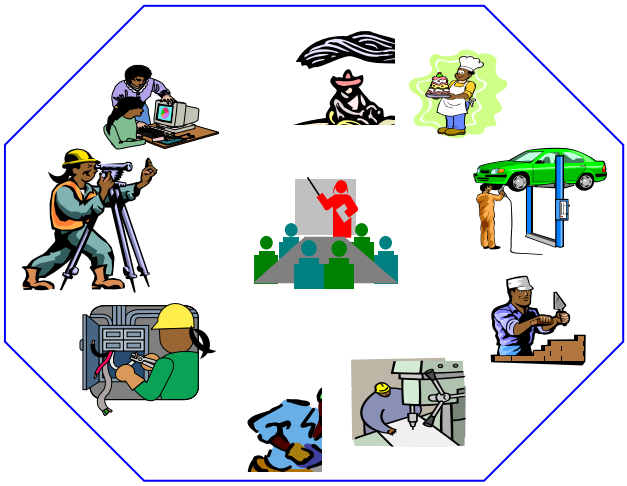
Natural Resources Conservation and Development

LEVEL IV

Based on March, 2018, Version 3 Occupational standards



Module Title: Coordinate Natural Resources Infrastructure Development and Maintenance

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Table of Contents

LG #38	LO #1- Determine infrastructure requirements

Instruction sheet

This learning guide is developed to provide you the necessary information regarding the following content coverage and topics:

- Accessing Information
- Confirming Characteristics of the land.
- Identifying and accessing data.
- Collecting Information.
- Considering organizational requirements.
- Identifying and comparing the analyzed information.
- Identifying OHS hazards, assessing risks and incorporating controls.
- Collecting Detail informations

This guide will also assist you to attain the learning outcomes stated in the cover page. Specifically, upon completion of this learning guide, you will be able to:

- Access Information
- Confirm the characteristics of the land.
- Identify and access data.
- Collect Information.
- Know how to consider organizational requirements.
- Identify and compare the analyzed information.
- Identify OHS hazards, assess risks and incorporate controls.
- Collect detail informations

Learning Instructions:

1. Read the specific objectives of this Learning Guide.
2. Follow the instructions described below.
3. Read the information written in the “Information Sheets”. Try to understand what are being discussed. Ask your trainer for assistance if you have hard time understanding them.
4. Accomplish the “Self-checks” which are placed following all information sheets.
5. Ask from your trainer the key to correction (key answers) or you can request your trainer to correct your work. (You are to get the key answer only after you finished answering the Self-checks).
6. If you earned a satisfactory evaluation proceed to “Operation sheets
7. Perform “the Learning activity performance test” which is placed following “Operation sheets” ,
8. If your performance is satisfactory proceed to the next learning guide,
9. If your performance is unsatisfactory, see your trainer for further instructions or go back to “Operation sheets”.

Information Sheet 1- Accessing Information

1.1. Definitions of terms

Infrastructure is a term architects, engineers, and urban planners use to describe essential facilities, services, and organizational structures for cities and communities. Infrastructure includes:

- Roads and bridges
- Air control towers
- Telephone lines and cell phone towers
- Dams, reservoirs, and sewers
- Electrical lines
- Fire stations and equipment
- Hospitals, clinics, and emergency response systems
- Schools
- Law enforcement and prisons
- Sanitation and waste removal
- Post offices and mail delivery

The major infrastructural factors that are most significant in accelerating the ecotourism development are:

- Transport(park road)
- Park entry
- Communication(telecommunication)
- Visitor parking
- Day-use areas
    - ✓ Waste treatment
    - ✓ Energy for lighting, heating,
    - ✓ Information Area or Lobby
    - ✓ Restrooms
    - ✓ Drinking fountains
    - ✓ Benches or appropriate seating areas
    - ✓ Food and drink services
    - ✓ Toilet
    - ✓ Camp sites
- Walkways
- Orientation and Way finding
- Outdoor or Onsite Areas

Transport

- Roads give visitors access further in to the park environment.

Entry

- Road design should follow natural contours and respect topography and landscapes.
- Design should help slow entering vehicles and heighten awareness of surroundings.
- Road and entrance signs should be unified with those onsite, reflect the visitor center's overall theme(s)

Parking

- Parking lot placement should not impinge on the visitor center building and should allow for transitional passage to the center.
- Service and emergency entrances and drives should be screened or routed to minimize visual impacts.
- Main parking lots should provide natural shading and landscaping that is consistent with landscaping throughout the rest of the site.
- Lighting should be modest; it should provide for safety but avoid light spillover. Lighting should be sufficient to light trails or walkways to and from visitor center and parking areas.

Walkways

- Walkways from the parking areas to the visitor center should be visible or clearly indicated. A view of the visitor center is desirable.
- Walkways to the visitor center and around the site need to consider visitor capacity and scale,
- A view of the visitor center entry should be clear from major walkways.

Orientation and Way finding

- Telephones should be provided for emergency use. Public telephones should be clearly signed and meet the technical standards for persons with hearing impairments.
- Orientation maps and instructions for site use should be provided
- . Way finding signs should be placed near the entrance to an area and should be on an accessible route for persons with mobility impairments

Outdoor or Onsite Areas

- In almost all cases, the visitor experience extends beyond the visitor center. Providing transition areas outdoors to enhance the visitor experiences is essential

Transportation systems and public utilities are essential for the economic vitality of our businesses and communities, the conservation of fuel and other natural resources, and the

comfort and safety of residents and visitors. On the most basic level, every community requires access to clean water and sanitary waste disposal.

1.2. Assessing products

The study of product and thus for consequential market requirements assessments, the availability of market data is essential. We have therefore investigated the current availability of market data, and have come to the conclusion that availability is a minor problem compared to the availability of characteristics of the products.

Product properties may be divided in three groups depending on their importance:

- **Obligatory properties: -** that the product must have in order to be at all considered as a relevant alternative. Example: A beverage container must not leak.
- **Positioning properties: -** that are considered nice to have by the customer and which may therefore position the product more favorably with the customer, relative to other products with the same obligatory properties.
    - Example: A beverage container may be more or less easy to handle.
- **Market-irrelevant properties**: - that do not play a role for the customer's preferences. Example: A (refillable) beverage container may be more or less easy to clean. The obligatory properties determine substitutability and are related to market segmentation. Positioning properties may influence the extent to which a potential substitution is actually and may – together with the market-irrelevant properties - determine the amount of substituted product or the interaction with other product systems.

The same product property may be placed in different groups on different markets

For a product substitution to be possible, the obligatory properties must be present. Only when these demands are met, the positioning properties can influence the willingness of the customer to switch from one product to another.

- Product properties may be related to:
    - ✓ Functionality, related to the main function of the product
    - ✓ Technical quality, such as stability, durability, eases of maintenance
    - ✓ Additional services rendered during use and disposal
    - ✓ Aesthetics, such as appearance and design
    - ✓ Image (of the product or the producer)
    - ✓ Costs related to purchase, use and disposal
    - ✓ Specific environmental properties

  Functionality, aesthetics, and image characterize the primary services provided to the user. Technical quality and additional services ensure the primary services during the expected duration of these.

1.3. Assessing market

- Markets are typically differentiated
  - ✓ Geographically,
  - ✓ Temporally, and
  - ✓ In customer segments

Thus, each has their own uniform set of preferences and demands for product properties.

The geographical segmentation of markets may be determined by differences in:

- Natural geography (climate, landscape, transport distances etc.),
- Regulation or administration (regulation of competition and market transparency, legislative product requirements, product standards, taxes, subsidies)
- Consumer culture.

Temporal segmentation of markets is common for service products (e.g. peak hours and night hours in electricity consumption, rush hours in traffic and telecommunication, seasons in the tourist industry). For physical goods, markets are generally only segmented temporally when adequate supply or storage capacity is missing, either due to the nature of the product or due to immature or unstable markets, as has been seen for some recycled materials. of the market segments separately and not allow for comparisons.

Self-Check – 1	**Written test**

Name …… ID…… Date…….

Direction: Answer all the questions listed below. Illustrations may be necessary to aid some explanations/answers. (3.5 points each)

1. Discuss briefly the readiness assessment
2. What is the purpose of setting monitoring period
3. Discus briefly the importance of outcomes

You can ask you teacher for the copy of the correct answers.

Note: Satisfactory rating - 5 points Unsatisfactory - below 5 points

Information Sheet 2- Confirming Characteristics of the land

2.1. Introduction

Land has two sets of environmental attributes: natural and man-made. The spatial unit of data collection must fit the purpose of the analysis .For instance , we need watershed data for drainage design, and "corridor" and "patch" data for habitat protection. The time-line of

the data collection must also fit the purpose of the analysis. For instance, we need base-line data for environmental quality control, and life-cycle data for infrastructure planning. It tracks nationally significant environmental issues using a stress-condition-response model. These include Ecological Life-Support Systems (ozone depletion, climate change, toxic contaminants in the environment, acid rain, etc.), Human Health and Well-Being (forest area air quality, municipal water use and waste water treatment, etc.), National Resources Sustainability (forest areas, marine resources, agricultural resources, etc.), and Pervasive Influencing Factors (passenger transportation, energy consumption, solid and hazardous waste generation, forest areaization, etc.).

2.2. Identifying the existing land

1. Soil and Geology. They determine the resource value (capability to support agriculture, forest area and plant life) and development value (bearing area, drainage and filtering area, and use as construction material) of land. They can also be hazard factors (susceptibility to erosion, slides and collapse, corrosivity, transportation and retention of pollutants, etc.)

2. Topography and Slope. They determine surface drainage patterns, solar aspects, view sheds, and site formation requirements. The gradient of a slope is the ratio between the vertical rise and the horizontal distance, and is expressed as a percentage. For instance, a rise of five feet over a distance of 100 feet is a 5% gradient. Incidentally, a gradient of less than 5% is considered gentle, and is suitable for most land uses. Any gradient exceeding 25% is considered too steep for most uses. Maximum sustained gradient for roads is about 10%. The top of a slope is the drainage divide, which forms the boundary of a drainage basin, and is an essential piece of planning information. Topography also affects the amount and duration of sunlight that a site can get at different times of the year, as well as the views (good and bad) that can be seen from the site. Topographic maps can be based on aerial photographs as well as ground surveys.

2. Cover and Vegetation. Plants hold soil, absorb water, modulate microclimate, and have aesthetic value. Plant cover can act as index of soil conditions (drainage, acidity and humus content) as well as weather conditions (temperature, sunlight, moisture and wind). Data on local flora are usually available from local sources, such as universities, colleges, horticultural societies, etc.

Often a municipality requires the development application for a large site to provide a detail inventory of vegetation (especially mature trees), as well as conservation or remedial measures. In general, local species and planting of mixed age are preferred. It is important to think of the site's ecology and future.

2.3. Identifying water sources

1. Surface Streams and Lakes Surface streams and lakes (and underground aquifer) supply our fresh water, and receive our runoffs and wastewater (sometimes treated and sometimes not). The amount and quality of water are essential determinants of land use potential. Streams and lakes also provide for our transportation and recreation. As well, they moderate climatic extremes and provide views and visual relief. They can be damaged by human activities such as dredging, shoreline modification, effluent discharge from point sources (e.g., wastewater treatment plants) and nonpoint sources (e.g., forest area runoff), and eutrophication (through agricultural or septic runoff). But they are also responsible for flooding, soil erosion, and transport and retention of pollutants.

2. Floodplains and Wetlands. Floodplain information is essential for the protection of life and property. Most communities have floodplain maps, usually based on a hypothetical one-in-a-hundred-years flood event. They are the basis for insurance coverage as well as zoning control. Floodplain maps usually make a distinction between flood channel (where absolutely no structure is permitted) and flood fringe (where some structures and uses may be allowed). Wetland loss has now been recognized as a major environmental problem. Wetlands provide for ground water recharge, wildlife habitats, forest area runoff quality control, as well as recreational and educational opportunities. In most cases, planners have to develop their own local information base.

2.4. Identifying the climatic condition

Land use planning does not deal directly with big climatic issues such as acid rain, ozone depletion, global warming, etc., although the cumulative results of land use decisions may be significant (such as the relationship between subforest area sprawl and auto-emission). However, some land use decisions require specific information. For instance, data on wind-direction and speed are needed for the siting of "smoke-stack" industries, sun-path data for passive solar energy use, and rainfall data for runoff and drainage design.

More important to land use planning is microclimate. There are six interrelated factors: temperature, humidity, precipitation, cloudiness, wind speed and direction, and sun path. Together, they affect people's comfort level. A combination of about 70-80 degrees Fahrenheit (21-27 degrees Celsius), 20%-50% relative humidity, and a wind speed of 50-100 feet (15-30 metres) per minute, would be considered very pleasant. Of course, much depends on the experience, cultural background and degree of activity of the inhabitants. Planners need meteorological information on all these factors.

Equally importantly is the information on topography, vegetation and built form because these affect the microclimate significantly. Topography affects the amount of sunlight and air movement. A south-facing slope will get more sun; air moves faster on a crest than on flat ground; cold air comes down to a valley at night; and afternoon breezes come up the slope from a water body. People generally prefer to live on a south or southeast slope, near water, and on the upper or middle slope. Ground cover can modify the microclimate by altering the surface, increasing the areas of radiation and transpiration, providing shades, acting as air breaks or air traps. Generally, vegetation makes a cooler, more humid and more stable microclimate. Buildings affect air movements (air tunnels, wind shafts, etc), radiation, sunlight, and shades. But the relationship between forest area buildings and microclimate is very complex and there are no general rules.

2.5. Identifying the existing habitats

Habitats (for both plants and animals) provide food and other renewable resources. They are an important component of natural processes such as the water cycle, nitrogen cycle, and carbon cycle. They moderate and mitigate natural hazards, and often have aesthetic and heritage values. On the other hand, they can pose health hazards (poisonous or disease-carrying species etc.) and injury and damages (falling trees, forest area fires, etc.).

Land use decisions affect the welfare of "endangered" or "threatened" species. The landscape can be viewed as a mosaic of habitats ("corridors", "patches", or "islands"). Different species require habitats of different minimum sizes and optimal shapes. But habitats usually coincide with streams and wetlands.

Self-Check – 2	**Written test**

Name …… ID…… Date…….

Directions: Answer all the questions listed below. Illustrations may be necessary to aid some explanations/answers. (2.5 points each)

1. Define and explain the difference between soil texture and soil structure.
2. Create a table that lists the sizes for sand, silt, and clay particles using USDA criteria.
3. What is a textural triangle?
4. What is the typical range of bulk density values for mineral soils? What is the range of bulk density values for an organic soil?

You can ask you teacher for the copy of the correct answers.

Note: **Satisfactory rating - 5 points** **Unsatisfactory - below 5 points**

Information Sheet 3-Identifying and accessing data

3.1. Reviewing planning standards

In Infrastructural planning much reliance is placed on the use of standards. This is unavoidable because professionals seldom have the time or inclination to return to basic analysis in their day-to-day functions. They rely on standards to assist them to make the right decisions.

Most standards were based on physical, social, economic and technological contexts of the past, which were different from the ones in which they are applied. Much more systematic study of the context-standards relationship is needed to gain insight into the process of standard formulation and develop a theoretically defensible framework to compare alternative standards as well as to formulate new ones. Only then will planners become more efficient in

the use of land and more responsive to changing user needs, market conditions, and technological advances.

In particular, the following contextual elements are crucial: environmental, climatic, and physical conditions, market pressures, consumer preferences, technological factors, institutional and administrative factors, the influence of tradition and convention, and the event that precipitated the establishment and/or change of the standards. Finally, there is the question of conflicts and incompatibility among standards. For instance, density standards to ensure sufficient space and privacy may produce Infrastructural patterns that are spread out.

On the other hand, service accessibility standards based on minimum distance and time may require development to be closer together. These two sets of standards conflict with each other, and trade-offs or priorities have to be set. In our discussion we will often refer to standards, especially the more established ones. But we should realize that while standards are unavoidable, their use must be guided by caution and sensitivity. What follows is a systematic discussion of the analytic considerations in the siting and sizing of different land uses.

Self-Check – 3	Written test

Name…… ID…… Date…….

Directions: Answerthe question listed below. Illustrations may be necessary to aid some explanations/answers. (2 point each)

1. Describe briefly the major element of soil chemical properties
2. Elaborate briefly PH
3. Define Cation Exchange Capacity
4. Write the importance of CEC

You can ask you teacher for the copy of the correct answers.

Note: Satisfactory rating - 5 points Unsatisfactory - below 5 points

Information Sheet 4 –Collecting Information

4.1. Making balance between economic, community and ecological development

An individual's well being depends on meeting the individual's basic physical and economic needs.

- The needs of future generations are as important as the needs of the current generation.
- There has to be fair distribution of costs and benefits of resource use.
- Waste discharges should not exceed the area of the ecosystem to process them.
- Use of renewable resources should be within the area of the ecosystem to regenerate them.
- Minimize the use of non-renewable resources — minimize use, reuse, recycle and seek substitutes.
- Increase Infrastructural efficiency by reducing sprawl and encouraging compact development.
- Aim at long-term economic development.
- Diversity in the economic, biological and cultural domains of an forest area system increases its ability to adapt to change.

There are three types of indicators.

Environmental quality These measure the connectivity and productivity of the landscape, such as species viability, open space conservation, and environmental conditions of water, air and land.

Effects of development These measures the harmful effects of development, such as acres of habitat destroyed, habitat loss, species loss, volume of runoff, volume of soil loss, percent of land covered by impermeable surfaces, percent of flood plain modified by development.

Environmental policies, practices and regulations These measure the potentials of policies, practices and regulations in curbing harmful development, such as those concerning the designation of areas for protection and control, environmental review prior to development, environmental monitoring, management of natural areas, and municipal purchase of conservation lands.

Self-Check – 4	Written test

Name…… ID…… Date…….

Directions: Discuss all the questions listed below. Examples may be necessary to aid some explanations/answers. (2 point each)

1. Describe briefly the biological property of the soil (3 points)
2. Discuss about Soil Biota (3 points)
3. Discuss about Soil Fauna (4 Points)

You can ask you teacher for the copy of the correct answers.

Note: Satisfactory rating - 5 points Unsatisfactory - below 5 points

Information Sheet 5 – Considering organizational requirements

5.1. Conducting best environmental practices

A systems approach that goes beyond individual sites to the larger region

- Channel development into areas that have already been disturbed.
- Preserve high-quality patches, as large and circular as possible, feathered at the edges and connected by wildlife corridors.
- Protect wetlands by designing around them.
- Protect wetlands and natural water bodies from erosion, nutrient overload and loss of species by using natural upland buffers.
- Preserve uplands in order to maintain biodiversity at a regional scale.
- Restore and enhance environmental processes previously disturbed by human activities.
- Minimize runoff by siting development on the least porous soil, and use infiltration devices and permeable pavements to reduce the risk of flooding and spread of pollutants.
- Detain runoff with open, natural drainage systems, such as swales and filter strips.
- Design artificial storm-water lakes and ponds to increase wildlife habitats.
    - ✓ A mix of shallow and deep water to help remove pollutants;
    - ✓ littoral shelves with aquatic plants to help absorb metals;
    - ✓ vegetation along the shoreline to increase habitat activity;
    - ✓ irregularly shaped ponds to provide space for vegetation;
    - ✓ sandbars and mudflats to provide feeding areas for wading birds;
    - ✓ islands to provide space for lownesting waterfowl; and
    - ✓ ponds located at the edge of a residential area to prevent cats and dogs from disturbing the wildlife
- Use reclaimed water on large landscaped areas.

- Use integrated pest management instead of pesticides by introducing natural enemies to local pests, and growing disease- and insect resistant grasses.
- Design landscaping that minimizes maintenance.

Because sustainable development stresses the balance between economic, community and ecological development, it emphasizes partnership among all the stakeholders in building a community vision, and use of local knowledge and experience. As such, sustainable development planning usually involves three components:

- goals which the community wishes to work toward;
- targets and triggers which set a time-frame for the targets to be achieved; and
- strategies and commitments by stakeholders to ensure continual partnership in achieving the objectives

In general, planning requires making choices. We cannot have two uses and two buildings occupying exactly the same space at the same time; and we cannot spend the same dollar twice. There are several strategic choices that have far-reaching effects on the match between use and land. We will examine those that influence forest area texture, siting priorities, Infrastructural mixes, the choice between rehabilitation and redevelopment, and the choices in infrastructure use and investment.

Self-Check – 5	Written test

Name…… ID…… Date…….

Directions: Answer the question listed below. Illustrations may be necessary to aid some explanations/answers.

1. Mention the types of crop suitable for both Saline and alkaline soil (3 points)
2. Mention the types of crops suitable for both Alkaline and neutral soil (3 points)
3. Mention the types of crops suitable for saline, alkaline and neutral soil in common (4 points)

You can ask you teacher for the copy of the correct answers.

Note: Satisfactory rating - 5 points Unsatisfactory - below 5 points

Information Sheet 6 – Identifying and comparing the analyzed information

6.1. Identiying and comparing the analyzed information

The Natural resources infrastructure Strategic Plan focused on three major goals:

1. **The right infrastructure**-Locate, size and configure facilities and associated infrastructure based on readiness requirements and business-case justification to support the organization.

2.**The right quality-Acquire**, operate, sustain, restore and modernize facilities and infrastructure to provide safe, healthful, responsive, cost-effective, efficient and flexible environments.

3. The right resources-Achieve equilibrium between requirements and funding to provide modern, efficient and cost-effective organization facilities and infrastructure.

The organization needed a process to align the facilities investments with its strategic objectives and to enable a framework for the continuous improvement of the organization facilities portfolio. It also needed to establish a process to directly link facility investments with performance goals articulated in strategic and business planning and enhance joint operations and interagency collaboration. There might a number of factors forcing change on the organization facilities infrastructure. Transitions from global theaters to installations and a national labor shortage for certain natural resource specialties were having a direct impact on the organization. These pressures drove transformation across the organization with significant implications for the entire infrastructure collection.

6. 2. Implementing goal explicit techniques

Goals-achievement matrix is perhaps a typical example of the goalexplicit techniques. It seeks to compare alternative courses of action on the basis of their relative achievement of established goals. The advantages and disadvantages 6f the alternatives are expressed in terms of progression toward or retrogression from the specified goals. All goal-explicit techniques deal with some or all of the following methodological issues: ranking, rating, or weighing of goals; the probability of implementation of the various alternatives; and the ordering of the alternatives in terms of how well or how effective they serve each of the goals. Sometimes, as a recognition that different people have different perceptions about the utility of the different goals, their valuation of the goals and their relative importance as a socioeconomic group are also taken into consideration. There are also different methods of summing up or integrating the overall achievement of an alternative with respect to all the different goals. These range from simple addition of scores to complex mathematical equations.

Another goal-explicit technique is optimization. Optimization (linear programming) is the maximization of some advantages or the minimization of some disadvantages within certain constraints. It offers the planner an immediately useful way to test various alternatives of matching needs and supply. The following is a typical example of what the technique can be used for. Suppose there is a piece of land which can be developed for only two kinds of housing which are defined in terms of density, housing price and the property tax revenue to the government. The constraint is the total development cost that can be spent. The technique can be used to determine the proper mixture of the two housing types which would give the maximum property tax revenue to the local government. Even for such a straightforward question the calculation is quite involved. In real life problems, many more variables and constraints are present. A computer will be needed to find the solution. But a more difficult problem is about the assumptions used and the difficulty in defining the "objective function" (that is, deciding exactly what we are trying to maximize or minimize).

Environmental impact assessment is yet another goal-explicit technique. It is the assessment of a development proposal against its potential environmental effects. As such, the goals are explicit. It helps us to appreciate the environmental consequences of any mismatch between

needs and supply. The assessment results can be made to assist the making of a rational decision based on the likely environmental loss due to the development, the benefit of the development, and the possibility and cost of mitigation. This can be done by using a simple checklist with a weighting scheme to a complex network approach which simulates the cumulative direct and indirect effects. But this perfectly reasonable technique has been abused by those who try to include everything from physical to cultural, social, and economic considerations. Since there is no convenient and convincing way to compare and evaluate the trade-offs between these various dimensions, the exercise has become a highly frustrating one for planners and developers alike.

Self-Check – 6	**Written test**

Name…… ID…… Date…….

Directions: Answer the question listed below. Illustrations may be necessary to aid some explanations/answers. (2.5 points each)

1. Discuss briefly Keeping records of field sheets
2. Explain step by step in on Collecting on cultural significance and habitats

You can ask you teacher for the copy of the correct answers.

Note: **Satisfactory rating - 5 points** **Unsatisfactory - below 5 points**

Information Sheet 7 – Identifing OHS hazards, assessing risks and incorporating controls

7.1. Identifying **hazard**

Hazard identification provides information that can be used to manage risks which if not controlled, have the potential to lead to injury. Consider the structure of the workplace — look at stairs, desks, floor surfaces, exits, driveways, housekeeping standards, check all machinery, appliances and vehicles used for work, examine how substances are stored, used and moved from one place to another, consider injury records (including 'near misses') Identify activities undertaken in the work area for which a risk assessment is required. List the hazards associated with each activity (you can use the Workplace Inspections Health and Safety Checklist which will help you assess and control the risk associated with each hazard.

7.2 Conducting Risk Assessment

Determine which hazards are more serious than others, so you can start dealing with those ones first. To assess the risk associated with hazards you have identified, ask the following questions:

How likely is the hazard to cause harm to someone?

What is the worst possible damage the hazard could cause in terms of human suffering and cost if you don't resolve the problem?

How many people are exposed to the risk? Sometimes it may be the amount of time workers spend on an activity that creates the safety risk, rather than the nature of the work task itself. Everyone is different. A hazard may also pose more risk to some people more than others because of differences in physical strength, experience, training etc.

Risk Control

- Identify the underlying cause of hazards and put measures in place to prevent a recurrence of the risk,
- Focus attention on the most urgent hazards;priorities the hazards using the risk management matrix, understanding that some methods are more effective than others.
- Use the following hierarchy of controls (for Manual Handling refer to Code of Practice) to establish the most appropriate control measure. It should be remembered that Level 1 is the most effective control. Use the highest-ranked control that is practicable for controlling risk, and only use the lower-ranked controls as a last resort or until a more

effective way of controlling risk can be used. More than one control measure can be used to reduce the exposure to hazards.

Level 1: Eliminate the hazard

For example, repair damaged equipment; safely remove any unwanted or waste chemicals from the workplace immediately. If this is not practicable, then

Level 2: Substitute the hazard with a safer alternative

For example, use a less toxic chemical; lift smaller packages. If this is not practicable, then

Level 3: Isolate the hazard

For example, relocate photocopiers to separate, ventilated rooms; install barriers to restrict access to hazardous work areas. If this is not practicable, then

Level 4: Use engineering controls

For example, place guards on dangerous parts of machinery; use a trolley for moving heavy loads.

If this is not practicable, then

Level 5: Use administrative controls

For example, rotate jobs to reduce the time spent on any single work task; train staff in safe work procedures; carry out routine maintenance of equipment.

If this is not practicable, then

Level 6: Use personal protective clothing and equipment (PPCE)

For example, use hearing/eye protection equipment, hard hats, gloves, masks and train staff to use PPE correctly.

7.3.. Reviewing the evaluated result

Review your safety solutions regularly to make sure they are effective, and making sure your controls do not introduce new hazards. To assess the success of your risk control methods: Talk to the people involved and look at your centre injury/accident records.

Seek advice from those affected by the changes and consult with them regarding any modifications to their workplace or work routines.

Consider staff training needs; communicate with employers, managers, contractors and workers work together as all parties in the workplace have a legal responsibility for workplace health and safety.

7.4 Making good interactions with other staff and customers

Interaction is very important to understand the overall activities of infrastructure works with other staffs. The interaction may create some impression between the workers and other staffs about the significance of landscape work, way of landscaping process, advantages of landscape work and environmental importance. In addition to these the interaction also develops positive relationship among the industry, staff and customers in order to protect the landscape from different damaging agents.

7.5. Understanding enterprise policy and procedures

Any enterprise has its own policy and procedures that helps to guide the work operators how to use their time, how to perform their work, how to handle their tools, materials and equipments and other activities. Therefore, the employee before starting their work, they should know or understand the enterprise policies and procedures to perform their work properly with in proposed time. Knowing the policy and procedures of the enterprise may support the employee from doing wrong things.

7.6. Handling materials and equipments

“The law says you must keep every part of your construction site in ‘good order’ and every place of work clean”. The objective is to achieve what is usually called a good standard of working site.

Storage areas- designate storage areas for plant, materials, waste, flammable substances e.g. foam plastics, flammable liquids and gases such as propane and hazardous substances e.g. pesticides and timber treatment chemicals;

- **Pedestrian routes**- do not allow storage to ‘spread’ in an uncontrolled manner on to footpaths and other walkways. Do not store materials where they obstruct access routes or where they could interfere with emergency escape;
- **Flammable materials**- will usually need to be stored away from other materials and protected from accidental ignition;

To operate these work activity different materials, equipments and machinery are very important component of the work.

These mentioned materials, equipment and machinery needs great care during handling and transportation.

When we use tools and equipments to clean up landscape work, these tools should be handled properly during work operation. Our handling should be safe and care full during using tools for work, if we apply wrongly any tools we may harming the instruments or tools, so this situation leads to delay the work operation system. So our handling system should be full of care by doing this we can minimize the risk which will be occurred on the equipments and tools.

7.7. **Understanding of instruction for good environmental and OHS practices**

Instruction is a statement of principles that the organization prepare to manage their employees, the work activities and environmental issues. Instruction gives a clear direction to the members of the entire organization. It will also be the basis for any occupational health and safety decisions and action.

After completion of work activities the output of the work should be reported to the concerned bodies on time.

This report of work out put gives some clue about the positive performance of the activities and the weakness or limitation of the work activities.

Self-Check – 7	Written test

Name…… ID…… Date…….

Direction 1 Choose the best answer and encircle it

1. The materials which are used for construction work must be bought from abroad.
   a. True
   b. false
2. We can use all types of materials without any identification, if they are available around us.
   a. true
   b. false
3. Which one of the following is true about loading and unloading?
   a. during loading no need of care about the loading materials
   b. if we don't made any care, while transporting tools and materials nothing will happen
   c. transporting with care may minimize the damage of tools and materials
   d. all of the above are answers
4. From the following equipments which one is used for protecting direct sun radiation?
   a. glove
   b. boot
   c. hat
   d. overall

5. One of the following is true about landscape operation.
   a. identifying the land
   b. fencing the land
   c. leaving the naked part without any protection
   d. designing and covering the naked land
   e. all except 'C'

1. One of the following is correct about waste storage.

a. Make the working environment pleasant

b. Providing favorable habitat for rodents

c. Accumulating all waste materials without segregation

d. No need of planning for waste storage

6.One is wrong about handling of materials. Which one is it?

a. Workers can use materials without care

b. If we don't give emphasis during work operation they may lead to additional cost.

c. Even if there is sufficient materials we have to use materials properly

d. All are the correct answer except "A"

7.Maintenance of clean and safe work site is vital to initiate the workers but no need of safety in any work operation.

a. true

b. false

Directions2: Answer the question listed below. Illustrations may be necessary to aid some explanations/answers.

1. Mention the environmental importance of landscape work.
2. Discus the advantage of reporting problems in work operation.
3. What will happen if we don't guided by the instruction of the institution?

4. Discus the advantage of interaction with other staffs and customers.
5. What does it mean when we say storage of materials?
6. Discuss the importance of instruction in any organization.
7. What will happen if we don't handle materials properly?

You can ask you teacher for the copy of the correct answers.

Note: **Satisfactory rating - 5 points** **Unsatisfactory - below 5 points**

Information Sheet 8 – Collecting Detail informations

8.1. Collecting general development-oriented information

Some general development-oriented data include location information, intensity information (ratio between the number of people or dwelling units and land area, ratio between the amount of total floor space and land area, etc.), structural information (health and safety conditions, maintenance and repair needs, etc.), aesthetic information (architectural and heritage designations, forest area design quality indicators, etc.), and time-line information (forest area development programmes, capital improvement programmes, etc.). The following deserve special attention.

(i) Land ownership has been identified by some researchers as the prime determinant of land development patterns. The identity of the owners, the shapes and sizes of the land, the suitability of the land for various kinds of development, and the kind of land assembly action within an area are all important data. Ownership can be public or private and it can range from fee simple to leasehold and from private covenant to cooperative ownership, each of which represents a different level of control over the use and development of the land. The source of data often is confidential. Information may be obtained from land registry or property tax assessment records. The research can be very time consuming because these records show one address at a time. There is also the problem of owner identities hidden behind numbered companies, and it is very difficult to obtain a clear picture of the overall ownership pattern. Planners often have to rely on local estate agents or real estate boards for information. (ii) Data on land values are used to analyze development trends and are a particularly important input to public decisions about the purchase and assembly of land for various public purposes, such as open space and lowcost housing. The whole subject of land values is very complex,

especially when the data are needed to make future projections. Nevertheless, real estate boards often publish area-wide averages of sales. Land in forest area areas is computed on the basis of square footages or on a frontage basis adjusted for lot depth, corner influence, and so on. In the fringe areas land values are computed on the acreage basis. It should be noted that transaction prices are not necessarily reflective of the market values of the land involved, and they often do not distinguish between the value of the land and the value of the buildings on the land. Assessment records can be used but, again, they list one property at a time and it is very difficult to use them for area-wide planning purposes. To generate any reliable information on land values is a very arduous undertaking. (iii) Areascape has not been receiving proper attention in spite of the fact that it is what many ordinary people consider to be an essential function of area planning. This is partly due to the persistent myth that visual perceptions are subjective and therefore entirely arbitrary, although it is interesting to note that equally subjective "satisfaction" measures of various kinds are given much weight in planning. More importantly, perhaps, is that visual studies are not a strong suit in the "social science" approach to planning. Although there are many studies of environmental images, especially by geographers, these tend to relate to large areas such as a whole country or a region or to fundamental cognitive constructs which are not directly useful for forest area Infrastructural decisions.

8.2. Collecting transportation information

Although transportation planning is a very specialized discipline, a Infrastructural planner must deal with the movement systems in a area. These include not only landbased transports such as pedestrians, bicycles, automobiles, taxis, buses, rail and trucks but also waterborne movements and, in some case, air movements such as heliports. We need information about the volume of use, the routes and the area of the systems.

Road area is the maximum number of vehicles that can be expected to travel over a given section of roadway (or laneway). It is determined by two conditions. Prevailing roadway conditions include vertical and horizontal alignments, lane width, number of lanes, road surface, and type and number of intersections. Prevailing traffic conditions

include traffic type, speed, volume, direction, control and driver skills; turning movements; bus lines and bus stops; and conflicting pedestrian and bicycle movements. The effects of these conditions determine the "service level". The most significant impact on service level comes from traffic interruption at at-grade intersections.

8.3. Collecting maps and geographical information system

1. Maps

Maps are needed to collect, record and analyze data. Usually, a planning office has a variety of engineering, topographic and property maps. Much of mapping data comes from aerial photographs. They are used to produce line-drawn cartographic base maps which show boundaries of towns and cities, rivers, railroads and highways, and land uses and structure, as well as photographic-image orthophoto base maps which show the actual images of the ground features. From these base maps topographic maps can be developed by adding contour lines and spot elevations.

Cadastral maps show land parcels by ownership. In addition to the usual boundaries of government jurisdictions, roads, rivers and other features that help locate land parcels, each piece of land also has a parcel identification number (PIN) and is described by the owner's name, parcel boundaries and size (as computed from the boundaries, as registered in the deed, and as assessed for tax purposes). There are other kinds of maps, such as insurance, highway, census, historical, assessment, and real estate sales maps. In particular, some commercial maps produced by insurance companies can be very useful because they show the uses and layout of both the ground floor and the upper floors of the buildings.

General and specific planning maps may be produced from the above base maps, and may be used for Infrastructural surveys, subdivision reviews, zoning reviews and site planning purposes. Depending on the use, such maps may include streets and names of streets, planning area boundaries, railroads, major public buildings, lakes and rivers, and so on. These maps can be wall-size, table-size and letter-size. The very basic ones show roads and streets, railroads, waterways and area boundaries. The more detailed

maps have property and easement lines, and the still more detailed ones include structures as well.

Sometimes a survey is needed to obtain specific information. A survey is always demand-driven: to identify sites for development, to locate problem areas such as forest area blight, or to evaluate the adequacy of certain facilities and services. It is, therefore, very important to have clear purposes so that the right kind of maps can be used. The most important consideration in devising standard maps for surveys is the appropriateness of the scale, coverage, and notations, and whether the maps are being regularly kept up-to-date. Once a base map is chosen, a manual of standard field procedures has to be developed to ensure that all field workers will follow the same procedure and record the same information. Before the survey actually takes place, the survey instruments should be pre-tested to ensure that they will produce the information needed.

In the actual survey we can use either one of the following field recording techniques. Information can be written down directly on the base map. This mapnotation system is the simplest technique, and is suitable for small cities. Alternatively, a field-listing technique can be used, where the field worker records the relevant information against an address or a location, and the information is later coded for machine manipulation. This technique is more complicated but more information can be recorded.

The field information gathered can be organized in a number of ways. Point locations can be used to indicate where the information applies, particularly in the case of environmental surveys. Regular grids (usually rectangular) can also be used. The problem with points and grids is that they do not really relate to the boundaries of any sociopolitical divisions or to the natural boundaries of an environmental phenomenon. A third way is to use irregular polygons which coincide with sociopolitical divisions, functional boundaries, or environmental phenomenon, but data organized in this way are not easy to manipulate analytically.

2. GEOGRAPHICAL INFORMATION SYSTEM

We now have sophisticated computerized geographic information systems. They use integrated spatial (geographic) and textural (attribute) databases to help monitor, analyze and model planning situations as well as make presentations (Star and Estes, 1990). In fact, some municipalities are using geographic information systems within their "corporate" function for a wide variety of tasks, such as tracking citizen complaints, monitoring expenditures, and assessing growth potentials.

A Geographic Information System (GIS) is one "in which data has some spatial or geographical referent, this data being ordered according to this referent, and displayed by software in such a form that some spatial analysis is possible" (Batty, 1993:52). It usually consists of the following components:

- **Data input processing** — the transformation of spatial and non-spatial information from both printed and digital files into a GIS database. A variety of methods may be used: digitizing, satellite images, scanning, keyboard entry, etc. The sources of the data may include maps, aerial photography, remote sensing, existing data sets and so on.
- **Data storage, retrieval and database management** — the handling of data at different spatial scales and levels of resolution through the use of a database management system (DBMS).
- **Data manipulation and analysis** — operations such as geometric calculations, topological operations, spatial comparison operations, multilayer spatial overlay and network analysis.
- **Display and product generation** — statistical reports, maps or graphics.
- **User interface** — the interactions between the user and the GIS software.

Too often, too much information is gathered to serve no specific planning purpose. Information must be relevant to the intention for which it is gathered and it must facilitate

the kinds of analysis and synthesis of which the planning agency is capable. Therefore, definitions and measurements of data must be meaningful to the planning problems or objectives at hand, and capable of spatial and locational analysis. For example, in analyzing the need for commercial and retail space, the number of employees may be a more relevant piece of information than the amount of sales.

There are four important considerations in designing an information system. First, the immediate utility of information has to be balanced against its future or on-going use. This means one should aim for a system which has a standardized format, is adaptable to machine use, and is capable of being updated. Of course, the benefit must be weighed against the cost of collecting, processing and retrieving the information.

Second, since information is to be gathered by many people and used by many different people again, it is necessary to ensure consistency and accuracy in the information collection phase. Surveys should be pre-tested, there should be adequate training for interviewers and field observers, and the field work has to be carefully monitored. The completeness of the information should be checked immediately so that remedial action can be taken before the survey is over. The coding should be consistent and carefully controlled.

Third, the way that information is classified and stored should be flexible enough to allow for new information to be added, for the information to be used for various kinds of analysis, and for new information technology to be incorporated, especially the use of new computer software and hardware. An equally important issue is the comparability between the information collected and the information that can be obtained from other sources, such as censuses. In this regard, compatible measurement units and definition of terms are essential, as well as the spatial units and the coverage of the survey.

Fourth, surveys should be conducted smoothly and economically. In this respect it is particularly relevant to consider carefully whether the survey should be done by information specialists or by the planning personnel. In-house information sources must be considered first, such as development application records and previous planning studies. It is better to have less information than the wrong information.

Self-Check – 8	Written test

Name…… ID……

Date…….

Directions: Answer the question listed below. Illustrations may be necessary to aid some explanations/answers.

1. What are Sources of data to conduct performance monitoring & evaluation? (2.5 points)
2. Briefly elaborate the step to be conducted in the data collection process.(2.5 points)
3. Compare and contrast quantitative and qualitative data (5 points)

You can ask you teacher for the copy of the correct answers.

Note: **Satisfactory rating - 5 points** **Unsatisfactory - below 5 points**

Operation Sheet 1- Undertake site selection process

ROCEDURE

1. Pre-project Planning
2. Form a site selection team (skills needed include finance, marketing, manufacturing operations, human resources, transportation/distribution, engineering, law, and environment).
3. Identify goals and objectives of the new facility (for example, lowering operating costs, entering new markets).
4. Develop a budget and analyze the feasibility of building a new facility (for example, design and engineering concepts, facility requirements, market research, and financial feasibility).
5. Identify critical site evaluation criteria (for example, quality and quantity of the workforce, transportation and utilities, and site and building characteristics).
6. Determine which site evaluation factors are necessities and which are desirable but less critical.
7. Collect and analyze data for these factors (if available from national sources). g. Identify a geographical area for the site search (typically between 5 and 10 states).
8. Collect more detailed data on the communities (typically between 15 and 20) that are being considered. State and local development organizations can usually provide needed data (for example, higher education resources, payroll costs, average salaries, transportation, quality of life).
9. Using the community data and the site evaluation criteria, narrow the number of potential sites to five or six.
10. Community Fieldwork and Site Visits
11. Finally report

LAP TEST	Performance Test

Name……. ID……..

Date…….

Time started: _____ Time finished: _____

Instructions: Given necessary templates, tools and materials you are required to perform the following tasks within 8 hour. The project is expected from each student to do it.

Task-1 Collect and collect infrastructural information in forest area

LG #39	LO #2- Obtain infrastructure

Instruction sheet

This learning guide is developed to provide you the necessary information regarding the following content coverage and topics:

- Identifying Solutions and bridging the gaps.
- Undertakings cost benefit analysis.
- Organizing and Undertaking work preparation.
- Undertaking Negotiations and optimizing infrastructure.
- Planning and commissioning infrastructural Works.
- Identifying environmental and waste management requirements

This guide will also assist you to attain the learning outcomes stated in the cover page. Specifically, upon completion of this learning guide, you will be able to:

- Identify solutions and bridge the gaps.
- Undertakecost benefit analysis.
- Organize and undertake work preparation.
- Undertake negotiations and optimize infrastructure.
- Plan and commission infrastructural Works.
- Identify environmental and waste management requirements

Learning Instructions:

1. Read the specific objectives of this Learning Guide.

2. Follow the instructions described below.

3. Read the information written in the “Information Sheets”. Try to understand what are being discussed. Ask your trainer for assistance if you have hard time understanding them.

4. Accomplish the “Self-checks” which are placed following all information sheets.

5. Ask from your trainer the key to correction (key answers) or you can request your trainer to correct your work. (You are to get the key answer only after you finished answering the Self-checks).

6. If you earned a satisfactory evaluation proceed to “Operation sheets

7. Perform “the Learning activity performance test” which is placed following “Operation sheets” ,

8. If your performance is satisfactory proceed to the next learning guide,

9. If your performance is unsatisfactory, see your trainer for further instructions or go back to “Operation sheets”.

Information Sheet 1- Identifying Solutions and bridging the gaps

1.1. Identifying Solutions

The solution is completed as follows:

Discovery: During the discovery phase the existing and needs in terms of infrastructure systems are identified. Current infrastructure strategy is discussed as well as outlines on infrastructure that are underway or in planning. This forms the basis for the functional analysis and will highlight the main areas to be addressed in the scope of the review.

Analysis: In this stage a functional analysis is conducted on the infrastructure. This may involve physical inspection or auditing of systems. It may also be necessary to meet key infrastructure users as well as review infrastructure operations with key organizational staff depending on the outcome from the discovery. The objective of this phase is to review the infrastructure in sufficient detail to allow for meaningful and comprehensive recommendations.

Review: This will include an analysis/research on technology to meet/bridge any gap identified. This may also include an interim review with infrastructure management on the areas to be addressed and the general route that will be taken by the consultant.

Recommendations: A comprehensive report detailing the scope, areas reviewed, findings and recommendations including any technological enhancements/best practices that will improve the environment as well as meet or exceed the business needs, where required.

Findings review: Once the report is submitted, a follow-up meeting/workshop is conducted to review the findings and provide for a “discussion “session with your team.

1.2. Briding the gaps

The choice of alternatives is not solely the result of public participation. It is based on a combination of independent and related actors involved in the decision-making process: elected representatives, interest groups, the public, government agencies, as well as the planner. The planner's role in this is to ensure that these actors understand the relationships between solutions and goals, and the advantages and disadvantages of

the various alternatives. Informed and impartial presentation of alternatives is a very practical means of attracting informed, sensible, and helpful expressions of public opinion about what alternative to adopt.

But we must avoid two fatal defects:an insufficient discrimination in the selection thus resulting in a large number of half-baked and poorly evaluated alternatives; and a biased presentation in favor of the alternative preferred by the planner thus resulting in a misinformed or antagonized public.

The following are some suggestions about how to generate Infrastructural decisions innovatively.

1. **Use stereotypes**. Stereotypes are tested solutions and therefore they are usually good for normal, stable situations and can be readily related to by the user. For instance, cul-de-sacs for residential layout, sidewalk cafes for an entertainment area, the corner grocery store, the industrial park, the office village, the everything-under-the-same-roof giant shopping mall, and the more recent "new forest areaism" layouts.
2. **A problem can be turned upside down and become a solution.** Instead of trying to solve a problem one can make use of the problem situation, such as making a steep terrain a dramatic backdrop for buildings perching on it, turning an unsightly drainage retention pond into an artificial lake for recreation, and converting a dilapidated market building into a studio and specialty retail complex.
3. **Identifying a problem first and then finding a solution to it,** a planner may examine innovative financial, technological or legislative instruments to determine what profitable ends can be served by these. He/she may look at senior government programme funding criteria and then identify what local goals can be best pursued by these programmes. The same approach can be used to exploit new building techniques, laws, market conditions, and so on. This approach suffers from a lack of direction and conviction and the area might end up spending a lot more on items that may not be essential. But as a tool to stimulate the mind it can be useful. Making sound planning synthesis is really a

question of good habits. We have to be constantly observant and alert, to explore with all our senses, to empathize with the users, and, most importantly, to bridge the gap between lines, shapes, and words on paper and lives as lived.

Self-Check – 1	Written test

Name…… ID…… Date…….

Directions: Answer all the questions listed below. Examples may be necessary to aid some explanations/answers. (5.Points each)

1. Discuss briefly about analysis of soil sample by feel and appearance method
2. Discuss briefly about analysis of soil sample by textural method

You can ask you teacher for the copy of the correct answers.

Note: Satisfactory rating - 3 points Unsatisfactory - below 3 points

Information Sheet2- Undertaking cost benefit analysis

1.2. Conducting infrastructure asset management

Infrastructure asset management (IAM) is a systematic approach of maintaining, upgrading, and operating infrastructure facilities cost effectively. Examples of infrastructure assets in addition to equipment, machinery and vehicles, the organizations infrastructure may include buildings, sheds, shelters, stock yards, stock handling structures, fences, water supply systems, roads, tracks, soil conservation works, Infrastructure and drainage channels, silage pits, dams, monitoring systems, information technology systems, bridges, drainage culverts and storm drainage systems, safety rest areas and roadside. IAM combines engineering principles with sound business practices and economic theory, and it provides tools to facilitate amore organized, logical approach to decision making. The goal of infrastructure asset management is the effective management of large and complex infrastructure systems in an integrated manner, by considering the interdependency between all of the facilities within thesystem. As such, infrastructure asset management aims to provide information to decision makers about the problems of different alternative solutions. Generally, the management process focuses on the stages of a facility's life cycle specifically maintenance, rehabilitation, andreplacement.Infrastructureasset management specifically uses mathematical models and computer softwareto organize and implement with the fundamental goal to preserve and extend the service life oflong-term infrastructure assets which are vital underlying components in maintaining the qualityof life in society and efficiency in the economy. In the broadest sense, infrastructure managementcovers all phases of infrastructure planning, design, construction, maintenance and disposal. All infrastructure facilities deteriorate over time due to different reasons, including material, usage and environmental damage. Deterioration of infrastructure systems overtime is inevitable because of wear and tear caused by usage and that the materials that make up the facility begin to break down and become affected by elements such as rain, sunlight, and chemicals that come into contact with

the surface. For example, the asphalt binder that is the “glue” of the pavementbegins to lose its natural resistance to water, allowing moisture to penetrate into and underneaththe pavement. The truth is, no infrastructure facility is exempt from deterioration no matter howwell it is constructed. Material deterioration begins immediately. Even in normal conditions substantial deterioration can begin to take place after a certain period of time. As infrastructure facilities deteriorate, the cost to operate and maintain them increases. Therefore, managing maintenance activities for large scale infrastructure systems is a difficult task. Many projects and interests compete for the limited resources allocated to different programs. Many factors are involved in the decision making process of infrastructure asset management.

2.2. Undertaking cost benefit analysis

1. Goal-implicit technique is social cost-benefit analysis the definition of what constitutes a cost or benefit is value-laden but the technique does not require an explicit recognition of what, or whose, values are represented by the various costs and benefits. Cost-benefit analysis is a generic name for those techniques which try to put a monetary value to, or at least to quantify, the costs and benefits of a development proposal and to use them as a basis for deciding whether that proposal is acceptable. Such a technique devotes great effort in measuring and aggregating costs and benefits and in refining the decision criteria which may be benefit maximization, cost minimization, maximization of the benefit-to-cost ratio, or some other such formulae. Here the questions of time-horizon, accounting prices, discount rates for future costs and benefits, and the basis for choosing between alternatives are even more complex than in the case of optimization. Besides, different groups disagree on what constitutes the potential costs and benefits of a proposal. A planning balance sheet technique which deals with values more explicitly by examining the costs and benefits from the points of view of both the provider and the consumer (user). But this compromise has serious methodological consequence in that overall costs and benefits of a scheme can no longer be aggregated, leaving the balance sheet technique nothing more than an account of the valuation by different interested parties, without any decision criterion. A limited but often used approach is fiscal impact analysis which examines the direct current public costs and revenues associated with a development proposal to the local

jurisdiction. These costs include various municipal capital and operation costs, as well as those incurred by school boards, public utilities commissions, etc. The increased revenues include property tax and transfers and grants from senior governments as well as user fees, lot levies, parkland dedications, etc. The main problem with this approach is that it takes a very narrow view of what should be evaluated. Besides, it also has many difficult methodological issues to deal with, such as the choice between average and marginal costs, and the differentiation between one-time revenues and recurring revenues.

2.Threshold analysis is a technique to work out the timing for the release of land for development. The basic idea is that the development of a area can be supported satisfactorily and economically by the existing infrastructure up to a certain point. When the point is reached, that is the threshold, further development can only be considered after the provision of a package of infrastructure projects involving substantial capital expenditure, such as a new sewage treatment plant, and a major highway. Since such infrastructure projects are usually indivisible and cannot be provided incrementally, some choice has to be made as to when to implement a particular project or when to proceed with development in a particular area. This choice may depend upon the relationship between the capital costs involved for each project and the quantity of new population that each completed project can service satisfactorily.

3.planning games are actually role playing games in which a planning situation is simulated, such as a proposal to redevelop a disused railway yard for a commercial and shopping complex, and people play the roles of various parties who would take part in the negotiations and decisions, such as planning officials, politicians, developers, and various interest groups, thereby learning insights about how a planning situation may evolve in real life. But real life situations are very different from games; the rules may change as events unfold. It seems that this technique may help planners to be more sensitized to the needs and intentions of the various actors, but it is doubtful whether in the end it will make better land use.

Perhaps the simplest evaluation method that most planners employ is the ubiquitous checklist which is widely used in Infrastructural and transportation planning and

environmental impact studies. In essence, the checklist method evaluates alternatives against a set of criteria according to some ranking, rating or scoring schemes. The simplest checklist may consist of only a few criteria and each alternative is judged as either positive or negative with respect to each criterion. The more sophisticated application involves weighting of the different criteria, ranking or rating of alternatives against each criterion, aggregation of total ranking or rating scores, and successive-iterations to eliminate alternatives. In order to be meaningful and effective the criteria must be related to the goals to be pursued; they must be measurable at reasonable cost; and they must not have a bias in favour of any particular alternative.

Self-Check – 2	Written test

Name…… ID…… Date…….

Directions: Answer all the questions listed below. Examples may be necessary to aid some explanations/answers. (5. points each)

1. Why you establish parameters for land use production
2. Discuss about Interpretive Soil Properties

You can ask you teacher for the copy of the correct answers.

Note: Satisfactory rating - 3 points Unsatisfactory - below 3 points

Information Sheet 3- Undertaking Negotiations and optimizing infrastructure

2.3. Undertaking Negotiations and optimizing infrastructure

When developing or enhancing a planning program—whether at the national, state, local, or organization—a planned approach is essential for success. Use of a program planning process can improve an organization program because change may be difficult both on a personal and organizational level. It is critical to set the stage by choosing the appropriate community participants and organization professionals. A team with the appropriate mixture of responsibility, knowledge, and experience can lead the organization in an improvement that will make a difference for workers. The team should define the problem from a national, state, local, or school level Perspective as appropriate. Then the team can do an assessment of the problem or need, set goals and objectives, develop an action plan with strategies to be used, implement the plan, and evaluate the results.

The six key steps in a planning process are listed below.

1. Establish the planning team.
2. Access health problems and service needs.
3. Set goals and objectives.
4. Develop an action plan.
5. Implement the plan.
6. Evaluate effectiveness of the planning process and program.

This sub-section, “Planning Process Steps,” summarizes the steps of a logical planning process, which can be used at the school level for enhancing or establishing a school health program. The information presented can be modified according to what is appropriate at national, state, or local level.

Consider creating a Infrastructure plan in your community. In practice, mapping your natural resources as part of a Infrastructure scheme should be focused at the landscape scale, looking across multiple parcels and ownership. Ideally, this occurs before land development begins, which will allow land managers, landowners and planners to consider which areas should be selected for conservation or restoration, in order to provide such ecosystem services as wildlife habitat, recreation areas, storm water treatment, energy savings, aesthetic values, improved community health and a sustainable economy. This ensures that areas are not cut off, or that ecosystem functions, such as groundwater recharge, are not unintentionally disrupted.

Ecosystem services are those positive benefits nature provides, that are essential to a community, such as: clean air and water, storm water remediation, food, energy, recreation and cultural opportunities. Forests provide us all of these services and more!

Even inner suburbs, towns and cities can contain unique habitats, as well as substantial open spaces. In urban areas, Infrastructure planning focuses on different scales and types of data. It assesses the citywide tree canopy and the condition of public trees, riparian habitats and stream corridors, as well as the trees and streams in a local district, neighborhood or watershed. It looks at where there are connected blocks of habitat, such as large city parks and trail systems, as well as good loca tions for community gardens and opportunities for small-space habitat restoration, plus water features or water infiltration. Most importantly, Infrastructure plans keep habitats connected by planning across the landscape and across parcels.

Engage stakeholders! This is key to a successful planning process The first step is to engage stakeholders in deciding which Infrastructure assets are the most important to identify and conserve. Deciding this is a value-driven process. It requires some form of community engagement in order to determine which natural assets to include. For example, while the best available science can tell us the types of habitats that are most important for wildlife, we must first decide that wildlife conservation is important to us.

Furthermore, community support is usually needed for implementation, so establishing goals that meet community needs can be key to ensuring the strategy succeeds.

Self-Check – 3	Written test

Name…… ID…… Date…….

Directions: Answer all the questions listed below. Examples may be necessary to aid some explanations/answers. (5 points each)

1. What are the steps to be conducted before providing backstopping cases?
2. Elaborate briefly the feedback process for undertaking monitoring and evaluation

You can ask you teacher for the copy of the correct answers.

Note: **Satisfactory rating - 3 points** **Unsatisfactory - below 3 points**

2.4. Organizing work preparation

The scope of a infrastructure plan may vary between only the physical aspects of land and its use to all aspects of government functions. The degree of detail can range from broad-brush sketches of the whole area to detailed prescriptions of the external appearance of buildings. Its functions can vary between policy guidance to civic education. There is really no such thing as typical contents. on the format and content of a area-wide or area-wide infrastructure plan is perhaps still the most logical and precise statement of how a infrastructure plan can be organized. In fact, the organization and contents of most of the municipal general plans can be readily related to Kent's prescription. Site-specific, land-use-type-specific, or function-specific plans may also have similar logic and organization.

2.5. Undertaking work preparation

Infrastructural control, often referred to as development control, is perhaps older than Infrastructural planning. When we speak of Infrastructural control as a tool to implement a plan, we are assuming that control is guided by a plan and that it does not precede nor replace planning. This may seem obvious but, as we shall find out, it was and still is in some cases, not so.

The scope of development control is extraordinarily wide, from regulating the siting of an international airport to requiring a permit to cut down and replant a tree. Development control has often been described as "negative." It is only negative to the extent that it prevents some development from happening, which may be a very positive means to implement a plan.

Generally speaking, development control covers all aspects of siting, sizing, and environmental impact of any type of land use. The rationale for control may include a full range of "public interest," from health and safety to economic viability and social desirability. And in the ideal state of affairs these rationales should all be clearly expressed in the plan.

As a tool to implement the Infrastructural plan, the development corporation derives its strengths and weaknesses from the same source. Its mandates are usually very clear and the integration of functions enables it to pursue its mandate efficiently. As long as the municipal government retains a reasonable level of control, a development corporation is a powerful instrument. Experience has shown, however, that a municipal government usually has to concede much of its control when it enters into partnerships with senior governments and the private sector. Moreover, a successful corporation becomes so powerful that it breaks out of municipal government control. There is also the question of single-mindedness in the fulfillment of its mandate. Infrastructural planning is not just forest area renewal or waterfront development, although these may be of strategic importance. A successful development corporation may be tempted to exploit its success to perpetuate itself even after the task for which it was created has been fulfilled, or to expand its mandate as an effort of empire building. It is difficult to argue with success.

Self-Check – 4	Work out

Name…… ID…… Date…….

Directions: Show Your steps clearly and neatly

1. How much water must be added to a field of area 5ha to increase the volumetric water content of the top 50cm from 16% to 28%? Assume all water added to the field stays in the top 50cm.
2. Compute the depth, RAW, and frequency of Infrastructure required for a certain crop with data given below.

   Crop: wheat, Average daily CU: 1.5cm D rz: 1.40m, Application efficiency: 70%

   FC: 17%, PWP: 5%, Bulk density: 1.72 gm/cm^3
3. Calculate Infrastructure interval (f) & Infrastructure period (IP) under the following condition. CWR (ET_C) =12mm/day, root depth=1.5m, FC=24%, PWP=8%, Q_M =0.03m^3/s, A=1.5ha, GIWR = 70% and Depletion=50%

You can ask you teacher for the copy of the correct answers.

Note: **Satisfactory rating - 5points** **Unsatisfactory - below 5 points**

Information Sheet5- Planning and commissioning infrastructural Works

2.5. Planning and commissioning infrastructural Works

As opposed to new development, redevelopment, or renewal, community improvement assumes that conservation and enhancement of the existing building stock and/or forest area infrastructure is a more appropriate way to implement the plan. Instead of introducing new uses to an area or relocating its existing uses, community improvement efforts aim at enhancing the locational and spatial quality for existing uses by improving the quality of the building stock and of the physical and social infrastructure and amenities.

To qualify for such efforts an area must demonstrate that it is both deserving and capable of conservation and improvement. It has to be an area with relative stability and homogeneity in its use, but one that is suffering a decline in its vitality and yet the decline is not yet irreversible. The usual indicators are: age and condition of building stock; existence of incompatible uses; changes in demographic and familial structure, especially the proportion of elderly and young children; changing socioeconomic status and income of the residents, or the types of shops and sales revenue in the case of a commercial area; the quality and upkeep of the environment including streets and open space; the pattern of property ownership, especially absentee owners; traffic and parking conditions; and the availability of community facilities and services. No wonder that most of the areas chosen for community improvement efforts have been inner area neighbourhoods and main street commercial areas

Community improvement involves a combination of tools, from regulation to public investment. For instance, building stocks, especially in residential areas, are improved through the enforcement of property maintenance standards, loans (forgivable or otherwise) for minor and major repair work, and subsidies for installing insulation. Upgrading of physical infrastructure is an important item, which includes drainage works, road works, and sidewalk repairs. A special consideration is accessibility for the handicapped, from ramps to audio traffic signals. Perhaps the most innovative use of community improvement efforts is in the area of soft services from tot lots to library facilities, and from soccer fields to street lighting. Soft services, that is, community facilities and services, get a lot of intellectual discussion but very little practical action in Infrastructural planning. But, with the conservation and enhancement emphasis in most community improvement programmes, soft services become very legitimate improvement items. Another emphasis is "beautification" of commercial areas, from sidewalk paving to street planting, and from street signage to weather protection.

Areas adjacent to the chosen area for community improvement may be affected by the programme, positively or negatively. It is important that the situation should be monitored and the boundaries of the area adjusted to respond to changing conditions. The delineation of the boundary of a community improvement area is a highly political issue. Infrastructural planning is the pursuit of congruence between user needs and land supply. This can be achieved by locating the user on the appropriate land or by changing the land to suit the user. Community improvement aims at improving the environment rather than relocating the user but if the improved environment leads to a change of user, then we may have to rethink the appropriateness of the tool in terms of the community goals to be served.

Even when the improvements are to benefit local residents, the programme has to ensure that these are the improvements the local residents want. These programmes should not end with the planting of trees, because trees have to be watered and maintained as well, usually by the local residents themselves. Therefore, if the intention

of community improvement is to improve the environment for the local people, it is important that they are convinced that they are the real beneficiaries of the effort.

Self-Check – 5	Written test

Name…… ID…… Date…….

Directions: Answer all the questions listed below. Examples may be necessary to aid some explanations/answers. (5. points each)

3. Why you establish parameters for land use production
4. Discuss about Interpretive Soil Properties

You can ask you teacher for the copy of the correct answers.

Note: Satisfactory rating - 3 points Unsatisfactory - below 3 points

Information Sheet6- Identifying environmental and waste management requirements.

2.6. Identifying environmental and waste management requirements.

An EIA is a study of the effects of a proposed action on the environment. In this regard the environment includes all relevant aspects of the natural and human resources.

The EIA evaluates the expected effects on human health, the natural environment and on property. The study therefore requires a multi-disciplinary approach. It should be done very early at the feasibility stage of a project. In other words a project should be assessed for its environmental feasibility.

Simply defined, EIA is a systematic process to identify, predict and evaluate the environmental effects of proposed actions and projects. This process is applied prior to major decisions and commitments being made. A broad definition of environment is adopted. Whenever appropriate social, cultural and health effects are considered as an integral part of EIA; Particular attention is given in EIA practice to preventing, mitigating and offsetting the significant adverse effects of proposed undertakings.

.1 Developing an Infrastructure Environmental plan in Consultation with property owner and manager

Irrigated agriculture is crucial to the economy, health and welfare of a verylarge part of the developing world. It is too important to be marginalized as it isvital for world food security. However, irrigated agriculture often radicallychanges land use and is a major consumer of freshwater. Infrastructure development thus has a major impact on the environment. All new Infrastructure and drainage development results in some of degradation. It is necessary to determine the acceptable level and to compensate for the degradation. This degradation may extend both upstream and downstream of the irrigated area.

The impacts may be both to the natural, physical environment and to thehuman environment. All major donors consider large Infrastructure and drainage developments to be environmentally sensitive.

An EIA is concerned both with impacts of Infrastructure and drainage on the environment and with the sustainability of Infrastructure and drainage itself.

Clearly an EIA will not resolve all problems. There will be trade-offs between economic development and environmental protection as in all development activities. However, without an objective EIA, informed decision making would be impossible.

Environmental planning is the process of facilitating decision making to carry out land development with the consideration given to the natural environment, social, political, economic and governance factors and provides a holistic framework to achieve sustainable out comes. It is the ability to analyze environmental issues that will facilitate critical decision making.

A major goal of environmental planning is to create sustainable communities, which aim to conserve and protect undeveloped land.

In our case land development considers Infrastructure and drainage activities. Some of the main elements of present-day environmental planning are:

- Social & economic development
- Urban development
- Regional development
- Natural resource management & integrated land use
- Infrastructure systems
- Governance frameworks

Defining and Including Environmental Responsibilities for the Property

Environmental responsibility refers to our responsibility to use natural resources carefully, minimize damage and ensure these resources will beavailable for future generations. In other words, we need to carry out ouractivities with sustainability in mind; not only environmental sustainability, but also economic and social sustainability, all of which are interrelated.

The call for environmental responsibility has arisen for a number ofreasons:

- Concern with increasing land degradation, including erosion, salinity, compaction, reduced soil microbial health, toxicity from pollutants.
- The economic consequences of land degradation and reducing water quality, including lost income (income foregone) and the costs of reparation (repair).

The definition used by the ISO 26000 Social Responsibility standard is a useful reference point, because it focuses on both environmental and social impacts, and was arrived at through a global multi stakeholder engagement process.

The definition states that an organization's social responsibility is the responsibility of an organization for the impacts of its decisions and activities on society and the environment, through transparent and ethical behavior that:

- Contributes to sustainable development, including the health and welfare of society
- Takes into account the expectations of stakeholders
- Compliance with applicable law and consistent with international norms of behavioris integrated throughout the organization and practiced in its relationships.

1.3 Establishing and Maintaining Environmental Records according to codes of practices, legislations and regulations

Industry codes of practice have been developed to help businesses comply with their general environmental duty and the *Environmental Protection Act 1994*.Codes are usually prepared by industry bodies and advise members on how to prevent or minimize environmental harm.

Complying with an approved code of practice is voluntary but, by proving yourCompliance, you can defend a charge of unlawfully causing environmental harm.

Infrastructure has contributed significantly to poverty alleviation, food security, and improving the quality of life for rural populations. However, the sustainability of irrigated agriculture is being questioned, both economically and environmentally. The increased dependence on Infrastructure has not been without its negative environmental effects.

Inadequate attention to factors other than the technical engineering and projected economic implications of large-scale Infrastructure or drainage schemes in Africa has

all too frequently led to great difficulties. Decisions to embark on these costly projects have often been made in the absence of sound objective assessments of their environmental and social implications. Major capital intensive water engineering schemes have been proposed without a proper evaluation of their environmental impact and without realistic assessments of the true costs and benefits that are likely to result.

The sustainability of Infrastructure projects depends on the taking into consideration of environmental effects as well as on the availability of funds for the maintenance of the implemented schemes. Negative environmental impacts could have a serious effect on the investments in the Infrastructure sector. Adequate maintenance funds should be provided to the implementing organizations to carry out both regular and emergency maintenance.

It is essential that Infrastructure projects be planned and managed in the context of overall river basin and regional development plans, including both the upland catchment areas and the catchment areas downstream.

Self-Check – 6	Written test

Name…… ID……
Date…….

Directions: Answer all the questions listed below. Examples may be necessary to aid some explanations/answers. (5. points each)

1. What is environmental plan? (3point)
2. What are environmental objectives? (2point)
3. What is environmental plan? (2point)
4. What are the main elements of environmental planning? (3point)
5. What is environmental responsibility? (2point)
6. Why finance and human resource is making available to implement environmental plan?

You can ask you teacher for the copy of the correct answers.

Note: Satisfactory rating - 3 points Unsatisfactory - below 3 points

Operation Sheet 1- Obtaining infrastructure

ROCEDURE

1. Prepare a check list
2. Identify solutions and bridge the gaps.
3. Undertake cost benefit analysis.
4. Organize and undertake work preparation.
5. Undertake negotiations and optimize infrastructure.
6. Plan and commission infrastructural Works.
7. Identify environmental and waste management requirements
8. Report

LAP TEST	Performance Test

Name……. ID……..

Date…….

Time started: _____ Time finished: _____

Task-1 Go to the a given green infrastructure area and obtain the necessary infrastructural information

LG #40	LO #3- Manage infrastructure

Instruction sheet

This learning guide is developed to provide you the necessary information regarding the following **content coverage** and topics:

- Determining and scheduling Infrastructure maintenance programs.
- Undertaking planning and consultation.
- Managing unplanned maintenance situations.
- Checking and adhering maintenance program.
- Checking and adhering OHS requirements.
- Checking and eliminating the potential detrimental environmental impacts

This guide will also assist you to attain the learning outcomes stated in the cover page. Specifically, upon completion of this learning guide, you will be able to:

- Determine and schedule infrastructure maintenance programs.
- Undertake planning and consultation.
- Manage unplanned maintenance situations.
- Check and adher maintenance program.
- Check and adher OHS requirements.
- Check and eliminat the potential detrimental environmental impacts

Learning Instructions:

1. Read the specific objectives of this Learning Guide.

2. Follow the instructions described below.

3. Read the information written in the “Information Sheets”. Try to understand what are being discussed. Ask your trainer for assistance if you have hard time understanding them.

4. Accomplish the “Self-checks” which are placed following all information sheets.

5. Ask from your trainer the key to correction (key answers) or you can request your trainer to correct your work. (You are to get the key answer only after you finished answering the Self-checks).

6. If you earned a satisfactory evaluation proceed to “Operation sheets

7. Perform “the Learning activity performance test” which is placed following “Operation sheets” ,

8. If your performance is satisfactory proceed to the next learning guide,

9. If your performance is unsatisfactory, see your trainer for further instructions or go back to “Operation sheets”.

3.1. Determining and scheduling infrastructure maintenance programs

Infrastructure maintenance consumes a significant proportion of the organization budget, while the costs borne by the road-using public for vehicle operation and depreciation are even greater. Facilities must be designed and constructed with budget and other applicable constraints. Infrastructure maintenance management is one of the most important components of infrastructure management.

It is the process of developing alternative maintenance strategies and determining the best solution to ensure desired level of service. For many types of infrastructurefacilities, the service life can be extended beyond the original design life by applyingmaintenance treatments. Maintenance strategies are generally considered a sequence oftreatments selected from a list of possible treatments generally available for the facility. Lifecyclecost concepts should be used to determine the difference in costs between variousstrategies. Costs should consider those borne by both user and agency.Maintenance options of an infrastructure facility consist of various routine, preventive, orreactive activities, and other rehabilitation and replacement techniques. Maintenance expenditureis one of the costly infrastructure investments.

From a mathematical point of view, there are two types of maintenance scheduling problems. The first one is network-level problem, wheredecision makers face great challenges of determining which facility is to be repaired, when andhow repairs should be carried out, and what treatment to use. Another is the project-levelmaintenance problem, in which only the maintenance scheduling of one facility is considered.

There are other uncertainties in the infrastructure management process. For example,infrastructure deterioration is a dynamic, complicated, and stochastic process

affected by avariety of factors such as usage, environmental conditions, and structural capacities, as well ascertain unobserved factors. Hence, the performance of an infrastructure facility can never bepredicted with absolute certainty. Ignoring such uncertainties during the modeling process maycompromise the validity of an optimal solution. It is also important to take those uncertaintiesinto consideration when making maintenance resource allocation decisions. Anatural resources infrastructure case is studied as part of these issues.

The following findings indicate that the proposed model and solution procedure is able to solve the maintenance scheduling problem efficiently and effectively. The benefit of using the stochastic programming approach over deterministic approach is also discussed. Stochastic programming solutions, which take future budget uncertainty into consideration, tend to allocate more resource into preventive maintenance than deterministic solution that ignores the uncertainty information. The proposedmethodology can help decision makers effectively obtain optimal maintenance planning underbudget uncertainty. The objective of the organization competence is to develop a network-level infrastructure maintenance scheduling problem under budget uncertainty. The problem was formulated as a multistage, linear stochastic programming model. The proposed model differs from its deterministic counterpart in that it attempts to find the optimal maintenance scheduling plan given the information that future funding is uncertain.

Self-Check – 1	Written test

Name…… ID…… Date…….

Directions: Answer all the questions listed below. Examples may be necessary to aid some explanations/answers. (5points each)

1. What do you mean by undertaking readiness assessment?
2. What are the models that pose key readiness questions?

You can ask you teacher for the copy of the correct answers.

Note: Satisfactory rating - 3 points Unsatisfactory - below 3 points

Information Sheet 2- Undertaking planning and consultation

1.2.Undertaking planning and consultation

Self-Check – 2	Written test

Name…… ID…… Date…….

Directions: Answer all the questions listed below. Examples may be necessary to aid some explanations/answers. (2 points each)

4. Briefly elaborate the steps to be conducted in initiating readiness assessment (10 points)

You can ask you teacher for the copy of the correct answers.

Note: Satisfactory rating - 3 points Unsatisfactory - below 3 points

Information Sheet 3- Managing unplanned maintenance situations

3.1. Situations that require ***unplanned maintenance***are managed within organization guidelines and policy.

Unplanned maintenance=May include, but not limited to:

To rectify machinery or plant breakdown, and damage caused by storm, stock or vandals

Is supplied before accepting a purchased, hired or donated item of plant and equipment

Before acquiring a new item (purchase or donate) item of plant and vehicles, organizations should:

- Ensure that the item of plant and vehicles complies with all applicable Standards e.g. the required Standards before acceptance of a purchased, hired or donated item of plant and equipment.
- Ensure that the designer of the item has performed design notification to the Victorian Workcover Authority, if it is requires design notification under Schedule (Plant) Regulations

Replacements, purchases and sales of plant associated with the use of the item of plant and vehiclesare assessed by a designer; Testing or inspection to be carried out on the plant and vehicles;

Installation, commissioning, use, transport and if the plant and vehicles is capable of being dismantled, dismantling; Systems of work and competencies required of operators;

Emergency procedures (if any) required if there is a malfunction of the plant and equipment;

If applicable, written advice that the plant and equipment is supplied for use as scrap; and

For used plant and vehicles, records kept by the previous owner of the plant and vehicles.

Self-Check – 3	Written test

Name…… ID…… Date…….

Directions: Answer all the questions listed below. Examples may be necessary to aid some explanations/answers. (5 points each)

1. Discuss the reasons behind program redesigning
2. Write the steps conducted to undertake program redesigning.

You can ask you teacher for the copy of the correct answers.

Note: Satisfactory rating - 3 points Unsatisfactory - below 3 points

Information Sheet 4- Checking and adhering maintenance program

3.2. Checks are made to ensure that program specifications are adhered to and amendments are made where necessary.

The organizationis to ensure (Plant) Regulations):

- There is sufficient work area around the plant and equipment to allow it to be used in a safe manner.
- Plant and equipment layout does not affect access and egress to the extent that it causes a risk.
- Inspections have been done to monitor risks associated with plant and equipment installation, erection and commissioning.

- Plant and equipment is not brought into operation unless commissioning has shown it is safe.

Self-Check – 4	**Written test**

Name…… ID…… Date…….

Directions: Answer all the questions listed below. Examples may be necessary to aid some explanations/answers. (5 points each)

1. Why site reconnaissance survey is important for Infrastructure project plane?(7pt)
2. What are the major essential items used for Proper system planning and design to Infrastructure Water Management (6pt)

3. How to Assess proximity of water resource for Infrastructure development plane ?(5pt)
4. How to be Delineate command area based on land use map of the area?(6pt)

You can ask you teacher for the copy of the correct answers.

Note: Satisfactory rating - 3 points Unsatisfactory - below 3 points

Information Sheet 5- Checking and adhering OHS requirements

1.5, identifying of Occupational Health and Safety (OHS) hazards

Occupational Health and Safety requirements

Occupational health and safety is a discipline with a broad scope involving many specialized fields. In its broadest sense, it should aim at:

- the promotion and maintenance of the highest degree of physical, mental and social well-being of workers in all occupations;
- the prevention among workers of adverse effects on health caused by their working conditions;

- the protection of workers in their employment from risks resulting from factors adverse to health;
- the placing and maintenance of workers in an occupational environment adapted to physical and mental needs;
- The adaptation of work to humans.
- Occupational Health and Safety hazards in the workplace are identified and reported to the supervisor. With regard to basic machinery and equipment operation, safety procedures and their application may be discussed with work colleagues or the supervisor.

Hazard: is a source or potential source of human injury, ill health or disease. Anything which might cause injury or ill health to anyone at or near a workplace is a hazard

Classes of hazard

Hazards are classified into five different types. They are

Physical - includes floors, stairs, work platforms, steps, ladders, fire, falling objects, slippery surfaces, manual handling (lifting, pushing, pulling), excessively loud and prolonged noise, vibration, heat and cold, radiation, poor lighting, ventilation, air quality

Mechanical and/or electrical - includes electricity, machinery, equipment, pressure vessels, dangerous goods, forklifts, cranes, hoists

Chemical - includes chemical substances such as acids or poisons and those that could lead to fire or explosion, cleaning agents, dusts and fumes from various processes such as welding

Biological - includes bacteria, viruses, mould, mildew, insects, vermin, animals

Psychosocial environment - includes workplace stressors arising from a variety of sources.

Occupational Health and Safety hazards associated with equipment operation may include

- exposure to loud noise and fumes, solar radiation, dust
- ergonomic hazards associated with posture and vibration
- hazardous substances (fuels, oils, fertilizer), oil and grease spills
- the presence of bystanders, livestock and wildlife

- uneven and varying terrain gradients, potholes, ditches, gullies, embankments, obstacles
    - rocks
    - logs
    - fences
    - debris
    - buildings
- extreme weather conditions, electricity, overhead hazards such as
    - power lines mechanical malfunctions
    - exposed moving parts
    - other machinery including hydraulics

Occupational Health and Safety requirements include:

- the safe operation and maintenance of machinery and equipment
- manual handling, including safe lifting and carrying techniques
- handling and storage of hazardous substances, and the appropriate use, maintenance and storage of personal protective clothing and equipment
- outdoor work including protection from solar radiation, hazardous noise and organic and other dusts
- identifying and reporting hazards
- projection of people in the workplace

Self-Check – 5	Written test

Name…… ID…… Date…….

Directions: Answer all the questions listed below. Examples may be necessary to aid some explanations/answers. (5 points each)

1. List out the tools and equipment used for drawing counturline ?
2. Explain the characteristics of conture lines (10 pts)

You can ask you teacher for the copy of the correct answers.

Note: Satisfactory rating - 3 points Unsatisfactory - below 3 points

Information Sheet 6- Checking and eliminating the potential detrimental environmental impacts

Checks are made to ensure that potential detrimental environmental impacts are minimized or eliminated.

1.1. Environmental action plan Program

The activities of the EAP have been grouped into nine priority programs. These programs summarize the guidelines recommended to government institutions and outline the short and medium term needs for technical cooperation, financial arrangements and institutional strengthening. The priority activities are presented in the form of project outlines that can serve as general terms of reference for subsequent pre-investment or investment studies.

Program 1: Strengthening national environmental management capability

This program will provide the institutional setting and support required to implement the EAP. The program will generate regulations, incentives, and specific instruments to help channel government and private efforts towards sustainable development and improve current and future quality of life. Its immediate objectives are:-

- Establish the National Environmental Council which will help to introduce environmental concerns into national development policy.
- Strengthen Programming and Projects Unit, to coordinate programming and project execution and, to monitor the EAP.
- Support public institutions and provide incentives to the executing agencies to design and implement environmental management activities.
- Strengthen the capacity of to control and regulate environmental quality.

- Undertake the studies and activities required to execute the programs and projects of the EAP.
- Strengthen the capacity to regulate waste recycling and control dissemination of non-biodegradable materials.
- Introduce the environmental dimension in economic and budgeting policies of the nation.
- Strengthen international level activities concerning environmental management.

Program 2: Conservation and sustainable use of biodiversity and genetic reserves

This program is to analyze the information contained in the national physical and biological database, and propose how the information should be incorporated in the formulation of development policies. It also supports the establishment and management of conservation areas. These areas constitute scientific, technological, scenic, and cultural reserves which can support medium- and long-term development.

- Creation of a national system of protected areas
- Ecotourism development
- Conservation
- Production of native fauna

Program 3: Coastal zone management and reclamation

This program will provide incentives and other instruments to regulate management of the country's coastal areas. It includes reclamation and conservation of those beaches and landscapes under greatest pressure from tourism and other uses. Reclamation efforts are to include beach conservation and renewal; beach cleanups; user education; development of alternatives for recreation; and, gearing legislation to coordinate objectives of national and departmental authorities. Other areas, such as those that are being overtaken by uncontrolled tourist settlements, also require specific actions and solutions.

- Coastal zone management
- Conservation and restoration
- Coastal zone and legislation for coastal conservation
- Zoning of tourist settlements

Program 4: Management of critical watersheds

This program's intent is to restore the productive capacities of watersheds, decrease the level of controversy over their use, and strengthen local and national capabilities to guide sustainable development. Because each watershed suffers specific problems, separate actions that tit within the overall national framework of the project as well as within the policies of regional integration are justified.

Program 5: Environmental sanitation

This program will generate and support solutions to eliminate current soil and water contamination problems caused by deficient or insufficient handling of urban effluent and solid wastes. It may also help to generate air quality information on a national basis. Some of the more important projects of this program are:

- Development of treatment plants for urban liquid wastes
- The introduction of a system of control standards for air contamination
- Sanitation project for the Interior of the country
- Sanitation of area
- Development of appropriate technologies for the disposal
- Management of the solid wastes
- Environmental sanitation

Program 6: Reclamation and sustainable use of natural resources and ecosystems

This program will demonstrate the economic value of good management by redirecting the use of natural systems and resources so that their conservation and continued use are assured. There are four components.

- Afforestation
- Valuation of the natural services provided by forests
- Sustained livestock production on natural pastures
- Land-use zoning

Program 7: **Energy for sustainable development**

The program seeks to support use of environmentally benign energy resources (i.e. wind), and greater energy saving through new technologies for home heating including low-cost housing projects.

- Wind-power farm
- Household energy conservation

Program 8: Environmental education

The proposed program is based on two complementary projects geared to: i) inspire mature, responsible attitudes regarding sustainable development and the carrying capacity of ecosystems and natural resources; and, ii) provide incentives for responsible, ethical, and impartial behavior. The projects will address the formal education sector and the development of non-formal mechanisms of education and organized social participation.

- Environmental education projects of the National Administration of Public Education (NAPE)
- Informal environmental education
- Environmental Sciences Institute

Program 9: Support of economic policy and environmental management

This program will generate a System of Environmental Accounts that will supplement the current system of National Accounts and the Natural Resources Accounting System.

- Establishment of a national system of environmental accounts
- System of natural resource accounts

Self-Check – 6	Written test

Name…… ID…… Date…….

Directions: Answer all the questions listed below. Examples may be necessary to aid some explanations/answers. (5 points each)

1. Discuss the reasons behind program redesigning
2. Write the steps conducted to undertake program redesigning.

You can ask you teacher for the copy of the correct answers.

Note: Satisfactory rating - 3 points Unsatisfactory - below 3 points

Operation Sheet 1- Undertake developing soil map

PROCEDURE:

1. Collect the necessary materials
2. Subtledifferences in slope gradient or configuration, in landform, and in vegetation since it is important indicators of soilboundaries
3. Using Aerial photographs provide important clues about kinds of soil from the shape and color of the surface and the vegetation. The relationships between patterns of soil and patterns of images on photographs can be learned for an area. These relationships can be used to predict the location of soil boundaries and kinds of soil within them.
4. Before an area is surveyed, making a careful stereoscopic study
5. Look for Important features that can be accurately identify are sketch lightly on the photograph. Some features can be determined with more certainty than others. mark Images that help identify obscure Use the following steps as a preliminary study.
6. Sketch Drainage ways, streams, and ponds
7. Identify Roads, buildings, and other location references.

8. If soils have been mapped along the match line with an adjacent photograph, the soil boundaries aretransfer to the outside edge of the match line. Some soil boundaries can be tentatively extended onto theunmapped sheet.
9. Additional features can be lightly penciled if they can be identified with confidence: boundaries of flood plainsand stream terraces, boundaries of wet areas and water, prominent landforms such as escarpments and areasof rock outcrop, gravel and borrow pits, ridge lines, sinkholes and wet spots.
10. Plotting soil boundaries.
11. After a delineation has been identified and crossed, the soil scientist turns and looks back on the landscape from a new vantage point. A final judgement is made on the boundaries and symbols. If mapping is done on an aerial photograph, the photographic images are checked against the landscape features before the final boundaries aresketched.

LAP TEST	**Performance Test**

Name……. ID……..

Date…….

Time started: _____ Time finished: _____

Instructions: Given necessary templates, tools and materials you are required to perform the following tasks within **3** hour. The project is expected from each student to do it.

Task-1 Go to the rural kebele area proximity to your college &Collect and Collet the necessary data, undertake plot topography and soil survey data on property map, write a report and present it.

LG #41	LO #4- Record and manage information

Instruction sheet

This learning guide is developed to provide you the necessary information regarding the following **content coverage** and topics:

- Analyzing the recorded data, observations and documentation.
- Preparing recommendations for future plans.
- Preparing a report.
- Keeping Records and documentation.
- Completing records and documentation.
- Documenting the recorded information.

This guide will also assist you to attain the learning outcomes stated in the cover page. Specifically, upon completion of this learning guide, you will be able to:

- Analyze the recorded data, observations and documentation.
- Prepare recommendations for future plans.

- Prepare a report.
- Keeprecords and documentation.
- Complete records and documentation.
- Document the recorded information.

Learning Instructions:

10. Read the specific objectives of this Learning Guide.
11. Follow the instructions described below.
12. Read the information written in the “Information Sheets”. Try to understand what are being discussed. Ask your trainer for assistance if you have hard time understanding them.
13. Accomplish the “Self-checks” which are placed following all information sheets.
14. Ask from your trainer the key to correction (key answers) or you can request your trainer to correct your work. (You are to get the key answer only after you finished answering the Self-checks).
15. If you earned a satisfactory evaluation proceed to “Operation sheets
16. Perform “the Learning activity performance test” which is placed following “Operation sheets” ,
17. If your performance is satisfactory proceed to the next learning guide,
18. If your performance is unsatisfactory, see your trainer for further instructions or go back to “Operation sheets”.

Information Sheet 1- Analyzing the recorded data, observations&documentation

1.1. Introduction

A data management plan is one component of the data management protocols you will need to put in place. The data management plan outlines the methods and the responsible party for collecting, entering, storing, and analyzing data and conducting quality assurance. In addition to the data management plan, you will need to establish policies and procedures for storing, transporting, and/or disposing of data; for guaranteeing confidentiality; and for ensuring ongoing data quality.

The Importance of Good Data

Identifying the key questions is only a first step. The next step, data analysis, requires the availability ofhigh-quality, targeted data in a format that helps to address the questions. Organization makingintensive use of data from state-mandated assessments stress how important it is to have data available that:

- can be easily disaggregated not only by organization but by stakeholder and specific groups of other; and
- provide a detailed analysis of results by objective or skill in addition to overall infrastructures.

Although much of the current emphasis on using assessment data began with data from high-stakes tests, schools and districts that are the most effective users of assessment data have begun to recognize and capitalize on the power of infrastructure assessment

1.2. Using geographical information system

We now have sophisticated computerized geographic information systems. They use integrated spatial (geographic) and textural (attribute) databases to help monitor, analyze and model planning situations as well as make presentations . In fact, some municipalities are using geographic information systems within their "corporate" function for a wide variety of tasks, such as tracking citizen complaints, monitoring expenditures, and assessing growth potentials.

A Geographic Information System (GIS) is one "in which data has some spatial or geographical referent, this data being ordered according to this referent, and displayed by software in such a form that some spatial analysis is possible" It usually consists of the following components:

- **Data input processing** — the transformation of spatial and non-spatial information from both printed and digital files into a GIS database. A variety of methods may be used: digitizing, satellite images, scanning, keyboard entry, etc. The sources of the data may include maps, aerial photography, remote sensing, existing data sets and so on.
- **Data storage, retrieval and database management** — the handling of data at different spatial scales and levels of resolution through the use of a database management system (DBMS).
- **Data manipulation and analysis** — operations such as geometric calculations, topological operations, spatial comparison operations, multilayer spatial overlay and network analysis.
- **Display and product generation** — statistical reports, maps or graphics.
- **User interface** — the interactions between the user and the GIS software.

Too often, too much information is gathered to serve no specific planning purpose. Information must be relevant to the intention for which it is gathered and it must facilitate the kinds of analysis and synthesis of which the planning agency is capable. Therefore, definitions and measurements of data must be meaningful to the planning problems or objectives at hand, and capable of spatial and locational analysis. For example, in analyzing the need for commercial and retail space, the number of employees may be a more relevant piece of information than the amount of sales.

There are four important considerations in designing an information system. First, the immediate utility of information has to be balanced against its future or on-going use. This means one should aim for a system which has a standardized format, is adaptable to machine use, and is capable of being updated. Of course, the benefit must be weighed against the cost of collecting, processing and retrieving the information.

Second, since information is to be gathered by many people and used by many different people again, it is necessary to ensure consistency and accuracy in the information collection phase. Surveys should be pre-tested, there should be adequate training for interviewers and field observers, and the field work has to be carefully monitored. The completeness of the information should be checked immediately so that remedial action can be taken before the survey is over. The coding should be consistent and carefully controlled.

Third, the way that information is classified and stored should be flexible enough to allow for new information to be added, for the information to be used for various kinds of analysis, and for new information technology to be incorporated, especially the use of new computer software and hardware. An equally important issue is the comparability between the information collected and the information that can be obtained from other sources, such as censuses. In this regard, compatible measurement units and definition of terms are essential, as well as the spatial units and the coverage of the survey.

Fourth, surveys should be conducted smoothly and economically. In this respect it is particularly relevant to consider carefully whether the survey should be done by information specialists or by the planning personnel. In-house information sources must be considered first, such as development application records and previous planning studies. It is better to have less information than the wrong information.

Self-Check – 1	Written test

Name…… ID…… Date…….

Directions: Answer all the questions listed below. Examples may be necessary to aid some explanations/answers. (5points each)

3. What do you mean by undertaking readiness assessment?
4. What are the models that pose key readiness questions?

You can ask you teacher for the copy of the correct answers.

Note: Satisfactory rating - 3 points Unsatisfactory - below 3 points

Information Sheet 2- Preparing recommendations for future plans

1.2. Preparing recommendations for future plans

Recommendations for future plans are prepared based on the analysis of the data.

In any organization using data to make decisions, a key step should be developing the right questions.

- What should organization have, and how should they be able to use what they have?
- How well should organization perform?
- What will we do to assess organization performance?
- How well do organization actually perform?
- What will we do to improve organization performance?

Self-Check – 2	Written test

Name…… ID…… Date…….

Directions: Answer all the questions listed below. Examples may be necessary to aid some explanations/answers. (2 points each)

5. Briefly elaborate the steps to be conducted in initiating readiness assessment (10 points)

You can ask you teacher for the copy of the correct answers.

Note: **Satisfactory rating - 3 points** **Unsatisfactory - below 3 points**

Information Sheet 3- Preparinga report

1.3. Preparinga report

The scope of a infrastructure plan may vary between only the physical aspects of land and its use to all aspects of government functions. The degree of detail can range from broad-brush sketches of the whole area to detailed prescriptions of the external appearance of buildings. Its functions can vary between policy guidance to civic education. There is really no such thing as typical contents. on the format and content of a area-wide or area-wide infrastructure plan is perhaps still the most logical and precise statement of how a infrastructure plan can be organized. In fact, the organization and contents of most of the municipal general plans we have can be readily related to Kent's prescription. Site-specific, land-use-type-specific, or function-specific plans may also have similar logic and organization.

The following is a very brief outline of his recommended format and content of a plan.

1. Introduction

- The agency responsible for drafting the plan, the purpose of the plan, and the organization of the contents.
- The mandate and the limits of power of the local government in development and redevelopment of land.
- A brief description of how the plan is to be implemented (this section may be placed later).
- Present situation, issues and problems,
- The function of planning.
- The scientific basis of planning. This includes the analysis of the present situation and prediction of the future. The following topics are usually included: history, geography, population, economy, environment, land, housing, and public facilities and infrastructure. Only the major findings should be reported here. The relevant data and analytic techniques used should be placed in an appendix.

2.Summary

This is a brief outline of the plan. It should be as complete, precise, and simple as possible. Both text and graphics should be used.

3. Social and Economic Goals to be Pursued and the Planning Concept Use

4. The Text of the Plan

- Basic development policies, including programming and design considerations.
- Living and working area plan.
- Community facilities plan.
- Forest area design.
- Transportation plan.
- Utilities and infrastructure plan. (vii) Others.

5. **Conclusion**

- Implementation, including control regulations, capital works programming, and inputs from, and actions by, other levels of government and agencies.
- Amendment procedure
- Appeal procedure.

6. Appendices

- The legislative text of the plan.
- Background studies.
- Supplementary reports such as documents of consultation with other agencies and records of public participation.
- Planning techniques employed.

The report should really be directed to three interested parties:

- the local government for which it will be a policy guidance to its own investments and the control of private action;
- the general public for whom it will be an information and discussion document; and
- developers for whom it will be a guide and a brief of what can or cannot be done. Both written texts and maps or other graphics should be used to describe the planning area or subareas, to outline the policies as they affect the various areas, to show the coordination with other government policies, plans, and programmes, to show the relationship between planning areas, and to indicate the phasing and implementation of the plan

Self-Check – 3	Written test

Name…… ID…… Date…….

Directions: Answer all the questions listed below. Examples may be necessary to aid some explanations/answers. (5 points each)

3. Discuss the reasons behind program redesigning
4. Write the steps conducted to undertake program redesigning.

You can ask you teacher for the copy of the correct answers.

Note: Satisfactory rating - 3 points Unsatisfactory - below 3 points

Information Sheet 4- Keeping records and documentation

Keeping records and documentation

Recordkeeping is the making and maintaining of complete, accurate, reliable evidence of required information. Recordkeeping systems are required information systems capable of:

- capturing
- maintaining and
- Providing access to records over time.

Recordkeeping do not just have to manage records - they can perform other business functions as well. Having the capacity to capture, maintain and provide access to records is however crucial.

The followings are the format for keeping and documenting infrastructures

Socio-economic Baseline

I. Basic Information

Planning Year/ Year in which Data taken: _____Region (Name):_____

Zone (Name): _____ Woreda _____ Kebele (Name):_____

Basin _____ Sub-Basin_____ Major Watershed _____

Sub-Watershed_____

Table 1.4: Community watershed team record

Name of Micro watershed	Area in Ha	Distance from Woreda	Altitude (masl)		Outlet Coordinate	
			Max.	Min.	X	Y

Community Watershed Team				
No	Name	Sex	Title/position	Remark
1				

2				
3				
4				
5				
6				
7				
8				
9				
10				
11				
12				

Table 1.5: Population data

Population data											
No of Household Heads				Micro-Watershed population			Average family size	Age Class in years			
	Male	Female	Total	Male	Female	Total		up to 17	18 - 35	36 - 60	> 60
No											
(%)											

II. Problem and solution analysis

(i) Identification and prioritization of major problems, root causes and solutions to address them: (Preliminary)

Table 1.6: Problem identification

Sector	Major problems	Problem ranking	Root causes	Measures/ solutions to address the problems/ root causes

Crop				
Livestock				
Natural Resource (Land, Forest, Water)				
Infrastructure (road, irrigation structures, water supply structure), and social services (school, health centers, FTC, market)				
Other socio-economic problems				
Others: specify				
Any remark made can be written down here:				

III. Agriculture – crop production

Table 1.7: Main crops and their coverage in the micro-watershed

No	Meher (main rainy season) crops	Area (ha)	Productivity (qt/ha)	Belg (small rainy season) crops	Area (ha)	Productivity (qt/ha)
1						
2						
3						
4						
5						
6						

Table 1.8: Crop calendar, (fill in months of the year)

Major crops	Ploughing frequency (1^{st}, 2^{nd},3^{rd},4^{th})	Sowing	Weeding	Harvesting	For food/market

- Existing crop rotation system including fallow

Crop 1_____year _____ from month _____to month _____
Crop 1_____year _____ from month _____to month _____
Crop 1_____year _____ from month _____to month _____
Crop 1_____year _____ from month _____to month _____

- Describe the crop rotation trend for the last ten years

_____

_____

Table 1.9: Crop coverage, Variety and yield in the watershed

No	Type of crop	Variety	Coverage in ha	Productivity (qt/ha)	
				Good season	Bad season

Table 1.10: Fertilizer usage and application

Type of fertilizer	Fertilizer Application (qt/ha)			Remark
	High (>75% of HHs)	Medium (50-75%)	Low (<50%)	
DAP				
UREA				
Organic fertilizer				
Others				

IV. Natural Resources

(i) Land Use

Table 1.17: Land use of the watershed

Current Land use	Area (ha)	Area (%)
Forest land		
Cultivated land		
Grass/ grazing land		
Other land use (swamps/ marshy land, settlement, water bodies, etc)		

Table 1.18: Status of forest in the Micro-watershed

Forest area (in ha)	Forest type		Type of ownership
	Plantation	Natural	

Table 1.19: Type of tree and shrubs available in the watershed

Type of tree & shrubs	Current/ or possible use	Type of land use where it is growing	Propagation techniques	Remark

Table 1.20: Source of fuel wood, (mark, XXX for very common, XX for common, X for rare, and 0 for nil)

Fuel source	Dry season	Wet season	Availability
Fire Wood			
Charcoal			
Animal dung			
Crop residues			
Others (specify)			

Who is responsible for collection of dung? _____

Describe the main problem related to fuel wood availability and fetching? _____

_____

_____

How long does it take for an individual to collect fuel wood? _____

What is the status of private forest ownership? _____

Total number of households who have access to the forest area

Total: _____Male: _____Female: _____Average forest area (ha) _____

Describe if there is natural forest in the watershed, area (in ha) and major species combination?

_____

_____

How the natural forest management looks like?

_____

_____

_____

Source of seedlings Distance from the watershed in Km

- Individual _____
- Government _____

- NGO's _____
- Others _____

Describe how the community addresses problems related to fuel and construction wood?

_____

_____

_____

_____

(ii) Water resources

Table 1.21: Source of water in the watershed

Source of water	Amount in Number	Purpose (what it is used for currently)	Average distance (km)	Flow seasons	Which source is used in the seasons (mark x as appropriate)	
					Rainy season	Dry season
River						
Spring						
Pond /Birka						
Well /Ela						
Lake						
Dam						
Other						

- Who is responsible to collect water? _____
- How long people travel to collect water (in km and hour)? Rainy season? _____Dry Season?_____

- How long livestock travel to get water (in km and hour)?_Rainy season? _____Dry Season_____
- Describe any issues/ problems related to access to water for domestic use (both human and livestock consumption) and how the community addresses the problems?

_____

_____

_____

_____

_____

Table 1.22: Water harvesting and small-scale irrigation

Existing structures	Quantity in No	Number of Beneficiary	Irrigated land (ha)	Potential irrigable land (ha)	Irrigation method utilized

Is there water source that is not used for irrigation? Why?

_____

_____

_____

Described if there are unused irrigation structures in the watershed? and why?

_____

_____

_____

Describe problems with regard to irrigation and water harvesting in the area?

_____

_____

_____

Land administration and certification (use this part only if it is applicable) When did land registration and documentation start? _____

No of households, which received first level certificate in the watershed?

Male _____ Female _____ Total _____

No of households which received second level certificate in the watershed?

Male _____ Female _____ Total _____

Is there any land management and utilization change after the provision of certificates?

_____

_____

Did land certification contribute for natural resource conservation, state some examples if any?

_____

_____

V. Social infrastructure and services, market and labor supply/ availability

Table 1.23: Distribution of Social infrastructure and service institutions in the watershed

No	Services/ Institutions	Location in the watershed or Outside		Distance from watershed	Remark
		Inside	Outside		
1	Road				
2	Market				
3	School				
4	Health center				
5	FTC				
6	Kebele administration				
7	Telephone				
8	Electric				

Table 1.24: Market supply and demand of goods in the community

No	Produce/goods for market supply	Demand of goods from the market

Table 1.25: Labor supply/ availability in the seasons

No	Month	Labor supply/ availability		
		High	Medium	Low
1	September			
2	October			
3	November			
4	December			
5	January			
6	February			
7	March			
8	April			
9	May			
10	Jun			
11	July			
12	August			

VI. Climate change – Community Knowledge, Attitude and Practice (KAP)

1. What do you understand by the term climate change?

WRITE IN _____

_____

2. How did you know about it?
    1. From your life experiences
    2. Heard from the media
    3. From relatives, neighbors etc. (Word of mouth)
    4. Through training courses at farmer/pastoral training centre
    5. From DAs
    6. From Woreda experts/official
    7. Other PLEASE SPECIFY _____

3. What do you think is the main cause of Climate Change? DO NOT READ OUT

    1 Human activity
    2 An act of God
    3 Something else
    4 Don't know

4. How worried are you about the impact of climate change on your livelihood?

    1 Very worried
    2 A little worried
    3 Not worried at all
    4 Don't know DO NOT READ OUT

5. Which of the following climate shocks have you experienced in the past year? READ AND THICK ALL (can be more than one)
    1 Flood
    2 Drought
    3 Increased temperatures
    4 Frost

5 Heavy rain

6 Hailstorm

7 Erratic rainfall

8 None

6. How can you protect your livelihood from climate shocks? READ AND THICK THAT ARE AGREED

A Crop diversification

B Water harvesting

C Diversifying income sources (e.g. through non-agricultural work)

D Migration

E Doing soil conservation activities on my farmland

E Planting trees

F: Other SPECIFY _____

F Don't know

Self-Check – 4	Written test

Name…… ID…… Date…….

Directions: Answer all the questions listed below. Examples may be necessary to aid some explanations/answers. (5 points each)

5. Why site reconnaissance survey is important for Infrastructure project plane?(7pt)
6. What are the major essential items used for Proper system planning and design to Infrastructure Water Management (6pt)
7. How to Assess proximity of water resource for Infrastructure development plane ?(5pt)
8. How to be Delineate command area based on land use map of the area?(6pt)

You can ask you teacher for the copy of the correct answers.

Note: Satisfactory rating - 3 points Unsatisfactory - below 3 points

1.5. Completing records and documentation

Self-Check – 5	Written test

Name…… ID…… Date…….

Directions: Answer all the questions listed below. Examples may be necessary to aid some explanations/answers. (5 points each)

3. List out the tools and equipment used for drawing counturline ?
4. Explain the characteristics of conture lines (10 pts)

You can ask you teacher for the copy of the correct answers.

Note: **Satisfactory rating - 3 points** **Unsatisfactory - below 3 points**

Information Sheet 6- Documenting the recorded information

6.1. Documenting the recorded information

Self-Check – 6	Written test

Name…… ID…… Date…….

Directions: Answer all the questions listed below. Examples may be necessary to aid some explanations/answers. (5 points each)

3. Discuss the reasons behind program redesigning
4. Write the steps conducted to undertake program redesigning.

You can ask you teacher for the copy of the correct answers.

Note: Satisfactory rating - 3 points Unsatisfactory - below 3 points

Operation Sheet 1- Undertake Recording

PROCEDURE:

PROCEDURE

1. Collect and collate climatologically (monthly total rainfall in mm of the last 1 yrs.of your area.
2. Collect and collate longitude, latitude, altitude, mean monthly temperature of the last 1 years of the area,
3. Collect and collate mean monthly wind speed, relative humidity and sunshine hours of the last years of the area, mean monthly pan evaporation data of the the area)
4. Collect and collate The mean monthly discharge of stream or river of the last 10 years of the area
5. Collect and collate The types soil and existing moisture condition of the cropping area,
6. Collect and collate Types of crops and their characteristics as well as their respective area
7. Finally report and document it in summary form and graphically

LAP TEST	Performance Test

photograph, the photographic images are checked against the landscape features before the final boundaries are sketched.

Name……. ID……..

Date…….

Time started: _____ Time finished: _____

Instructions: Given necessary templates, tools and materials you are required to perform the following tasks within **3** hour. The project is expected from each student to do it.

Task-1 Go to the rural kebele area proximity to your college &Collect and Collet the necessary data, undertake plot topography and soil survey data on property map, write a report and present it.

Reference Materials

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WEB ADDRESSES

1. Soil http://www.geolab.nrcan.gc.ca/geomag/e_cgrf.html
2. http://www.navcen.uscg.gov/gps/default.htm.
3. FAO):http://home.gdbc.gov.bc.ca/
4. PME Ltd (subscription based):http://www.terrapro.bc.ca
5. Soil map implementation http://www.nrcan.gc.ca/gsc

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