SQL Schema Creation

```
CREATE DATABASE Nairobi_Sewerage_Services;
USE Nairobi_Sewerage_Services;
-- Create table for Sewage Plants
CREATE TABLE SewagePlant (
    PlantID INT PRIMARY KEY AUTO_INCREMENT,
    Name VARCHAR(100),
    Location VARCHAR(100),
    Capacity INT
);

-- Create table for Technicians
CREATE TABLE Technician (
    TechnicianID INT PRIMARY KEY AUTO_INCREMENT,
    Name VARCHAR(100),
    Specialty VARCHAR(100)
);

-- Create table for Maintenance Schedules
CREATE TABLE MaintenanceSchedule (
    ScheduleID INT PRIMARY KEY AUTO_INCREMENT,
    PlantID INT,
    TechnicianID INT,
    MaintenanceDate DATE,
    Status VARCHAR(50),
    FOREIGN KEY (PlantID) REFERENCES SewagePlant(PlantID),
    FOREIGN KEY (TechnicianID) REFERENCES Technician(TechnicianID)
);

-- Create table for Sewage Incidents
CREATE TABLE SewageIncident (
    IncidentID INT PRIMARY KEY AUTO_INCREMENT,
    PlantID INT,
    Date DATE,
    Severity VARCHAR(50),
    Status VARCHAR(50),
    ReportedBy VARCHAR(100),
    FOREIGN KEY (PlantID) REFERENCES SewagePlant(PlantID)
);

-- Create table for Areas in Nairobi
```

```
CREATE TABLE Area (
    AreaID INT PRIMARY KEY AUTO_INCREMENT,
    Name VARCHAR(100),
    Population INT,
    WaterQualityIndex DECIMAL(5, 2)
);
```

Sample Data Insertion

sql
Copy code

```
-- Insert sample data into SewagePlant
INSERT INTO SewagePlant (Name, Location, Capacity) VALUES
('Dandora Treatment Plant', 'Dandora', 50000),
('Kariobangi Treatment Plant', 'Kariobangi', 30000);

-- Insert sample data into Technician
INSERT INTO Technician (Name, Specialty) VALUES
('John Doe', 'Plumbing'),
('Jane Smith', 'Waste Management');

-- Insert sample data into MaintenanceSchedule
INSERT INTO MaintenanceSchedule (PlantID, TechnicianID,
MaintenanceDate, Status) VALUES
(1, 1, '2024-08-01', 'Completed'),
(2, 2, '2024-08-05', 'Scheduled');

-- Insert sample data into SewageIncident
INSERT INTO SewageIncident (PlantID, Date, Severity, Status,
ReportedBy) VALUES
(1, '2024-07-15', 'High', 'Resolved', 'Citizen'),
(2, '2024-07-20', 'Low', 'Pending', 'Field Officer');

-- Insert sample data into Area
INSERT INTO Area (Name, Population, WaterQualityIndex) VALUES
('Kibera', 250000, 45.3),
('Westlands', 150000, 80.7);
```

Example Queries

1. **Monitor Sewage Incidents**
    - Find all unresolved incidents:

sql
Copy code
```
SELECT * FROM SewageIncident WHERE Status = 'Pending';
```

2.
3. **Maintenance Schedule**
    - View upcoming maintenance schedules:

sql
Copy code
```
SELECT * FROM MaintenanceSchedule WHERE Status = 'Scheduled';
```

4.
5. **Track Sewage Plant Capacity**
    - List plants with capacity over 40,000:

sql
Copy code
```
SELECT * FROM SewagePlant WHERE Capacity > 40000;
```

6.
7. **Water Quality Monitoring**
    - Identify areas with poor water quality:
8. sql
   Copy code
   ```
   SELECT * FROM Area WHERE WaterQualityIndex < 50;
   ```

Extended Data Insertion Script

```
sql

Copy code

-- Insert sample data into SewagePlant

INSERT INTO SewagePlant (Name, Location, Capacity) VALUES

('Dandora Treatment Plant', 'Dandora', 50000),

('Kariobangi Treatment Plant', 'Kariobangi', 30000),

('Ruai Treatment Plant', 'Ruai', 60000),

('Nairobi South Treatment Plant', 'Nairobi South', 40000),

('Kikuyu Treatment Plant', 'Kikuyu', 25000),

('Langata Treatment Plant', 'Langata', 35000),
```

```
('Kawangware Treatment Plant', 'Kawangware', 28000),

('Embakasi Treatment Plant', 'Embakasi', 32000),

('Gikambura Treatment Plant', 'Gikambura', 15000),

('Dagoretti Treatment Plant', 'Dagoretti', 30000);


-- Insert sample data into Technician

INSERT INTO Technician (Name, Specialty, ContactInfo) VALUES

('John Doe', 'Plumbing', 'john.doe@example.com'),

('Jane Smith', 'Waste Management', 'jane.smith@example.com'),

('Robert Brown', 'Sewer Engineering', 'robert.brown@example.com'),

('Emily Davis', 'Environmental Management',
'emily.davis@example.com'),

('Michael Wilson', 'Maintenance', 'michael.wilson@example.com'),

('Sarah Johnson', 'Waste Management', 'sarah.johnson@example.com'),

('David Lee', 'Sewer Repair', 'david.lee@example.com'),

('Emma Miller', 'Wastewater Treatment', 'emma.miller@example.com'),

('James Williams', 'Hydraulic Engineering',
'james.williams@example.com'),

('Olivia Taylor', 'Public Health', 'olivia.taylor@example.com');


-- Insert sample data into MaintenanceSchedule

INSERT INTO MaintenanceSchedule (PlantID, TechnicianID,
MaintenanceDate, Status) VALUES

(1, 1, '2024-08-01', 'Completed'),

(2, 2, '2024-08-05', 'Scheduled'),

(3, 3, '2024-08-10', 'In Progress'),
```

```
(4, 4, '2024-08-12', 'Scheduled'),

(5, 5, '2024-08-15', 'Completed'),

(6, 6, '2024-08-20', 'Pending'),

(7, 7, '2024-08-22', 'Completed'),

(8, 8, '2024-08-25', 'Scheduled'),

(9, 9, '2024-08-28', 'In Progress'),

(10, 10, '2024-08-30', 'Scheduled');


-- Insert sample data into SewageIncident

INSERT INTO SewageIncident (PlantID, Date, Severity, Status,
ReportedBy) VALUES

(1, '2024-07-15', 'High', 'Resolved', 'Citizen'),

(2, '2024-07-20', 'Low', 'Pending', 'Field Officer'),

(3, '2024-07-22', 'Medium', 'Resolved', 'Resident'),

(4, '2024-07-25', 'High', 'In Progress', 'Inspector'),

(5, '2024-07-28', 'Low', 'Pending', 'Technician'),

(6, '2024-08-01', 'Medium', 'Resolved', 'Citizen'),

(7, '2024-08-03', 'High', 'Resolved', 'Citizen'),

(8, '2024-08-07', 'Low', 'Pending', 'Resident'),

(9, '2024-08-10', 'Medium', 'In Progress', 'Field Officer'),

(10, '2024-08-12', 'High', 'Resolved', 'Inspector');


-- Insert sample data into Area

INSERT INTO Area (Name, Population, WaterQualityIndex) VALUES

('Kibera', 250000, 45.3),
```

```
('Westlands', 150000, 80.7),

('Karen', 100000, 85.6),

('Rongai', 120000, 75.5),

('Kasarani', 180000, 60.2),

('Githurai', 220000, 52.4),

('Embakasi', 300000, 70.1),

('Buruburu', 170000, 77.3),

('Ruiru', 200000, 65.8),

('Kilimani', 130000, 82.4);
```

1. Analyze the Frequency of Sewage Incidents per Plant

This query helps you understand which sewage plants have the most incidents reported.

```
sql

Copy code

SELECT

    sp.Name AS SewagePlant,

    COUNT(si.IncidentID) AS IncidentCount

FROM

    SewageIncident si

JOIN

    SewagePlant sp ON si.PlantID = sp.PlantID

GROUP BY

    sp.Name

ORDER BY
```

```
    IncidentCount DESC;
```

2. Average Severity of Incidents by Area

This query calculates the average severity of incidents reported in each area, which can help identify high-risk areas.

sql

Copy code

```
SELECT
    a.Name AS AreaName,
    AVG(CASE
        WHEN si.Severity = 'Low' THEN 1
        WHEN si.Severity = 'Medium' THEN 2
        WHEN si.Severity = 'High' THEN 3
        ELSE 0
    END) AS AvgSeverity
FROM
    SewageIncident si
JOIN
    SewagePlant sp ON si.PlantID = sp.PlantID
JOIN
    Area a ON a.AreaID = sp.PlantID
GROUP BY
    a.Name
ORDER BY
    AvgSeverity DESC;
```

3. Maintenance Status Summary

This query provides a summary of the current status of maintenance activities.

sql

Copy code

```
SELECT
    Status,
    COUNT(*) AS NumberOfTasks
FROM
    MaintenanceSchedule
GROUP BY
    Status
ORDER BY
    NumberOfTasks DESC;
```

4. Technician Workload Analysis

This query shows the number of maintenance tasks assigned to each technician.

sql

Copy code

```
SELECT
    t.Name AS TechnicianName,
    COUNT(ms.ScheduleID) AS TasksAssigned
FROM
```

```
    Technician t
JOIN
    MaintenanceSchedule ms ON t.TechnicianID = ms.TechnicianID
GROUP BY
    t.Name
ORDER BY
    TasksAssigned DESC;
```

5. Water Quality Index by Area

This query retrieves the water quality index for each area, which is crucial for environmental health analysis.

sql

Copy code

```
SELECT
    Name AS AreaName,
    WaterQualityIndex
FROM
    Area
ORDER BY
    WaterQualityIndex ASC;
```

6. Upcoming Maintenance Tasks

This query lists all upcoming maintenance tasks that are scheduled but not yet completed.

sql

```
Copy code

SELECT

    ms.MaintenanceDate,

    sp.Name AS SewagePlant,

    t.Name AS TechnicianName,

    ms.Status

FROM

    MaintenanceSchedule ms

JOIN

    SewagePlant sp ON ms.PlantID = sp.PlantID

JOIN

    Technician t ON ms.TechnicianID = t.TechnicianID

WHERE

    ms.Status = 'Scheduled'

ORDER BY

    ms.MaintenanceDate ASC;
```

7. Correlation Between Population and Water Quality Index

This query analyzes if there's a correlation between the population of an area and its water quality index.

```
sql

Copy code

SELECT

    a.Name AS AreaName,

    a.Population,
```

```
    a.WaterQualityIndex
FROM
    Area a
ORDER BY
    a.Population DESC;
```