as earth works and either repair or report faults is monitored, as appropriate.

ASSESSMENT CRITERION 2

Accurate record of information using, but not limited to, computers, pen and paper, peg board, etc., is compiled and entered in formats such as tables, graphs, simple markings, etc.

UNIT STANDARD ACCREDITATION AND MODERATION OPTIONS

The assessment of qualifying learners against this standard should meet the requirements of established assessment principles.

It will be necessary to develop assessment activities and tools, which are appropriate to the contexts in which the qualifying learners are working. These activities and tools may include an appropriate combination of self-assessment and peer assessment, formative and summative assessment, portfolios and observations etc.

The assessment should ensure that all the specific outcomes; critical cross-field outcomes and essential embedded knowledge are assessed.

The specific outcomes must be assessed through observation of performance. Supporting evidence should be used to prove competence of specific outcomes only when they are not clearly seen in the actual performance.

Essential embedded knowledge must be assessed in its own right, through oral or written evidence and cannot be assessed only by being observed.

The specific outcomes and essential embedded knowledge must be assessed in relation to each other. If a qualifying learner is able to explain the essential embedded knowledge but is unable to perform the specific outcomes, they should not be assessed as competent. Similarly, if a qualifying learner is able to perform the specific outcomes but is unable to explain or justify their performance in terms of the essential embedded knowledge, then they should not be assessed as competent.

Evidence of the specified critical cross-field outcomes should be found both in performance and in the essential embedded knowledge.

Performance of specific outcomes must actively affirm target groups of qualifying learners, not unfairly discriminate against them. Qualifying learners should be able to justify their performance in terms of these values.

- Anyone assessing a learner against this unit standard must be registered as an assessor with the relevant ETQA.
- Any institution offering learning that will enable achievement of this unit standard or assessing this unit standard must be accredited as a provider with the relevant ETQA.
- Moderation of assessment will be overseen by the relevant ETQA according to the moderation guidelines in the relevant qualification and the agreed ETQA procedures.

UNIT STANDARD ESSENTIAL EMBEDDED KNOWLEDGE

The person is able to demonstrate a basic knowledge of:

- The different options applied in land use.

Intermediate Knowledge

The person is able to demonstrate a basic knowledge of:

- The differentiations between high and low yield aspects of a landscape.
- Methods of data gathering and information presentation (e.g. graphs, etc.).
- The sustainable use of natural resources in an agricultural environment.
- The causes and consequences of soil erosion.

UNIT STANDARD DEVELOPMENTAL OUTCOME

N/A

UNIT STANDARD LINKAGES

N/A

Critical Cross-field Outcomes (CCFO):

UNIT STANDARD CCFO IDENTIFYING

Problem Solving: relates to specific outcomes:

- Organise and plan maintenance tasks related to the natural resource base of a farm, including the supervision of other workers.
- Monitor and maintain sustainability-based farm layout innovations that have been implemented in an agricultural environment as part of a land use plan.

UNIT STANDARD CCFO WORKING

Teamwork: relates to specific outcomes:

- Prepare and categorise collected and recorded information in an agricultural environment that informs the infrastructure development of an agricultural enterprise.
- Organise and plan maintenance tasks related to the natural resource base of a farm, including the

supervision of other workers.

UNIT STANDARD CCFO ORGANIZING

Self-management: relates to all specific outcomes.

UNIT STANDARD CCFO COLLECTING

Interpreting Information: relates to all specific outcomes.

UNIT STANDARD CCFO COMMUNICATING

Communication: relates to specific outcomes:

- Prepare and categorise collected and recorded information in an agricultural environment that informs the infrastructure development of an agricultural enterprise.
- Demonstrate the ability to identify high and low yield potential areas according to a range of land use options and criteria.
- Organise and plan maintenance tasks related to the natural resource base of a farm, including the supervision of other workers.

UNIT STANDARD CCFO SCIENCE

Use Science and Technology: relates to specific outcomes:

- Prepare and categorise collected and recorded information in an agricultural environment that informs the infrastructure development of an agricultural enterprise.
- Organise and plan maintenance tasks related to the natural resource base of a farm, including the supervision of other workers.
- Monitor and maintain sustainability-based farm layout innovations that have been implemented in an agricultural environment as part of a land use plan.

UNIT STANDARD CCFO DEMONSTRATING

The world as a set of related systems: relates to specific outcomes:

- Demonstrate the ability to identify high and low yield potential areas according to a range of land use options and criteria.
- Organise and plan maintenance tasks related to the natural resource base of a farm, including the supervision of other workers.
- Monitor and maintain sustainability-based farm layout innovations that have been implemented in an agricultural environment as part of a land use plan.

UNIT STANDARD CCFO CONTRIBUTING

Self-development: relates to all specific outcomes.

UNIT STANDARD ASSESSOR CRITERIA

N/A

UNIT STANDARD NOTES

N/A

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