

**GREATER MANCHESTER**

**STREET CRIME REPORT**

**FOR**

**JANUARY 2017**

**TO**

**DECEMBER 2018**

**(REPORTED IN MAY 2022)**

## **ABSTRACT**

The result indicated a total of 805,055 crimes were committed in Greater Manchester between January 2017 and December 2018. The month of July has the highest crime rate with a count of 72,813 while in January, violence and sexual offense topped the list with a count of 15,939.

The crimes with the highest count were committed “on or near shopping areas ”with a count of 6,714. Vehicles crime has the highest number of completed investigations with a count of 57,507 but also the highest in terms of unidentified suspects.

Finally, the report shows that there was a decrease of 18,733 crimes committed from 2017 (a count of 411,894) to 2018 (a count of 393,161).

## INTRODUCTION

In the office for National Statistics, Lower Layer Super Output Areas (LSOAs) are constructed from groups of 2011 census output areas, which are typically four to six. These LSOAs are designed to have a population of between one thousand and three thousand, with the latest published on the 16th of September, 2021.

For this analysis, two sets of data were used. Data pertaining to crime was downloaded from (<https://data.police.uk/data/>), a police data website in the United Kingdom while the second dataset, which focuses on population, was downloaded from

(<https://www.ons.gov.uk/peoplepopulationandcommunity/populationandmigration/populationestimates/datasets/lowersuperoutputareamidyearpopulationestimates>) the official website for The National Statistics.

This report was created using T-SQL queries, Excel reports, and QGIS maps with various filtering, sorting, and grouping options.

## RELATIONAL SCHEMA

There was a single schema called the database owner (dbo) where all the tables, views, user-defined functions, stored procedures, and other items were stored. The schema describe how these tables relate to one another. CrimesDB, a database for the analysis of crime reports, was created for this purpose under the schema (dbo.)

### Identify the tables

Crime data downloaded from (<https://data.police.uk/data/>), contained csv files on street-level crime, outcome, and stop and search data broken down by police forces and Lower Layer Output Areas for 2011. Using a program called Ablebit, the files between January 2017 and December 2018 totaling twenty-four in number were merged into a single file.CSV Columns. This Excel add-in allows the merging of two or more worksheets with ease.

From the population data, data on all ages in this category was extracted:

Mid persons

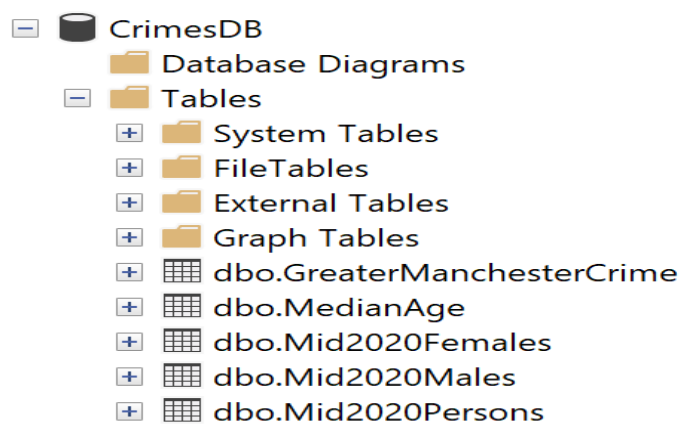
Mid female

Mid male

Median age

### Create the tables

(SQL Server import and export) was used to import crime data into T-SQL and was called GreaterManchesterCrime. T-SQL also imported four files from a single population data set namely MedianAge, Mid2020Females, Mid2020Males and mid2020persons.



## Create relationships between tables

In the population data, LSOA code was the primary key, while in the crime data, it was a foreign key. The population data also contained all ages column, an estimate of the ages for Mid persons, Mid female, Mid male, and Median age data which was joined to the GreaterManchesterCrime table under views.

## DESIGN RATIONALE

The rationale for the design of the database of the crime profiler dataset called CrimesDB includes a listing of the decisions made during the design process and the reasons for the design which are:

- A. The twenty-four files from crime data was merged into a single file by an Excel add-in called able bit and imported into SQL as GreaterManchesterCrime
- B. All the files were joined into a single view called vwCombinedData. The essence of this is to aggregate all the parameters required for generating the report as a single table. This is shown below.

```
-- Joining All our working Data into a Single View
CREATE VIEW [dbo].[vwCombinedData]
AS
    SELECT g.*, m.[All Ages] AS [Males], f.[All Ages] AS [Females], p.[All
Ages] AS [Total Persons], a.[Median Age] AS [MedianAge]
    FROM [dbo].[GreaterManchesterCrime] g
    INNER JOIN [dbo].[Mid2020Males] m
        ON g.[LSOA code] = m.[LSOA Code]
    INNER JOIN [dbo].[Mid2020Females] f
        ON g.[LSOA code] = f.[LSOA Code]
    INNER JOIN [dbo].[Mid2020Persons] p
        ON g.[LSOA code] = p.[LSOA Code]
    INNER JOIN [dbo].[MedianAge] a
        ON g.[LSOA code] = a.[LSOA Code];
```

- C. Since the values in the tables are not indexed in a table dictionary, only one schema called (dbo) was used.
- D. Creation of various views as the report to show the results of the total records of crime, the count of crime type monthly and yearly, the count of crime location, crime type frequency per location, crime reports with identified suspects, and crime report per location according to gender.

## DESIGN CONSIDERATIONS

Only one schema called (dbo) was created and the following was taken into consideration while designing the database.

- A. Various filtering, sorting and grouping facilities were used to create views that were queried with the required parameters.
- B. A view called vwCombinedData was created which aggregated all the needed information into a single view and warehoused the required variables for producing the report needed.
- C. Primary key which is the LSOA code in all the base tables was the foreign key in the transactional table.
- D. Inclusion of various search criteria and creation of stored procedures and user-defined functions.
- E. Creation of queries that can take on searching, filtering, and grouping for the report on the crime Profiler.

## Database normalisation

All rules were observed.

## Data validation

This bothers on the verification of the source document.

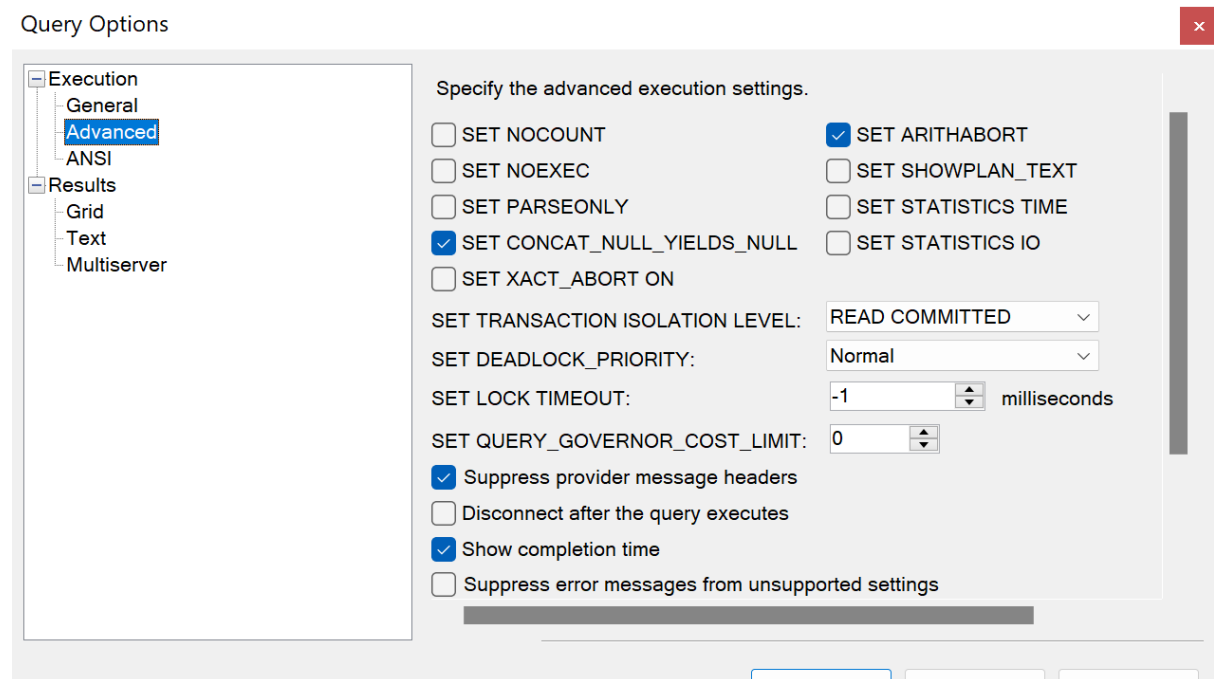
- A. Quality assurance: The site states that the data went through a quality control process
- B. Validity of source data: The source of the data is valid

- C. Import checks: Following the importing of the files into SQL, the success of the upload was checked by selecting from the tables to view the contents of the first rows.

```
SELECT TOP * FROM [dbo].[GreaterManchesterCrime];  
GO
```

## • Transaction concurrency and control

### Default



## Error handling

After the upload of the data into SQL from the Uk police and from The National Office of Statistic, the data was checked by selecting the top rows

```

1  USE [CrimesDB];
2  GO
3
4  SELECT TOP (10) * FROM [dbo].[GreaterManchesterCrime];
5  GO
6
7  SELECT TOP (10) * FROM [dbo].[Mid2020Persons];
8  GO
9
10 SELECT TOP (10) * FROM [dbo].[Mid2020Males];
11 GO
12
13 SELECT TOP (10) * FROM [dbo].[Mid2020Females];
14 GO
15
16 SELECT TOP (10) * FROM [dbo].[MedianAge];
17 GO

```

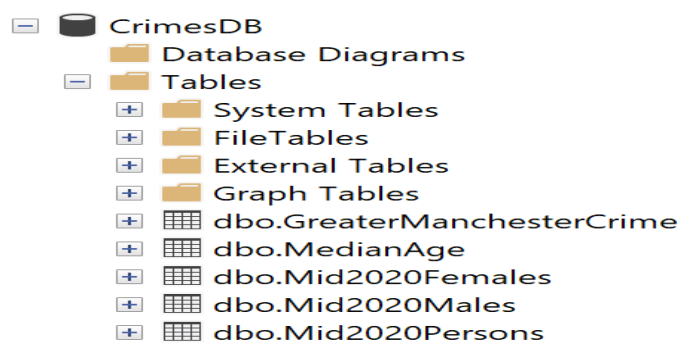
## Comments

The T-SQL statements were adequately commented to provide a comprehensive overview of the purpose of the codes.

## T-SQL STATEMENTS

### TABLES

(SQL Server import and export) was used to import crime data into T-SQL called GreaterManchesterCrime. T-SQL also imported four files from a single population data set namely MedianAge, Mid2020Females, Mid2020Males and mid2020persons. Five tables were created in total.



The SQL statement below can be used to create tables.

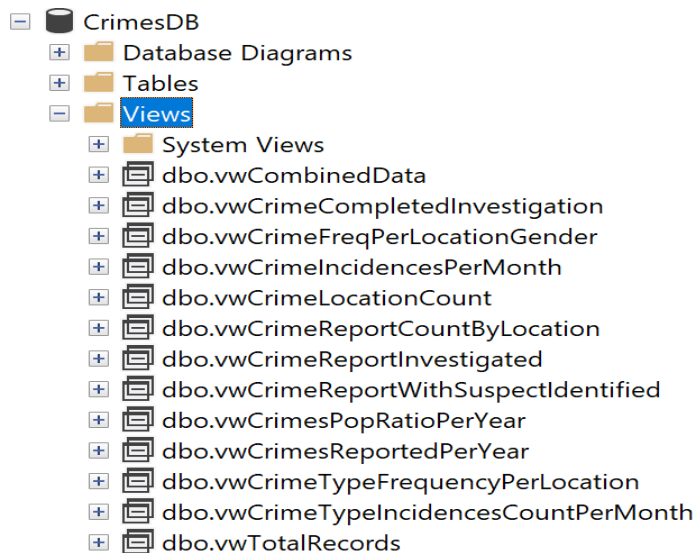


```
-- Creating the table structure

USE [CrimesDB];
GO
CREATE TABLE [dbo].[GreaterManchesterCrime](
    [Crime ID] [nvarchar](500) NULL,
    [Month] [nvarchar](50) NULL,
    [Repoted by] [nvarchar](150) NULL,
    [Falls within] [nvarchar](150) NULL,
    [Longitude] [float] NULL,
    [Latitude] [float] NULL,
    [Location] [nvarchar](255) NULL,
    [LSOA code] [nvarchar](150) NULL,
    [LSOA name] [nvarchar](150) NULL,
    [Crime type] [nvarchar](255) NULL,
    [Last outcome category] [nvarchar](500) NULL,
    [Context] [nvarchar](500) NULL
);
GO
```

## Views

Views offer an easy and convenient way to interact with data. For the purpose of creating a report for the crime profiler tool, the following views were created.



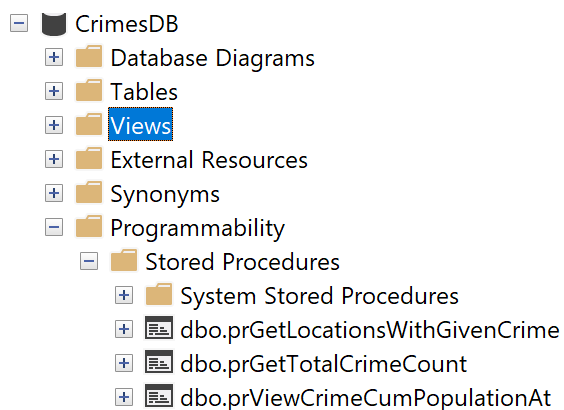
An example is given below of an SQL Statement for view creation.

-- Top 15 Crime Reports Count By Location Average No of Crimes Reported  
 -- This helps to know where to deploy more security measures

```
CREATE VIEW [dbo].[vwCrimeReportCountByLocation]
AS
SELECT [Location], COUNT(*) AS [Crime Cases Reported]
FROM [dbo].[vwCombinedData]
GROUP BY [Location]
--ORDER BY [No of Crime Cases Reported] DESC
;
GO
```

## Stored procedures

Stored procedures are prepared SQL codes that can be saved so that the code can be reused over and over again. Parameters can also be passed to a stored procedure so that the stored products can act based on the parameter (Value) that is passed. Three different stored procedures was created as shown below



One of the stored procedure SQL code is shown below:

```
CREATE PROCEDURE [dbo].[prGetLocationsWithGivenCrime]
@CrimeName NVARCHAR(255) = NULL, @No_of_location INT = 20
AS
BEGIN
SELECT TOP (@No_of_location) [Location], COUNT(*) AS [No of Crime Incidences]
FROM [dbo].[vwCombinedData]
WHERE [Crime type] = @CrimeName
GROUP BY [Location]
ORDER BY [No of Crime Incidences] DESC
END
GO
```

## TESTING STORED PROCEDURES CREATED

```

152 -- TESTING STORED PROCEDURES CREATED
153 -- Executing Procedure to return Total number of given crime in a given location
154 EXEC [dbo].[prGetTotalCrimeCount] @CrimeName = 'Public order', @CrimeLocation = 'On or near Manley Close';
155
156 -- Executing Procedure to return Total number of given crime in a given location
157 EXEC [dbo].[prGetTotalCrimeCount] @CrimeName = 'Anti-social behaviour', @CrimeLocation = 'On or near Supermarket';
158
159 -- Executing Procedure to return Total number of given crime in a given location
160 EXEC [dbo].[prGetTotalCrimeCount] @CrimeName = 'Violence and sexual offences', @CrimeLocation = 'On or near Kingsley
161
162
163 -- Executing Procedure to return TOP N locations where a given crime is mostly committed/reported
164 EXEC [dbo].[prGetLocationsWithGivenCrime] @CrimeName = 'Violence and sexual offences', @No_of_location=10;

```

12 % Results Messages

Crime type	Location	No of Incidence
Public order	On or near Manley Close	2

Crime type	Location	No of Incidence
Anti-social behaviour	On or near Supermarket	2478

Crime type	Location	No of Incidence
Violence and sexual offences	On or near Kingsley Street	23

Location	No of Crime Incidences
On or near Parking Area	4987
On or near Supermarket	2594
On or near Nightclub	2435
On or near Shopping Area	2341
On or near Sports/Recreation Area	2001
On or near Petrol Station	1463
On or near Waterson Avenue	1174
On or near Walker'S Croft	1015
On or near Hospital	942
On or near Pedestrian Subway	843

## User Defined Functions

- [-] Functions
  - [-] Table-valued Functions
    - [+] [table icon] dbo.fnGetCrimeCountInLocation
  - [-] Scalar-valued Functions
    - [+] [fx icon] dbo.fnGetTotalCrimeCount

One of the two user defined function SQL code is shown below:

```

USE [CrimesDB]
GO

CREATE FUNCTION [dbo].[fnGetCrimeCountInLocation](@CrimeName NVARCHAR(255),
@CrimeLocation NVARCHAR(255))
RETURNS TABLE
AS
RETURN
    (SELECT [Crime type], [Location], COUNT(*) AS [No of Incidence]
      FROM [dbo].[GreaterManchesterCrime]
     WHERE [Crime type] = @CrimeName AND [Location] = @CrimeLocation
     GROUP BY [Crime type], [Location]
    )
GO

```

## REPORT DESIGN

The is a summary of the LSOAs wise crime report with local population data for Greater Manchester between January 2017 and December 2018.

### Total Number of observations= 805055

```
SELECT 'Total Crime Records: ' + CAST (COUNT(*) AS VARCHAR) AS [Total records] FROM
[dbo].[GreaterManchesterCrime];
GO
```

Results		Messages
Total records		
1	Total Crime Records: 805055	

### Crime Reports Per Month:

July has the highest crime rate with a count of 72,813

```
SELECT DATENAME(MONTH, CONVERT(DATE, [Month]+'-01')) AS [Months], COUNT(*) AS [Counts]
FROM [dbo].[GreaterManchesterCrime]
GROUP BY DATEPART(MONTH, CONVERT(DATE, [Month]+'-01')), DATENAME(MONTH,
CONVERT(DATE, [Month]+'-01'))
ORDER BY DATEPART(MONTH, CONVERT(DATE, [Month]+'-01'))
;
GO
```

Results		Messages
	Months	Counts
1	January	63444
2	February	60393
3	March	68528
4	April	68998
5	May	71368
6	June	70783
7	July	72813
8	August	67842
9	September	63724
10	October	68828
11	November	66724
12	December	61610

### Count of crimes mostly reported per month:

Violence and sexual offences was the crime most recorded in January with a count of 15,939. The other months can be obtained from the table.

```

ELECT DATENAME(MONTH, CONVERT(DATE, [Month]+'-01')) AS [Months], [Crime type],
COUNT(*) AS [Counts]
FROM [dbo].[GreaterManchesterCrime]
GROUP BY DATEPART(MONTH, CONVERT(DATE, [Month]+'-01')), DATENAME(MONTH,
CONVERT(DATE, [Month]+'-01')), [Crime type]
ORDER BY DATEPART(MONTH, CONVERT(DATE, [Month]+'-01')), [Counts] DESC
;
GO

```

	Months	Crime type	Counts
1	January	Violence and sexual offences	15939
2	January	Anti-social behaviour	11941
3	January	Criminal damage and arson	6672
4	January	Public order	6162
5	January	Burglary	5613
6	January	Vehicle crime	5250
7	January	Other theft	4027
8	January	Shoplifting	2865
9	January	Other crime	1134
10	January	Theft from the person	1101
11	January	Robbery	1094
12	January	Drugs	678
13	January	Bicycle theft	601
14	January	Possession of weapons	367
15	February	Violence and sexual offences	14728
16	February	Anti-social behaviour	11301
17	February	Public order	6368
18	February	Criminal damage and arson	6074
19	Februarv	Vehicle crime	4963

### **Locations where crimes are mostly reported and their count:**

This shows the volatility of an area as regards crime rate. Shoplifting was the highest crime on or near shopping areas with a count of 6,714.

```
SELECT [Location], [Crime type], COUNT(*) AS [Counts]
FROM [dbo].[GreaterManchesterCrime]
GROUP BY [Location], [Crime type]
ORDER BY [Counts] DESC
;
```

GO

Results		Messages	
	Location	Crime type	Counts
1	On or near Shopping Area	Shoplifting	6714
2	On or near Supermarket	Shoplifting	5267
3	On or near Parking Area	Violence and sexual offences	4987
4	On or near Parking Area	Anti-social behaviour	4446
5	On or near Parking Area	Public order	2969
6	On or near Parking Area	Shoplifting	2624
7	On or near Supermarket	Violence and sexual offences	2594
8	On or near Supermarket	Anti-social behaviour	2478
9	On or near Petrol Station	Other theft	2462
10	On or near Nightclub	Violence and sexual offences	2435
11	On or near Shopping Area	Violence and sexual offences	2341
12	On or near Supermarket	Public order	2291
13	On or near Shopping Area	Anti-social behaviour	2194
14	On or near Shopping Area	Public order	2184
15	On or near Sports/Recreation Area	Violence and sexual offences	2001
16	On or near Parking Area	Vehicle crime	1985
17	On or near Parking Area	Other theft	1960
18	On or near Sports/Recreation Area	Anti-social behaviour	1704
19	On or near Nightclub	Anti-social behaviour	1594
20	On or near Parking Area	Criminal damage and arson	1513
21	On or near Shopping Area	Other theft	1508
22	On or near Petrol Station	Violence and sexual offences	1463
23	On or near Nightclub	Theft from the person	1451
24	On or near Petrol Station	Anti-social behaviour	1401

### **Number of Crimes Types reported whose Investigation was Completed:**

It provides information on how responsive the Police Department is to reported crimes.

Vehicle Crimes has the highest number of completed investigations with a count of 57,507

```
SELECT [Crime type], [dbo].[fnGetTotalCrimeCount]([Crime type]) AS [Total No
Reported], COUNT(*) AS [No of Completed Investigations],
[dbo].[fnGetTotalCrimeCount]([Crime type]) - COUNT(*) AS [Others]
FROM [dbo].[GreaterManchesterCrime]
WHERE [Last outcome category] LIKE 'Investigation complete%'
GROUP BY [Crime type]
ORDER BY [No of Completed Investigations] DESC
;
```

GO

Results Messages	
	No of Completed Investigations
1	Vehicle crime
2	Criminal damage and arson
3	Violence and sexual offences
4	Burglary
5	Public order
6	Other theft
7	Shoplifting
8	Theft from the person
9	Robbery
10	Bicycle theft
11	Other crime
12	Possession of weapons
13	Drugs

### **Number of Crimes Types reported with No Identified Suspect:**

This helps identify where to deploy more security measures and what crimes to watch out for.

Vehicle crime has the highest number of cases of no identified suspect with a count of 57,507.

```
SELECT [Crime type], [dbo].[fnGetTotalCrimeCount]([Crime type]) AS [Total No
Reported], COUNT(*) AS [Cases with No Suspect Identified],
[dbo].[fnGetTotalCrimeCount]([Crime type]) - COUNT(*) AS [Others]
FROM [dbo].[GreaterManchesterCrime]
WHERE [Last outcome category] LIKE '%no suspect identified'
GROUP BY [Crime type]
ORDER BY [Cases with No Suspect Identified] DESC
;
```

GO

Results Messages

	Crime type	Total No Reported	Cases with No Suspect Identified	Others
1	Vehicle crime	62921	57507	5414
2	Criminal damage and arson	77691	56677	21014
3	Violence and sexual offences	209853	56537	153316
4	Burglary	63232	55730	7502
5	Public order	94027	51276	42751
6	Other theft	51862	41863	9999
7	Shoplifting	35258	20864	14394
8	Theft from the person	13828	12951	877
9	Robbery	14001	9603	4398
10	Bicycle theft	8673	8028	645
11	Other crime	15157	5193	9964
12	Possession of weapons	6037	2071	3966
13	Drugs	9803	1465	8338

### **Crime Reports Count By Location Average No of Crimes Reported:**

This helps to know where to deploy more security measures. On or near parking areas has the highest with a count of 24,192.

```
SELECT [Location], COUNT(*) AS [No of Crime Cases Reported]
FROM [dbo].[GreaterManchesterCrime]
GROUP BY [Location]
ORDER BY [No of Crime Cases Reported] DESC
;
```

GO

Results Messages		
	Location	No of Crime Cases Reported
1	On or near Parking Area	24192
2	On or near Shopping Area	18618
3	On or near Supermarket	17124
4	On or near Petrol Station	10175
5	On or near Nightclub	9411
6	On or near Sports/Recreation Area	7703
7	On or near Pedestrian Subway	3993
8	On or near Piccadilly	3575
9	On or near Further/Higher Educational Building	2683
10	On or near Hospital	2596
11	On or near Bus/Coach Station	2442
12	On or near Park/Open Space	2017
13	On or near Police Station	1918
14	On or near Market Street	1651
15	On or near Theatre/Concert Hall	1547
16	On or near Prison	1438
17	On or near Church Street	1409
18	On or near Manchester Road	1398
19	On or near Waterson Avenue	1348
20	On or near Walker'S Croft	1184
21	On or near Chapel Street	1118
22	On or near Albion Street	1108
23	On or near King Street	1056
24	On or near George Street	1040

**Reported crime count per year:** Gives an indication whether crime cases is decreasing. Thie report shows that there is a decrease of 18,733 in the number of crimes between the year 2017 and 2018.

```
SELECT DATEPART(YEAR, CONVERT(DATE, [Month]+'-01')) AS [Year], COUNT(*) AS [Crime Counts]
FROM [dbo].[GreaterManchesterCrime]
GROUP BY DATEPART(YEAR, CONVERT(DATE, [Month]+'-01'))
--ORDER BY [Crime Counts] DESC
;
```

GO

Results Messages		
	Year	Crime Counts
1	2017	411894
2	2018	393161



## QGIS MAPS

Visualisation of Vehicle crime in Greater Manchester on QGIS using MSSQL Connector.

OpenStreetMap is used as OpenLayers plugin.

```
-- Creating a Geolocation field to store location Point data for Spatial Data Map  
Visualization later
```

```
--ALTER TABLE [dbo].[GreaterManchesterCrime]  
--ADD [GeoLocation] GEOGRAPHY;  
--GO
```

```
-- Updating the Geolocation field to contain Geolocation Point data from the Latitude  
and Longitude fields
```

```
UPDATE [dbo].[GreaterManchesterCrime]  
SET [GeoLocation] = geography::Point([Latitude], [Longitude], 4326)  
WHERE [Latitude] IS NOT NULL  
AND [Longitude] IS NOT NULL  
AND CAST([Latitude] AS decimal(10,6)) BETWEEN -90 AND 90  
AND CAST([Longitude] AS decimal(10,6)) BETWEEN -90 AND 90;  
GO
```

```
QGIS VEHICLE CRIMES VISUALIZATION DATA
```

```
DROP VIEW IF EXISTS vwVehicleCrimeLocationsQGIS;  
GO  
CREATE VIEW vwVehicleCrimeLocationsQGIS  
WITH SCHEMABINDING  
AS  
    SELECT [ID], [LSOA Name], [Crime type],[GeoLocation]  
    FROM [dbo].[GreaterManchesterCrime]  
    WHERE [Crime type] = 'Vehicle crime';  
GO
```

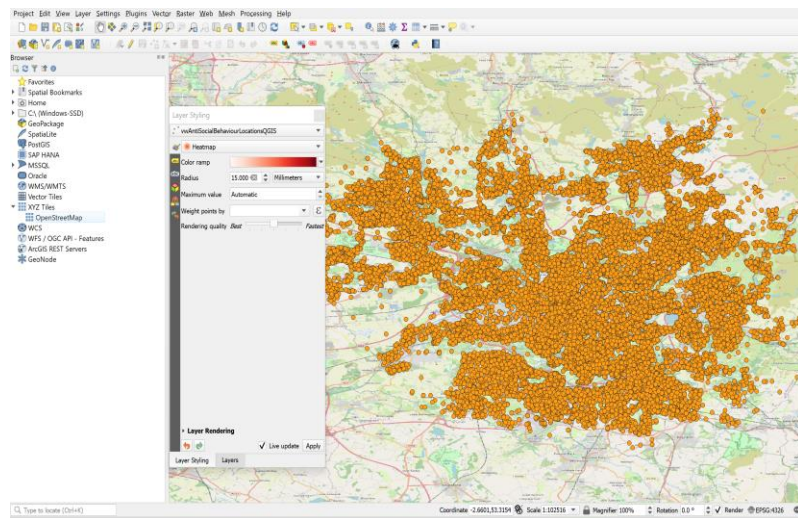
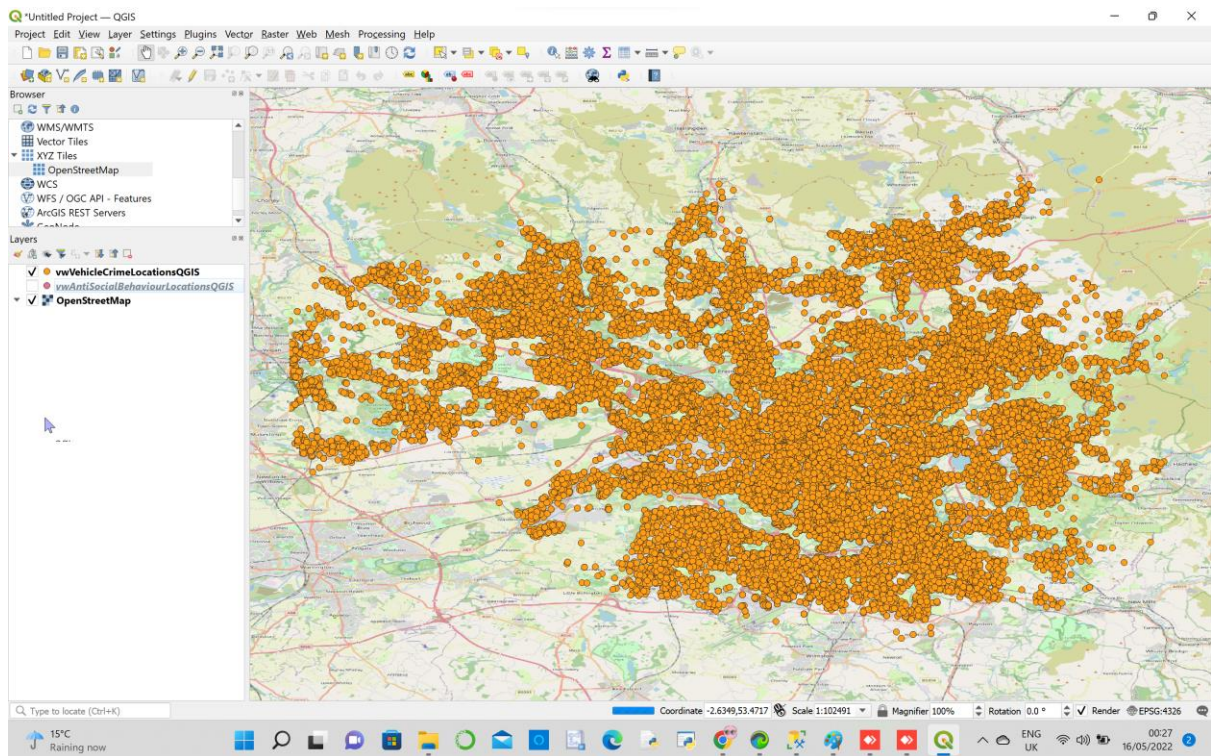
```
-- QGIS ANTI-SOCIAL BEHAVIOUR VISUALIZATION DATA
```

```
DROP VIEW IF EXISTS vwAntiSocialBehaviourLocationsQGIS;  
GO  
CREATE VIEW vwAntiSocialBehaviourLocationsQGIS  
WITH SCHEMABINDING  
AS  
    SELECT [ID], [LSOA Name], [Crime type],[GeoLocation]  
    FROM [dbo].[GreaterManchesterCrime]  
    WHERE [Crime type] = 'Anti-social behaviour';  
GO
```

```
CREATE UNIQUE CLUSTERED INDEX idx_id ON [dbo].[vwVehicleCrimeLocationsQGIS](ID)
```

```
CREATE UNIQUE CLUSTERED INDEX idx_id ON [dbo].[vwAntiSocialBehaviourLocationsQGIS](ID)
```

```
GO
```



## **CONCLUSION**

In conclusion, this report gives a general overview of the crime in Greater Manchester between the period of January 2017 and December 2018 in terms of the total number of crimes committed both monthly and yearly, locations with the highest crime rates, the types of crimes committed, and their count, crimes with completed investigations and unidentified suspects.

This shows the areas that need closer monitoring and where more security measure needs to be deployed.

Visualization of the report was produced using the Microsoft Excel tool and the QGIS map was also used to show the areas of Vehicle crimes in Greater Manchester.

**Visualisation - Creation of a summarised LSOAs wise crime report with local population data in Greater Manchester between Jan 2017 and Dec 2018.**

