

## 1.1 General

Drainage is the term applied to systems for dealing with excess water. It is important for the disposal of surplus irrigation water, storm water, and wastewater. Water drainage is a natural phenomenon which takes place naturally and depends on the geomorphological and hydrological features, water drainage is often considered as a minor problem, but with rapid increase in population and consequent in all round activities of man, the problem has been exacerbated.

The wide expansion and accelerated development of Dora city had led to change in the hydrological and geomorphological features and the drainage system had become more complex, hence the amount of wastewater and running water has increased. At the same time wastewater collection system are not exist.

In view of this prevailing condition, the drainage system in Dora city would have a new characteristics . This study is conducted to design a wastewater collection system for Dora city.

Dora like other Cities in Palestine have no sewerage facility. The people are using latrines, cesspits and few of them use septic tanks, which are emptied by cesspit emptier and tankers from time to time. These latrines and cesspits are deteriorating and they are in very bad condition, adding to this the increasing water consumption and consequently increasing in wastewater production resulting in over flows from the cesspits and excessive recharge of ground water in Dora area. For all the reasons mentioned, this evaluation and design of wastewater collection system for Dora have been conducted.

## 1.2 Problem Definition

The acceleration expansion and developed of Dora has resulted in increasing of water consumption and consequently in generation of large quantities of wastewater from various sources such as residential areas, commercial establishments and different industries. Due to the absence of wastewater collection system, the wastewater has been seeping into the ground through the overflows of the deteriorated cesspits and latrines that are commonly used in Dora. Moreover, in some areas wastewater is flows to the wadis through open drains in different routes causing serious environmental and health problems.

The main damaging consequences of these wastewater routes are offensive odors and smells, proper media for breeding of mosquitoes, soil contamination and polluting of the existing aquifers. The municipality of Dora is receiving on daily bases complains from the people asking a comprehensive solution for the wastewater problems in the city.

In view of these bad conditions, and since there is no sewerage networks exist, along with fast increasing of the environmental and health problem. The design of wastewater collection system study become a pressing necessity so as to solve all problems that were mentioned above. This study will consider the annual growth of the people and their water consumption for the coming 25 years, which will be the design period, along with the commercial industrial development in the area .

### **1.3 Objectives Of The Project**

The main objectives of this project are:-

1. Division of Dora area into catchment and sub-catchment areas according to existing situation and the topographic maps and classifying them into classes.
2. Estimation of population and their densities for the design period for each catchment area.
3. Determination of the water consumption and consequently the wastewater production from the different sources for each catchment area.
4. Evaluation of the collected data, propose collection system of the city and design of the main trunks of the network.
5. Showing the proposed wastewater network its parts on different maps for different purposes.
6. Preparation of Bill of Quantities for the main trunks.

### **1.4 Methodology**

1. Many site visits to Dora city and Municipality were done.
2. All needed maps and the previous studies that contain different information about Dora were obtained.

3. The amounts of water consumption for different purposes and consequently the amounts of wastewater production for each area were obtained.
4. The different layouts of the proposed wastewater collection system were plotted.
5. The necessary hydraulic calculation for the systems and other design requirements were carried out.
6. Bill of quantity of the designed wastewater main trunks were prepared with needed recommendations.
7. Finalizing of the project that will contain the report and the needed maps and drawings.

### 1.5 Phases Of The Project

The project will consist of the four phases as shown in (Table 1.1)

**TABLE 1.1:- Phases Of The Project With Their Expected Duration**

Title	Duration							
	9/14	10/14	11/14	12/14	2/15	3/15	4/15	5/15
Data collection and survey								
Preparing layout for wastewater collection system and collect the amount of wastewater								
Design of wastewater collection system								
Writing the report and preparing maps								

### **1.5.1 First phase:- Data Collection And Survey**

In this phase, available data and information were collected from different sources. Moreover, many site visits to both the city and the municipality were done. This phase include the following tasks.

1. Collecting of topographical maps for all the area.
2. Collecting of meteorological and hydrological data(temperature, wind , speed, rainfall, evapoeration...etc) from different sources.
3. Evaluation of population densities in each zone of the city with their water consumption and predicting their numbers, densities and their water consumption in year 2039.

### **1.5.2 Second Phase:- Preparing Layout For The Network And Calculate The Amount Of WasteWater .**

In this phase layout will prepared and put in its final shape and then quantities of wastewater were determine.

This phase include the following tasks:

1. Draw the layout of the network and compare it with the real setuation in Dora city then make adjusment and last draw the final layout , this task is the most improtant.
2. Evaluation of the contour maps and matching it with actual ground levels in the city.
3. Determination of the wastewater quantities.
4. Determination of the wastewater quantities and projection of the wastewater production in year 2039.

### **1.5.3 Third Phase:- Design Of WasteWater Collection Systems**

In this phase the necessary hydraulic calculation needed for the design of the main trunks were carried out. This phase include the following tasks:

1. Establish a system layout, which includes the areas that are going to be served, topography...etc.
2. Establish the catchments and sub-catchments areas and routes of the sewers.

3. Establish the design criteria and conducting the needed sewer diameter hydraulic calculations.
4. Preparing needed different drawings for the designed sewers.

#### **1.5.4 Fourth Phase:- Writing The Report And Other Needed Jobs**

After finishing the design calculation of the main trunks the project team prepared the specifications drawing, bill of quantities and preliminary maps. Final report of the project was prepared and submitted to the Department of civil and Architectural Engineering at Palestine Polytechnic University.

### **1.6 Organization Of The Project**

The study report has been prepared in accordance with the objectives and scope of work. The report consists of five chapters. The first chapter entitled “Introduction” outlines the problem, project objectives, and phases of the project.

Chapter two entitled “Characteristic Of The Project Area” presents basic background data and information on the project area, water supply, wastewater disposal.

Chapter three entitled “Design Criteria” deals with municipal sewage system, types of wastewater collection systems, sewer appurtenances, flow in sewers, design of sewer system, and sewer construction and maintenance.

Chapter four entitled “Analysis And Design” presents the design calculations and maps of the system.

Chapter five Bill of quantities deals with the quantities of pipes manhole excavation, backfilling and...etc.

Chapter six entitled “Conclusions” discusses the conclusions of the study.

