



**Hashemite Kingdom of Jordan**



**GUIDE**  
**on**  
**Performance Audit**  
**of**  
**Solid Waste Management**  
**2019**

In cooperation with the World Bank

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## INTRODUCTION

In line with the Audit Bureau Law No. (28) for the year 1952 and amended by Law No. (36) for the year 2018, through which work in accordance with international standards has become a prerequisite for the work of the Bureau, it has become necessary to document all executive procedures for all audit tasks so that they are a basic reference for all auditors in clarifying work procedures systematically and in accordance with the international INTOSAI standards so that all available resources are optimally utilized, and reduce the time and effort expended in carrying out those tasks.

In implementation of this, work has been done by the Directorate of Performance and Environmental Audit at the Audit Bureau, in cooperation with the World Bank, to prepare a manual of work procedures to evaluate the performance of solid waste management in the municipalities of the Kingdom, in which it shows the procedures to be followed in sequence to assess the efficiency of solid waste management in those municipalities.

## THE PURPOSE OF PREPARING THE GUIDE

The main objective of preparing this guide is the importance of having a basic reference on which to be relied on by the auditors of the Audit Bureau when carrying out environmental audit tasks on the issue of solid waste management in all municipalities of the Kingdom in the future. This will have a direct impact on encouraging all field audits at the Audit Bureau to carry out audit tasks related to the performance audit of solid waste management in all municipalities of the Kingdom, especially with the commitment of the Jordanian government to implement the 2030 Sustainable Development Goals (SDGs), where the issue of solid waste management is included in the eleventh goal. (sustainable cities and communities).

## METHODOLOGY FOR PREPARING THE GUIDE

The methodology that was followed in preparing this guide is represented in the performance audit methodology in accordance with the international standards INTOSAI (3000-) (INTOSAI 3999), which explains all stages of the implementation of performance audit. The guide explains the procedures to be followed in detail in the following stages: the planning stage, the fieldwork stage, report writing stage, and follow-up stage, in addition to documenting all field procedures and documents to be obtained, and how to analyze the documents obtained to derive the preliminary results of the audit and strengthen them with the necessary evidence.

All procedures and documents that were implemented by the work team formed by the Audit Bureau were relied on to evaluate the performance audit of solid waste management in each of the following municipalities: Greater Irbid, Greater Ajloun, and Greater Mafraq during the period (2015-2018) and under the supervision of a specialized team from the International Bank, as it was chosen to be the basic core for preparing this guide.

**Solid Waste Management**

A group of works related to solid waste, including the stages of sorting, collecting, transporting, storing, treating, recycling and terminal disposing.

**Solid Waste**

Solid and semi-solid materials resulting from any activities that must be treated or disposed of and are not included in the definition of harmful and hazardous waste contained in the System of Harmful and Hazardous Substances Management, Transport, and Handling.

**Municipal Waste:**

Waste generated from households, as well as other waste which by its nature or composition is similar to household waste.

**Hazardous Waste:**

Waste that has one or more characteristics, which may pose a danger to human health and the environment because of its origin and composition.

**Non-Hazardous Waste:** Wastes not covered by the definition of "hazardous waste"

**Inert Waste:**

Wastes that are not subject to any physical, chemical, or biological transformations, are insoluble or incinerated, are not physically and chemically reactive, are not subject to organic decomposition, and do not negatively affect any material they come into contact with in a way that is likely to increase environmental pollution or harm human health

**Industrial Waste:**

All non-hazardous waste are generated by industries and industrial facilities (which may also include small quantities of waste generated from restaurants, offices, or retail centers in the same industrial area).

**Biodegradable Waste:**

Which can take place aerobic or anaerobic decomposition, such as food waste (food leftovers), gardens, paper, and cardboard.

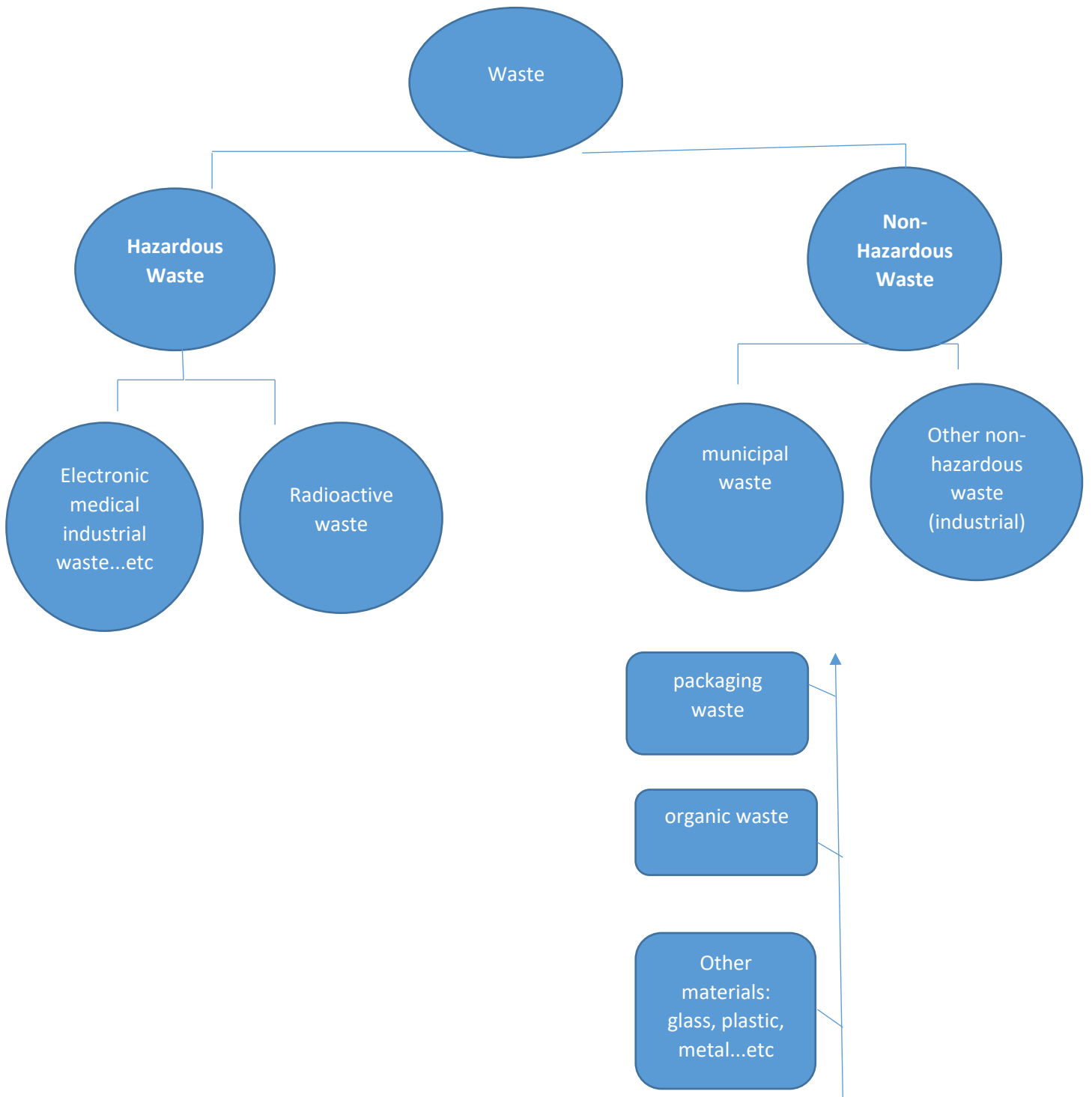
**Liquid Waste:** Any waste in liquid form, except sludge

**Medical Waste:**

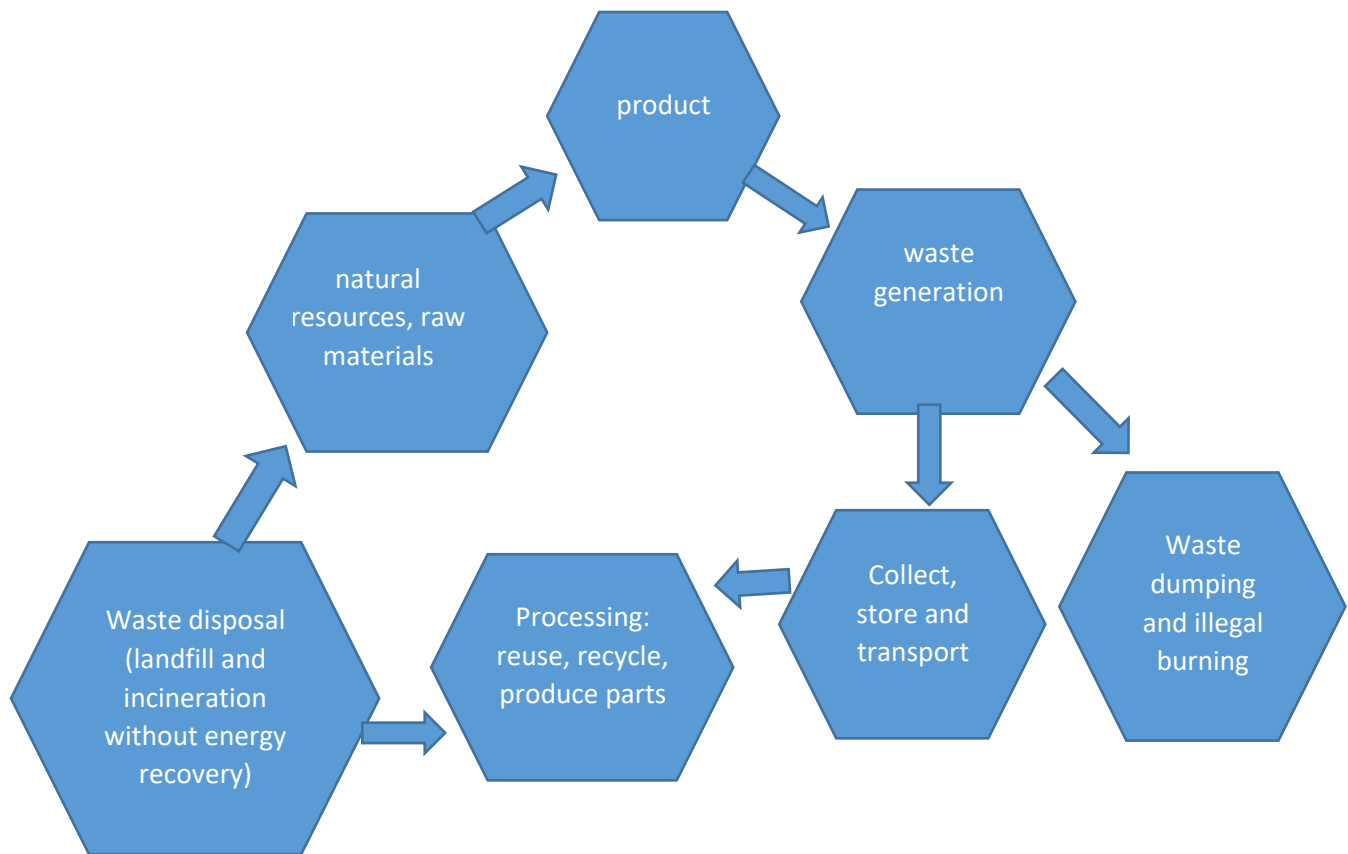
That is generated from diagnosis, treatment, or vaccination of humans or animals, and related researches.

**Special Waste**

Which have specific management and final disposal problems and need special treatment such as used lubricants, tires, depreciated vehicles, batteries, and electronics.



**Diagram (1): Waste classification**



**Diagram (2): Product life cycle/waste stream**

### **\*Legal framework of solid waste management**

Due to the comprehensiveness and importance of the issue of solid waste management, the performance audit of solid waste management requires the participation of many official and local bodies. Therefore, the audit process should take place at different levels.

The bodies related to solid waste management include the following:

#### **Ministry of Environment:**

As the official entity responsible for regulating the solid waste management process in Jordan.

#### **Ministry of Municipal Affairs:**

Municipalities or joint service councils and landfills, except Greater Amman Municipality, Aqaba Special Economic Zone, and Petra Development Zone.

#### **Cities and Villages Development Bank.**

The following laws, regulations, and instructions for solid waste in Jordan can be referred to:

#### **The legislative framework of the Ministry of Municipal Affairs:**

A: Municipalities Law No. 41 for the year 2015

B: Joint Services Councils Regulation No. 113 for the year 2016

C: The Law of Preventing hazards and Waste Collection Fees within the Municipalities Area No. (68) For the year 2016

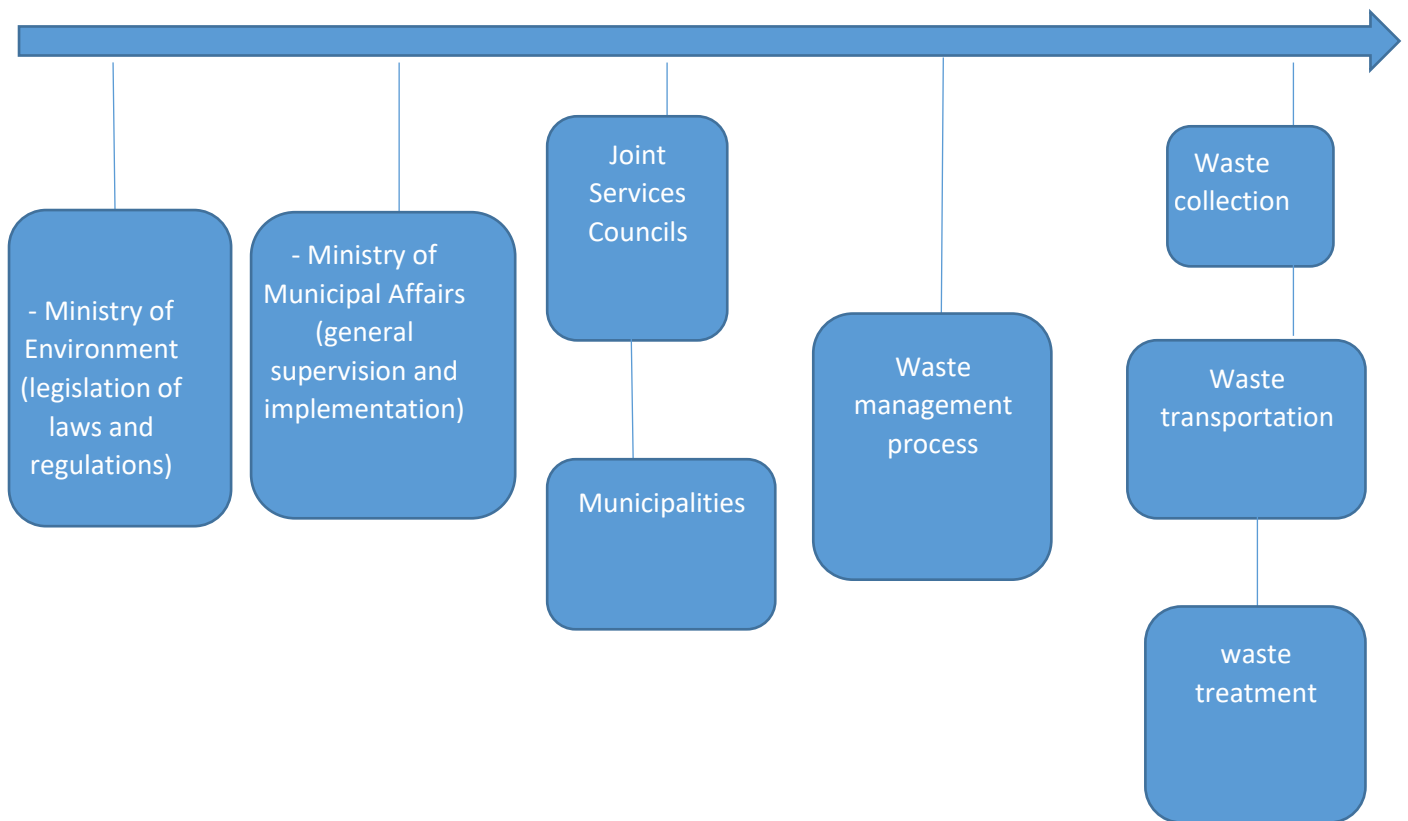
#### **The legislative framework of the Ministry of Environment:**

A: Environmental Protection Law No. 52 for the year 2006

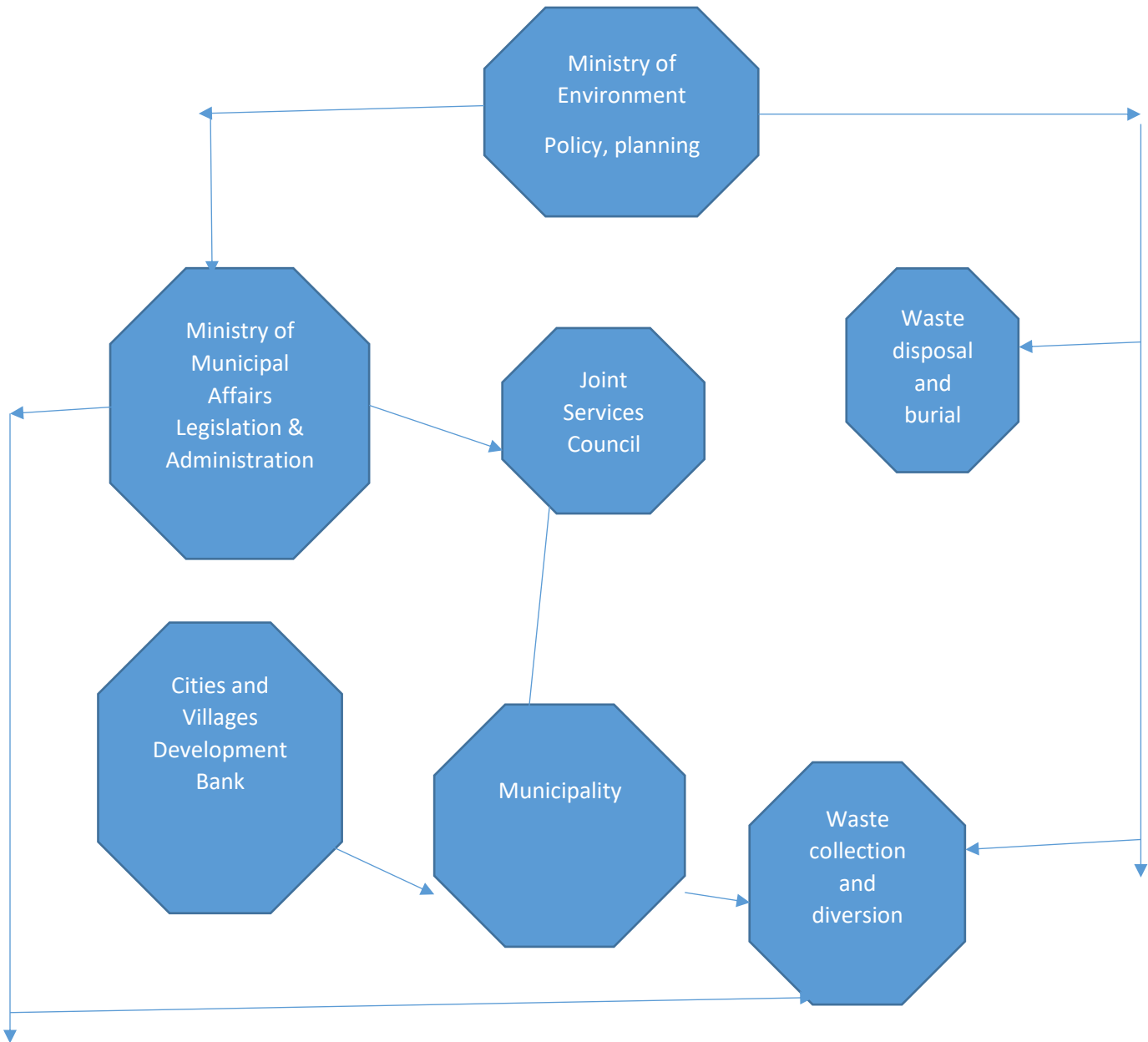
B: Solid Waste Management System No. 27 for the year 2005

C: Solid waste management framework (underway)

The below diagram shows the stages of solid waste management that are audited by the work team:



**Diagram (3): The Stages of solid waste management**



**Diagram (4): Solid waste Management related Parties**

It is worth noting that the Audit Bureau monitors the evaluation of all parties related to solid waste as an external audit.



## AUDIT STEPS:

### planning stage

-Initial Survey stage

1

- The stage of preparing the audit program (the audit plan)

field work stage

2

The stage of writing the report and issuing it in its final form

3

Follow-up stage

4

## FIRST: THE PLANNING STAGE

### **Initial survey stage:**

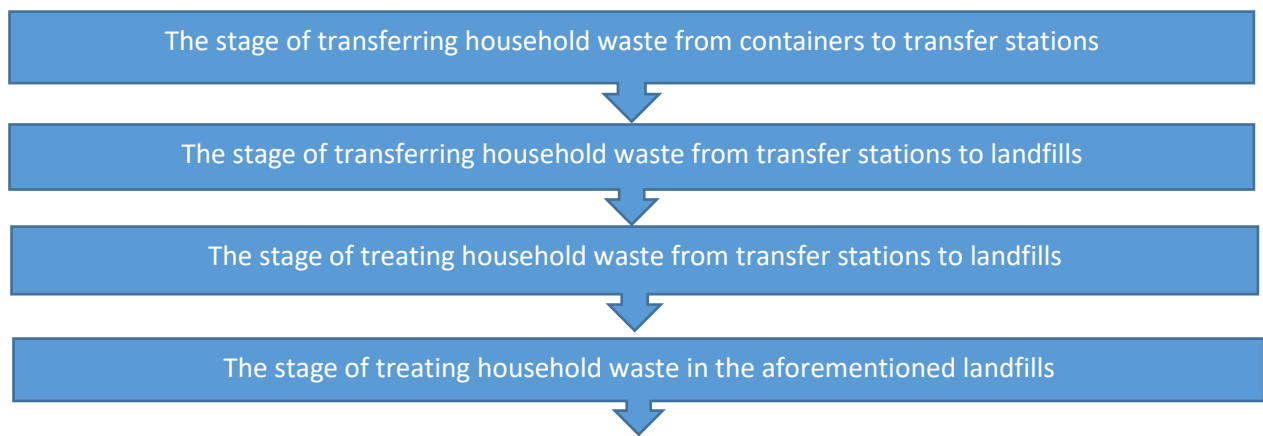
The main objective of this stage is to understand the subject of the evaluation by collecting basic information that helps the work team in deciding on the possibility of implementing the subject, and thus helps the team in preparing the audit plan, including the objectives and audit questions, in addition to defining the scope of the audit and the timetable for carrying out the task.

### **The following steps must be followed at this stage:**

1- Determine members of the team required to carry out the task.

- 2- Holding a brainstorming session among the working team members to determine the main topics of the subject of the assessment and the necessary documents to be collected.
- 3- Carrying out a field visit to the concerned municipality to inform the administration of the nature of the task that will be implemented and taking the necessary data to communicate with the teamwork (names of the concerned staff, their phone numbers, e-mail).
- 4- Focusing on the importance of continuous communication through a liaison officer with the municipality staff in charge of solid waste management and establishing a relationship that enables the smooth exchange of data and opinions.
- 5- Preparing a memorandum to the concerned municipality requesting data that include the most important documents necessary to form a clear vision of the issue of solid waste management in the concerned municipality. As shown in Model No. (1).
- 6- Studying and reviewing relevant documents to gain a comprehensive perspective of the nature of solid waste management.
- 7- Hold meetings with concerned staff again if necessary to inquire about some of the data collected.
- 8- Preparing the initial survey report that includes the following themes:
  - Introduction: includes a brief overview of the subject matter of the assessment. As shown in Form No. (2)
  - Justifications for choosing the topic: To enhance the institutional capabilities of the State Audit Bureau in financial auditing and performance auditing at the municipal level, and to determine the importance of the effective role played by solid waste management in securing a safe and clean environment as a basic service provided by local municipalities to citizens, and the impact of negligence in providing this service on the local environment and the health of citizens. As shown in Model No. (1)
  - Audit objectives: These include the main audit objective and the sub-objectives emanating from it. As shown in Form No. (4)
  - **Scope of the audit:** so that the scope includes the following: As shown in Form No. (5)  
Type of audit (performance - commitment).
    - Field and scope of the audit.
    - Selected municipalities.
    - Types of waste included in the audit.
    - Exceptions from the scope.
    - Landfills covered by the audit.
    - Stages of waste management included in the audit (collection - transport - disposal):

The stage of collecting waste from residential neighborhoods and shops until it is placed in containers



9- Preparing an official letter to form the work team: The stage of preparing the audit plan ends with preparing official letters addressed by the President of the Audit Bureau to each of the Ministry of Environment, the Ministry of Municipalities, the heads of the concerned municipalities, the heads of the joint services councils, specifying the nature of the task and the names of the members of the task team and the requesting the concerned to facilitate the task of the work team members.

The delivery of this book is considered an announcement of the start of the fieldwork phase of the work team.

The stage of preparing the audit program (the audit plan):

The outputs of the initial survey include in addition to the following:

- Audit questions: These include the formulation of the main audit question (level one) and audit sub-questions (level two). So that they are linked to the main and secondary audit objectives so that they help the members of the work team to make the best use of working time and highlight the areas that require research on answers to specific questions. It is worth noting that the audit questions should cover the three main elements of performance control (the third level) and include economy, efficiency, and effectiveness.) As shown in Form No. (6)
- Preparation of the audit matrix: It is prepared for each element of performance audit for the sub-questions related to the third level. The matrix includes the following: the sub-question, the criterion that answers this question, the information that answers this question, determining the source of information, methods of data collection and analysis determinants that may hinder obtaining an answer to this question, identifying potential risks and classifying the degree of risk. The presence of this matrix helps to draw the roadmap for the auditor to implement the work plan professionally and make optimal use of his time. As shown in Form No. (7)

## Memorandum of request for data and information

The work team of the performance audit of solid waste management in the northern municipalities

Number: XX/XX/XXXX

Date: XXXX

To: Honorable Mayor of XXXX

From: representative of the State Audit Bureau

Subject: Request for data and information

Please kindly instruct those who are required to provide the work team with the required information below, as soon as possible, supported by documents.

1. The municipality's strategic plan for the years(xxxxxxx)
2. Annual work plans for the years(xxxxxxx)
3. Laws, regulations, and instructions for waste management that are applied by the municipality
4. Municipal executive programs during the same period.
5. Performance indicators approved by the municipality for solid waste management
6. The approved organizational structure.
7. Job Description.
8. The municipal budget for the years(xxxxxxx)
9. Final accounts for the years (XXXX XXXX)
10. Budgeting Methodology
11. The total area of the municipality inside and outside the organization
12. Names and areas of regions under the administration of the Greater Municipality.
13. Population of the municipality's areas in the years (XXXX)
14. The number of Syrian refugees in the years (xxxxx).
15. Number of transfer stations in the municipality.
16. The number of pistons in the transfer station.
17. The volume of household solid waste collected during the years (xxxxx)
18. The volume of waste transferred to the landfill annually.
19. The number of the workers of the homeland working in the municipality.
20. The number of staffs working in solid waste.
21. The cost of the vehicles acquired during the period.
22. Number and capacity of compressors.
23. The number and types of containers distributed over the regions and their capacity.
24. Laws, regulations, and instructions regulating work with the Joint Services Council in the field of solid waste management.

25. Maintenance cost of machinery for solid waste management.
26. Fuel costs for solid waste management vehicles.
27. Names of the vehicles assigned to transport management and their preparation during the period.
28. Number of machines designated for solid waste sorting.

Accept my respect

Audit Bureau teamwork

#### FORM NO. (2): EXAMPLE OF THE AUDIT INTRODUCTION

Introduction:

Over the past decades, Jordan has received various waves of human migrations, whether in the form of asylum or displacement. Since the beginning of 2011, Jordan has faced the worst wave of displacement in the modern era, represented by the asylum of large numbers of Syrians to its lands as a result of the Syrian crisis that erupted that year, and is continuing until the present time. Jordan has provided asylum services to nearly (1.3) million Syrians, about (650) thousands of them are registered as refugees, where about (141) thousands of them live in camps, and the rest of them live in different places in the Jordanian cities and countryside, most of them in the northern governorates of the Kingdom (Irbid, Mafraq).

The environmental sector is one of the sectors of the Jordanian economy that is still affected by the negative repercussions of hosting refugees. That resulted in an increased pressure on natural resources, which are already scarce for Jordan, and the solid waste sector is the most important environmental sector affected by this crisis, with increasing pressure on the infrastructure for solid waste management, especially in the northern governorates. Where the problem of solid waste management is considered the first main problem for nearly (92%) of the municipalities of those areas, with the increase in waste quantities to more than 360 tons per day than the capacity that was collected daily before the influx of refugees. Domestic waste dumps in those areas are receiving additional quantities of waste that exceed their capacity, in addition to the insufficient number of waste collection workers and the insufficient number of containers in those areas. Because of the sudden increase in the amount of waste generated by refugees, the services of frequent collection and transportation of solid waste were affected, which resulted in the spread of rodents, insects, and unpleasant odors significantly in those areas.

Al-Ekaidar landfill is the largest waste disposal site in the north of the Kingdom, located 35 km east of Irbid. Al-AIEkaidar landfill currently serves 31 municipalities in the northern region, and the site is operated by the Irbid Joint Services Council. On the other hand, the Joint Services Council of Mafraq Governorate manages the Husainiyat landfill for waste disposal which is located 20 km east of Mafraq. The Husainiyat site currently serves 10 municipalities in the Mafraq Governorate, in addition to the Zaatari camp for Syrian refugees located in Mafraq.

From this point of view, the topic of evaluating the performance of solid waste management in the municipalities of (Greater Irbid, Greater Ajloun, and Greater Al-Mafraq) was chosen as being the municipalities affected by the Syrian asylum so as to determine the municipality's efficiency in solid waste management and its effectiveness in mitigating the negative effects of the problem of Syrian refugees to reach a safe environment.

#### FORM NO. (3): AN EXAMPLE OF EVALUATION JUSTIFICATIONS

##### Justifications for evaluation

- Based on the grant provided by the World Bank to strengthen the institutional capacities of the Audit Bureau in financial auditing and performance auditing at the municipal level.
- The effective role undertaken by the solid waste administration to secure a safe and effective environment, provided by the local municipalities, and the extent of the impact of negligence in providing this local environmental service and the health of citizens.
- Knowing the extent of effectiveness of the administration of the municipalities affected by the Syrian asylum in dealing with the negative effects caused by the Syrian asylum on the solid waste management service in those municipalities.

#### FORM NO. (4): EXAMPLE OF AUDIT OBJECTIVES

##### **The main objective:**

Studying the efficiency of the management of the selected municipalities in managing solid waste in terms of collection, transportation, and disposal to reach a safe and clean environment.

##### **Sub- objectives:**

- Verifying the ability of the selected municipalities to proper planning for the exploitation of all available resources for solid waste management, in addition to consolidating environmental awareness among citizens.
- Studying the procedures taken and the processes implemented by the selected municipalities in managing solid waste in terms of collection, transportation, and disposal in a manner that protects the environment and public health.
- Verifying that the measures implemented by the selected municipalities helped to reach a safe and clean environment.
- Studying the procedures followed in the disposal of solid waste and studying the environmental impacts on the landfill.

- **Audit Type**

Performance, Environment, and Commitment

- **Audit Field and Scope**

The scope of the audit is the processes and procedures related to solid waste management implemented by the selected municipalities during the period 2015-2017.

**Selected municipalities:**

- Greater Mafraq Municipality
- Greater Irbid Municipality
- Greater Ajloun Municipality

**Types of waste included in the audit:**

- Domestic solid waste
- Solid waste of commercial markets

The following types of waste will not be included in the audit:

- Hazardous medical waste
- Electronic waste
- Industrial waste
- Construction waste







Landfills covered by the audit:

Al-Egaider landfill/Ramtha

Al-Husainiyat landfill/ Al-Mafraq

**Audit questions (audit matrix)**

The first question: Did the procedures and processes implemented by the administration of the selected municipalities achieve a safe and clean environment?

		
Level two questions	Level two questions	Level two questions
Have all available resources been optimally utilized in an effective solid waste management planning?  (economy)	Are the tasks implemented in solid waste management being managed most efficiently and in compliance with the required quality level?  (Efficiency)	Has solid waste management achieved its desired objectives in achieving a safe and clean environment?  (effectiveness)
		
3rd level questions	3rd level questions	3rd level questions
Are studies and action plans for solid waste management prepared?	Are there programs prepared for action plans execution and is the implementation of those programs monitored?	Do the tasks implemented help mitigate the negative effects of solid waste on the environment and public health?
Do all tasks performed in solid waste management cover the environmental needs of the selected cities?	Are there indicators or criteria to measure the performance of the tasks implemented in solid waste management, and is the performance of employees periodically monitored?	Is off-target performance monitored?
Are the costs of collecting, transporting, and disposing of solid waste estimated?	Are our modern technologies being used most efficiently in the collection, transportation, and disposal of solid waste efficiently?	Do the tasks implemented in solid waste management contribute to achieving sustainable development?
Are the best modern technologies used in the collection, transportation, and disposal of solid waste?	Is it being benefited from solid waste by recycling, reusing and producing energy out of it?	
Is the environmental awareness related to solid waste disseminated to the residents of the selected cities?	Is the technical staff responsible for collecting, transporting, and disposing of waste properly trained, and is it qualified for such work?	
Are studies and plans evaluated from outside the cadre of the selected municipalities?	Is the evaluation and follow-up of program implementation carried out from outside the supervision and implementation team?	
Are studies and work plans evaluated from outside the municipality's cadre?		
Is a financial return achieved from household waste?		



The general audit question: Have all available resources been optimally utilized in an effective solid waste management planning?

Sub-audit question: Are studies and action plans for solid waste management prepared?

Standard	Required Information	Source of Information	Data Collection Methods	Data Analysis Methods	Determinants	The potential risks	risk rating
Existence of studies and action plans related to solid waste management in the selected municipalities	The strategic plan for the selected municipalities Studies related to solid waste management Municipal annual work plan	The Environment and Hygiene Unit in the selected municipalities - Municipal administration	- Field visits - Interviews - Documents submitted by the municipality under the data collection memorandum	Review of studies and strategic plans	Insufficiency of information and available data.	Lack of strategic plans for the selected municipalities	high risk

Sub-audit question: Do all tasks performed in solid waste management cover the environmental needs of the selected cities?

Standard	Required Information	Source of Information	Data Collection Methods	Data Analysis Methods	Determinants	The potential risks	risk rating
predetermined environmental needs  Percentage coverage of programs/environmental needs	Studies and surveys related to environmental needs	The Environment and Hygiene Unit in the selected municipalities	- Field visits - The websites of the concerned parties	Study and analysis of studies and survey results	Difficulty obtaining survey results	Not preparing surveys to determine environmental needs	medium risk

Sub-audit question: Are the costs of collection, transportation, and disposal of solid waste estimated?

Standard	Required Information	Source of Information	Data Collection Methods	Data Analysis Methods	Determinants	The potential risks	risk rating
The rate per capita production of waste per day The value of the estimated cost of collecting and transporting solid waste. The average cost of collecting kg of waste. - The average cost of transporting kg of waste. The average cost of disposing of a kilogram of waste - Estimated cost value for safe disposal of solid waste.	- Results of solid waste cost reports - Final accounts related to the costs of collection, transportation, and disposal of waste	Studies and Planning Department	- the interview - Data request memorandum	- Analyzing financial statements - Matching the results of the analysis - Reviewing waste services costing processes	- Not all the required data is available -Lack of regular and sequential records and files	- The estimated costs are not representative of the actual expenses paid - Preparing cost estimates from unqualified persons	high risk - medium risk

### Economic component audit matrix

Sub-audit question: Are the best modern technologies used in the collection, transportation, and disposal of solid waste?

Standard	Required Information	Source of Information	Data Collection Methods	Data Analysis Methods	Determinants	The potential risks	risk rating
-The latest solid waste collection technology. -The latest technologies for solid waste transportation. -The latest technologies for solid waste disposal. Modern technical specifications for the collection, transportation, and disposal of waste	- Techniques used in waste collection. -Techniques used to transport waste. -Waste disposal methods	- Division of Waste Operations / Department of Cleaning Operations. - Substations section. - Waste treatment department	- Searching for the best technical specifications for similar technologies by reviewing the experiences of developed countries in this field. - Expert discussion	- Making a comparison between the current means used in collecting, transporting, and disposing of waste and the latest technologies in this field.	- Lack of expertise and catalogs of technical specifications for existing technologies.	Using techniques for collection, transportation, and disposal that are not in line with modern technical specifications	Low risk

Sub-audit question: Is solid waste environmental awareness disseminated to the residents of the selected cities?

Standard	Required Information	Source of Information	Data Collection Methods	Data Analysis Methods	Determinants	The potential risks	risk rating
- Number of courses, workshops, and conferences related to environmental awareness. -Educational and awareness programs in the local media	Plans and work programs related to spreading environmental awareness	Education and Awareness Division/Environmental Awareness Division	- interview -Data request note	-View monthly and annual progress reports -Review the results of the evaluation of workshops and seminars	Lack of organized files documenting all environmental awareness activities	-Decreased awareness-raising role on solid waste issues	Medium risk

Sub-audit question: Are studies and plans evaluated from outside the cadre of the selected municipalities?

Standard	Required Information	Source of Information	Data Collection Methods	Data Analysis Methods	Determinants	The potential risks	risk rating
-The average review of studies assessed from outside the municipality out of the total number of studies prepared. -The average of the work plans reviewed from outside the directorate out of the total prepared work plans	- Technical reports to evaluate studies  -Technical reports to evaluate work plans.	- Environment Directorate. - The internal control unit.	-Reviewing issued reports and studies. -Document checking	-Studying technical reports to evaluate the studies prepared. -Studying technical and administrative reports to evaluate work plans. - Conducting personal interviews	-Difficulty obtaining the required documents. - Unable to conduct interviews	- Not evaluating studies and plans from outside the cadre of the selected municipalities	High risk

**Sub-audit question: Is there a financial return from household waste?**

Standard	Required Information	Source of Information	Data Collection Methods	Data Analysis Methods	Determinants	The potential risks	risk rating
- Percentage of revenues obtained from re-sorting waste/total revenues of municipalities. -The volume of revenues obtained from the production of fertilizers / the total revenues of the municipality. -The volume of revenues generated from waste collection fees	Annual final accounts	- Department of finance	Data request note	- Performing reconciliation of the financial statements	Not organizing data that is representative of what is required.	- Lack of financial return from household waste. Do not separate the accounts of the financial statements of solid waste from the rest of the municipality's financial accounts.	Medium risk  High risk

**MATRIX OF AUDIT FOR COMPETENCY FACTOR**

<p>The general audit question: Are the tasks implemented in solid waste management being managed in the most efficient manner and compliance with the required quality level?</p>							
<p>The sub-audit question: Are executive programs for action plans being prepared, and is the implementation of those programs being monitored?</p>							
Standard	Required Information	Source of Information	Data Collection Methods	Data Analysis Methods	Determinants	Potential Risks	Risk Rating
<p>The rate of coverage of the operational programs of the objectives and responsibilities assigned to the municipalities related to the performance of solid waste. The strategic plan of the Ministry of Environment. Action plans - - executive programs.</p>	<p>Strategic plans follow-up reports monthly and annual progress reports</p>	<p>Directorate of Environment – Projects Follow-up Section / Environmental Studies and Planning Department</p>	<p>Interviews with those responsible for performance measurement and planning. Data request note.</p>	<p>Reviewing work plans and making a comparison with that is implemented</p>	<p>There is a lack of required data do not document records</p>	<p>Low coverage of operational programs for objectives related solid waste management</p>	<p>Medium risk</p>
<p>Sub-audit question: Are there indicators or criteria to measure the performance of tasks performed in solid waste management, and is the performance of employees periodically monitored?</p>							
Standard	Required Information	Source of Information	Data Collection Methods	Data Analysis Methods	Determinants	Potential Risks	Risk Rating
<p>Standard rate of waste collection. Standard rate of waste transfer. Size and capacity of the container area. Individual container share. The carrying capacity of the waste compressors.</p>	<p>Plans follow-up reports. Project performance evaluation reports. Achieve ment reports Individua</p>	<p>Environment Directorate solid waste project / Environmental Projects Follow-up Section / Environmental Studies and Planning Department.</p>	<p>Interviews field visits. Results indicators. Indicators for measuring the performance of supervisors and workers in the field of implementation.</p>	<p>Reviewing and studying follow-reports on plans, projects, and individuals.</p>	<p>The lack of organized records of all the required data. Lack of qualified staff to follow up the achievement.</p>	<p>There are no indicators to measure the performance of the executed tasks.</p>	<p>High risk</p>

**Sub-audit question: Are modern technologies used in the collection, transportation, and disposal of solid waste efficiently?**

Standard	Required Information	Source of Information	Data Collection Methods	Data Analysis Methods	Determinants	Potential Risks	Ranking
<p>-The average time is taken to collect waste compared to the standard rate</p> <p>-Average cost of waste collection.</p> <p>- Average time is taken to transport waste / standard time.</p> <p>-Average cost of waste transportation.</p> <p>-Average time is taken to dispose of waste safely.</p> <p>-Average cost of disposal</p>	<p>Data related to the means used in waste collection.</p> <p>Data related to the means used to transport waste.</p> <p>Methods and means of safe disposal of waste</p>	<p>Division of Waste Operations Department of cleaning operations.</p> <p>Substations</p> <p>Waste Treatment operations</p> <p>Waste Treatment Division /</p> <p>Waste Treatment Division.</p>	<p>Reviewing the work methodologies of relevant departments.</p> <p>Studying the achievement reports of the relevant departments.</p> <p>Conducting spot checks on field sites.</p> <p>Conducting interviews with supervisors of technical works.</p> <p>analyzing the financial costs of collecting, transporting, and disposing of waste and comparing them with previous years.</p>	<p>Studying documents and photos</p> <p>Conducting interviews</p> <p>Comparison with best practices.</p>	<p>Availability of data for all the data</p>	<p>waste collection, transportation, and disposal technologies are not used most efficiently.</p>	<p>High risk</p>

**Sub-audit question: Is solid waste benefiting from recycling, use, and energy production?**

Standard	Required Information	Source of Information	Data Collection Methods	Data Analysis Methods	Determinants	Potential Risks	Ranking
<p>The rate of sorted waste. -- Recycled waste rate.</p> <p>The rate of the used waste.</p> <p>Biogas production</p>	<p>Work plans and executive programs of the concerned department.</p> <p>Achievement reports for the</p>	<p>Waste Treatment Division/Waste treatment Department of cleaning Operations.</p>	<p>Conducting interviews with persons concerned</p>	<p>Review records and reports.</p>	<p>Difficulty obtaining the required information on</p>	<p>Household waste not recycled or used.</p> <p>Solid waste is not used in energy production</p>	<p>High risk</p> <p>Medium risk</p>

the rate of electrical energy produced.	concerned department.				delay in responding to the requests for information.		
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**Sub-audit question: Is the technical staff responsible for collecting, transporting, and disposing of waste appropriately trained and qualified for such work?**

Standard	Required Information	Source of Information	Data Collection Methods	Data Analysis Methods	Determinants	The potential risks	risk rating
-Job description for job occupation. -Previous technical experiences of the technical staff. -Number of training hours for technical staff.	-Technical qualifications of the supervisory staff.  -Previous experiences of similar projects to the supervisory staff.	- Directorate of Human Resources.  -Training Directorate.	- Conducting interviews with the persons concerned.  -Seeking advice from technical experts.	-View the files of the supervisory staff.  - Count of the number and quality of technical courses for the supervisory staff.	Lack of complete documentation of all documents.	-Lack of qualified staff to manage solid waste tasks.  -Decrease of interest in developing the human cadre	Low risk  Medium risk

**Sub-audit question: Is program implementation evaluated and monitored from outside the supervisory and implementation team?**

Standard	Required Information	Source of Information	Data Collection Methods	Data Analysis Methods	Determinants	The potential risks	risk rating
-Project implementation follow-up reports. - Indicators of performance measurement for the completion of projects and individuals.	-Records of the follow-up and supervision department.  -Internal control reports.	-Environment Directorate.  - Directorate of Internal Control	the interview	Reviewing the internal control reports related to the audit of the competent departments and - Directorates, in addition to evaluating the workflow of the implemented projects.	Failure to respond to all memoranda items.	Lack of follow-up to the implementation of programs from outside the supervision and implementation team	Medium risk

## MATRIX OF AUDIT FOR EFFECTIVENESS FACTOR

General audit question: Has solid waste management achieved its desired objectives in achieving a safe and clean environment?							
Sub-audit question: Do the tasks performed help mitigate the negative impacts of solid waste on the environment and public health?							
Standard	Required information	Source of information	Data Collection methods	Data Analysis methods	Determinants	Key potential risks	Risk rating
<p>The rate of the population that receives a periodic waste collection service.</p> <p>Average amount of solid waste disposed of by unitary landfill method.</p> <p>The number of insect and rodent control campaigns.</p>	<p>Reports, studies, and statistical data.</p> <p>Pollution rates report.</p> <p>Contingency plans to control insects and rodents.</p>	<p>Division of regional waste operations.</p> <p>Waste treatment department</p> <p>Department of insect and rodent control</p>	<p>Studying and analyzing related reports and studies.</p> <p>Conducting field visits.</p> <p>Make a comparison with departments of similar nature of work.</p>	<p>Interviews</p> <p>Field visits</p>	<p>Not documenting procedures</p>	<p>The learned tasks did not reduce the negative impacts of solid waste on the environment and public health</p>	<p>Low risk</p>
Sub-audit question: Is off-target performance monitored?							
Standard	Required information	Source of information	Data Collection methods	Data Analysis methods	Determinants	Key potential risks	Risk rating
<p>The rate of deviations in the plan/total deviations.</p> <p>Follow-up rate of actions decisions</p>	<p>Internal control reports</p> <p>Special committee reports</p>	<p>Directorate of Internal Control</p> <p>Municipal Administration</p>	<p>Personal interviews</p>	<p>Studying reports</p>	<p>Non-cooperation of the concerned units</p>	<p>Performance against targets is not monitored periodically</p>	<p>High risk</p>
Sub-audit question: Do the tasks performed in solid waste management contribute to achieving sustainable development?							
Standard	Required information	Source of information	Data Collection methods	Data Analysis methods	Determinants	Key potential risks	Risk rating
<p>The rate of contribution of fees resulting from household waste in the production of electrical energy.</p> <p>The rate of reduction of waste production.</p> <p>Waste accumulation rate reduced.</p> <p>The number of waste landfills.</p> <p>The number of transfer stations</p>	<p>Landfill records and files.</p> <p>Statistical data and indicators.</p>	<p>Husainiyat landfill management.</p> <p>Al-Ekaider landfill management.</p> <p>Department of hygiene operations.</p>	<p>Conducting interviews with specialists</p>	<p>Field visits</p> <p>Best practices interviews</p> <p>Study-related records and reports.</p> <p>Making a comparison with other entities of a similar nature of work.</p>	<p>Not organized records</p>	<p>Decreased contribution of the implemented tasks achieving sustainable development</p>	<p>Medium risk</p>

## SECOND: THE STAGE OF FIELDWORK

The main objective of this stage is to collect evidence that answers the audit questions that have been set, compare the actual status with the standard, determine the gap between them, and thus derive audit conclusions and make the associated recommendations. The stage of fieldwork related to solid waste management begins as follows:

- Determine the planning concerned entity in the concerned municipality.
- Executing an interview with the management of the entity concerned with planning and informing them of the audit task, and then enquire them about the planning methodology by asking the following questions:

Question	Available	Not Available	Notes
Is a strategic plan and annual work plan prepared for the municipality?			
Are relevant parties involved when preparing a strategic plan for the municipality?			
What is the methodology used in preparing those plans?			
Is there an assessment of the actual needs of the municipality?			
Are basic data and information available for the municipality to prepare plans, and are they updated annually?			
What are the approved criteria for measuring the extent of achievement?			
Are there indicators to measure achievement?			
Is the implementation and completion of those plans monitored?			
Is the failure to implement these plans accountable?			
Is there a timetable for the implementation of these plans?			
Is there a determination of direct responsibility for the implementation of the programs and activities of these plans?			
Are plans and work programs evaluated from outside the municipality's staff?			
Are the necessary financial allocations available to implement these plans?			
Does the municipality have the qualified staff to implement these plans?			
Does the municipality have an accounting system that can determine the cost?			
Are base year values and annual target values covering plan years defined to measure progress?			



**A: Data collection:**

1. The department responsible for solid waste collection is determined in the municipality.
2. Meeting with the concerned employees in this department.
3. Directing a memorandum to request data related to solid waste collection that includes the following:
  - Determine the number of municipalities (main and sub-regions).
  - Determining the areas experiencing an unregulated urban development
  - Determine the population of these areas.
  - Determining the difficulties related to access to the various areas (the condition of the roads, the extent to which the areas are covered by rainwater drainage networks and wastewater networks....)
  - Determining the number and capacity of containers in each region.
  - Determining the volume of waste collected daily from each area and the periodicity of its collection.
  - Determine means of waste collection.
  - Determine the number of homeland workers collecting waste in each region.
  - Determining the number and capacity of compressors and, and the periodicity of waste collection in each area.
  - Determine the means of waste collection
  - Determining the number and capacity of compressors and compressors and the periodicity of waste collection in each area.
  - Determining the technical specifications of the equipment and tools for waste collection.
  - Determining the criteria and indicators approved in the municipality for waste collection.
  - Determine the programs for exceptional hygiene campaigns during the month of Ramadan and on holidays and feasts.
- 4 Analyzing the data after obtaining it and deducing the preliminary results. The data analysis is as follows:
  - Analysis of the extent to which criteria are based on judging the efficiency of organizing work related to waste collection, in addition to indicators to measure performance.
  - Comparing the adequacy of the number of containers and their capacity to the total population in each region by comparing the rate of per capita generation of waste daily and calculating the total capacity of containers in the region.
  - Relate the periodicity of waste collection from containers with the volume of waste generated.
  - Determining the adequacy of the number of workers in collecting waste from homes and comparing their distribution in all regions.
  - Ensure that waste is separated from the source before collection.
  - Ensure that there are approved paths suitable for the path of waste collection mechanisms, in addition to an approved path for the workers of the homeland.

- Ensure that container maintenance is carried out in addition to sterilization.
  - Ensuring the extent to which the waste collection service is provided in areas far from the main streets and residential and commercial compounds.
  - Ensuring that there is control over the commitment of the workers of the homeland and the drivers of machinery to their work.
  - The existence of a hotline for complaints by citizens about the waste collection service.
  - Analysis of the procedures taken in complaints submitted by citizens and the time is taken to address the causes of these complaints.
  - Study the evolution of the number of complaints during the period and the extent of the response to them.
  - Classifying complaints according to their nature and source to measure the evolution of the beneficiaries' satisfaction with the solid waste management service during the period.
  - Analyzing the extent of the increase in the number of containers with the increase in population, especially after the influx of several refugees from neighboring countries.
5. Writing the initial notes mentioned in the previous item and preparing related tables and drawings.
  6. Attach the reinforcements and the supporting evidence related to each item.
  7. Send the initial notes to the rest of the team members.
  8. Reviewing and approving the initial observations related to the waste collection phase.
  9. Moving to the next stage, which is the stage of waste transportation.

## **B. 1. Waste transportation:**

1. Determine the department responsible for transporting solid waste in the municipality.
2. Meeting with the concerned employees in this section after sending a memorandum to request data related to the transportation of solid waste, including the following:
  - Determining the mechanism of waste transportation in the municipality.
  - Determine the number of machinery and equipment used to transport waste. -Determine the periodicity of waste transportation.
  - Determining the technical specifications of the mechanisms for transporting waste.
  - Ensure that there are tracks for waste transport mechanisms and choose the most effective route based on geographic information systems.
  - Ensure that public safety tools are used in the waste transfer phase.
  - Determine the costs of transporting waste.
  - Determine the volume of waste that is transported daily.
  - Determining the mechanism of control over the transport of waste in terms of fully exploiting the vehicle and ensuring that the transport does not pollute the environment (leakage, exceeding the capacity of the mechanisms...).

-Request database statements related to the volume of waste.

3. Analyze the data after obtaining it and derive the preliminary results so that the analysis is the following:

-Determine the extent to which criteria are based on which to judge the efficiency of organizing work related to waste transportation, in addition to performance indicators.

- Verify that there is a periodic identification of the municipality's needs of mechanisms.

- Making a comparison between the volume of household waste that is transported and the volume of waste generated (gap analysis).

- Ensure the suitability of waste transport mechanisms with concentrated containers in various regions (the capacity of the mechanisms is proportional to the size of the containers).

- Analysis of the efficiency of the mechanisms used in transporting waste (the number of days in which the mechanism was broken, the number of times the maintenance was carried out, the current cost of maintenance ....).

-Ensure that there is preventive maintenance for the vehicles designated for transporting waste.

- Verify the maintenance procedures that are being implemented for the waste transport vehicles (internal and external maintenance).

- Studying the maintenance records of waste transport vehicles.

- Verify the extent to which there is control over the waste vehicles.

- Are the vehicles used efficiently?

- Check the household leakage disposal mechanism in the compressor.

## **B. 2. Transform stations:**

1. Determine the authority responsible for managing the transform station.

2. Meeting with the management of the transform station and conducting a field visit.

3. Sending a memorandum to request data related to the transformer station in which the following information is requested:

- Determine the capacity of the station to receive waste per day.

- The number of compressor operating in the station.

- Determining the number of working staff.

- Determine the municipalities that supply household waste to the station.

- The volume of waste that the station receives daily.

- Determining the number of large vehicles that transport waste from the station to the household landfill.
- Inquire about the method of disposal of household leakage.
- Ensure that there are weighing scales at the station.
- Request maintenance records for station equipment.
- Ensure that waste is sorted at the station.
- Verify that there are residential areas adjacent to the landfill.
- Verify the extent of the presence of waste pickers licensed by the municipality or not, and make sure that the waste pickers do not cause waste to scatter.

4. Analyze the data after obtaining it and derive the preliminary results. The data analysis is as follows:

- Studying records related to the volume of waste received from municipalities and making a comparison with the station's absorptive capacity and comparing it with the municipality's records.
- Studying the adequacy of the number of compressors in the station to receive solid waste daily.
- By determining the number of days of failure of the pistons.
- Sporadic period in the maintenance of the pistons.
- The place where the waste is put in case the piston fails.
- Checking the work of weighing in the station and whether the compressors are weighed before unloading their loads into the pistons.
- Ensure that the information on the volume of solid waste that is weighed and received at the station is documented, as well as the volume of waste that is transferred from the station to the landfill.
- Studying the preventive and periodic maintenance procedures that have been implemented for the station's equipment, and whether there is a maintenance team in the same station.
- Verify the existence of procedures for sorting solid waste before it is compressed in the plant and the production of fertilizers.
- Verify the use of public safety equipment for station workers (protective clothing, general safety gloves, safety shoes).
- Ensure that the station does not receive medical waste.
- Ensure that all compressors arrive to unload the load at the station.

### **B.3. Joint Service Councils:**

1. Meeting with the management of the Joint Services Council.
2. Sending a memorandum to request data related to the Joint Services Council:
  - The council's work plan about waste management.
  - Determining the legal framework for the work of the Joint Services Council.
  - Defining the organizational framework for the council's work (job description).
  - Determining the tasks assigned to the work of the Council about the management of household waste. The staff and their qualifications.
  - Collections of fees incurred by municipalities.
  - The mechanism of supervising the transfer stations from each council.
  - The mechanism of supervising the landfills of the council.
  - The criteria and indicators on which the council is based in judging the work related to solid waste management.
  - Determining the aspects of support provided by the council to municipalities about solid waste management.
3. Doing data analysis after obtaining it to judge the efficiency of the organization.
  - Analysis of the roles related to solid waste management by the council management and whether they are covered in the annual work plan.
  - Verify the existence of a special organizational unit in waste management in the council and whether it carries out its activities on the ground about following up on the work of transfer stations and landfills.
  - Ensure that basic information is kept in terms of the volume and type of waste that is sized and transported from transfer stations to landfills.

### **C. Waste treatment and disposal:**

The stage of treating household waste in landfills:

- 1- Meeting with the management of the landfill by conducting a field visit to the landfill.
2. Send a memorandum to request the following data:
  - Landfill space.
  - Basis for choosing landfill sites.
  - Protect the landfill with a fence.

- Surface and underground wells are located in the vicinity of the landfill, specifying the closest distance to these wells.
- Periodicity of groundwater quality checks and test results during the period.
- The volume of household waste received daily.
- Municipalities that directly supply waste to landfills.
- Transfer stations that supply waste directly to the landfill.
- The number and qualifications of the landfill staff.
- Landfill work hours.
- The type of waste received by the landfill.
- Waste treatment mechanism inside the piston.
- The mechanism of separating the waste before it is buried in the landfill.
- Methods of utilizing landfill waste (gas, fertilizers, materials that are recycled or used).
- How to get rid of home leakage.

3. Analyzing data after obtaining it to derive the preliminary results. The data analysis is as follows:

- Verify the extent to which the bases for selecting the landfill sites match the current landfill, whether there is a direct impact on the groundwater basins, and whether there are studies prepared by the municipality, the council, or on the environmental impact of the landfill.
- Studying records related to the volumes and quality of waste received daily.
- Study the mechanism used in waste treatment and ensure that the following are followed:
  - Existence of pits to bury the waste.
  - Lining the landfill cells with insulating materials to leak leachate into the ground.
  - The presence of a system for collecting home leakage.
    - The presence of a system for collecting methane gas in the landfill pit.
  - Ensure that there is a management system for the explosion hazard associated with the process of releasing and collecting gas from the landfill.
  - Ensure that landfill employees use personal protective equipment and health and safety equipment adequately.
  - Verify that waste incineration is not used inside the landfill.
  - Verify the work of the landfill and whether all compressors and vehicles that transport waste to the press are weighed, and whether the vehicles are kept through records.

- Verify the extent to which the landfill management has made a comparison between the carrying capacity of the vehicles with the volume of transported waste.
- Verify the extent to which the municipalities receive the volume of waste and compare it with the load out of the municipality.
- Ensure that waste is accumulated on the unlined ground, which brought insects and harmful animals.
- Ensure that there is a contingency plan to deal with emergencies in the landfill.

#### \* THIRD: THE STAGE OF WRITING AND ISSUING THE REPORT:

The results of the audit are the specific evidence collected and analyzed by the auditor to achieve the objectives of the audit, as a means of communication with the subject entity, to answer audit questions and verify the stated hypotheses. The report is usually used as a means of communication with the auditee, as well as to oversight and to provide well-founded, complete, objective information, analysis, and assessments to add value to decision-makers and other stakeholders.

#### **This stage includes the following procedures:**

- Gathering initial notes and discussing them with team members.
- Preparing conclusions and preparing recommendations in their initial form.
- Discussing the initial draft of the report with the auditee.
- Amending the initial draft of the report based on the course of the meeting with the auditee.
- Issuing the report in its final form.

#### **According to the international standard (ISSAI 400), the audit report has the following characteristics:**

1. Address
2. Signature and date.
3. Objective and scope
4. Completeness.
5. The addressee: (the addressed).
6. Determine the subject of the report.
7. Legal basis.
8. Standards compliance.
9. The optimal timing for submitting the report

The report should be accurate, comprehensive, written in a clear, easily readable language, and persuasive, following a logical order of facts and reinforcers. At the same time, it should be objective and balanced in content. On the other hand, the report should be short, no longer than necessary, and be drafted in a way that reflects and supports its objective. To organize and arrange the paragraphs of the supervisory report, it is useful to follow the structure consisting of (standard, reality, cause, effect).

Elements	Standard	Indeed	Reason	Impact
The questions that will be answered in the paragraph	-What are the rules and regulations? -What is logical? -Why is it logical?	-How is the situation? -What are the problems?	-What are the reasons behind the present status? -Why did the situation develop?	-Well, so what? -What will the situation lead to? -What other problems can arise from this situation?
Example	Having a solid waste management plan	There is no solid waste management plan	There is no planning methodology	constitute a health hazard

#### RECOMMENDATIONS:

The auditor's recommendations and conclusions are an important aspect of the audit process and if they are appropriate, they will be written as a guide to action.

#### Effective recommendations are:

- a. specified.
- B. measurable.
- c. can be achieved.
- D. Realistic.
- e. Timely.

#### \* FOURTH: THE IMPLEMENTATION FOLLOW UP STAGE:

This stage begins after the auditee receives the final report from the Audit Bureau, including the recommendations to be followed by that auditee. The auditee is usually given a period ranging from (4-6) months to implement these recommendations, after which a report is prepared on the extent of the auditee's commitment to correct the violations contained in the report and recommendations.

#### \* FINANCIAL ANALYSIS

The financial analysis in solid waste management includes whether the financial statements have been prepared by the applicable reporting framework in addition to the regulatory tasks covered by the legislation, which may result in additional objectives that include financial reporting responsibilities, showing cases of non-compliance with laws and regulations, and



expressing an opinion on the general budget, financial statements, public accountability and financial reporting on the effectiveness of internal control.

#### \*REFERENCES

- Performance Control Manual - Jordan Audit Bureau.
- Environmental Audit Handbook.
- Team worksheets.
- Solid Waste Management System No. 27 of 2005.
- General Framework draft for Waste Management.