TABLE OF CONTENT

T3.1 ABSTRACT

Crime is almost always present everywhere albeit in differing measures and counts. This report is a general comprehensive outlook into the intricacies of street crimes committed in Greater Manchester. Armed with data gotten from the Lower Layer Super Output Areas and population statistics dataset from UK police repository 'https://data.police.uk/data/', and the UK Office for National Statistics, this report seeks to provide a more in-depth insight into the criminal underbelly of Greater Manchester.

T3.2 INTRODUCTION

The UK Police website is rife with data on all sorts of criminal goings-on in the country. With data from the archives of the police repository, key information and statistics can be derived and used to help keep the general public safe.

T3.3 DESIGN RATIONALE

All the codes (including tables and views creation) used in this work were written in T-SQL, and relevant references are made to the 'Ayogu_Statements' file, which is the file within which all the SQL statements are located.

- This task has been designed with an outline as follows:
- There will be 2 raw files imported from the UK Police and the ONS websites
- These files will be imported into the [Ayogu_database] database
- The 2 resulting tables will be queried either individually or together.
- The results of these queries will be taken to either Microsoft Excel or Power BI, with which visualisations will be carried out, and the results will be returned into this report

T3-4 DESIGN CONSIDERATIONS

T3-4.1 DATABASE NORMALISATIONS

The normalization applied in this task is the creation of a view housing all the required columns from the raw file. This was done to increase the ease of access to the dataset. This view also changes the

T3-4.2 DATABASE VALIDATION

All of the information used in this job is from official documents that have been verified by authorities all throughout the world. The information contained in the data is consistent, extremely accurate, and of the highest quality during the time period when it was sourced.

T3-4.3 TRANSACTION AND CONCURRENCY CONTROL

The role of concurrency control in any database cannot be over-emphasized. It is the key factor in ascertaining that the database has integrity.

It is this concept that ensures that a database can be accessed by multiple users at the same time and the database still maintains its ACID (Atomicity, Consistency, Isolation, and Durability).

Concurrency is usually applied to a database when it involves direct changes (making additions and removals), as this wasn't the case in this task, concurrency was not required.

T3-4.4 SECURITY

For the security, the use of schemas and stored procedures was employed as these have the capability to limit what the end-user has access to.

T3-5 T-SQL STATEMENTS

T3-5.1 TABLES

CodeT3-6b (Create Table for Persons(Population))

```
Drop Table if exists Crimes.Allpersons
SELECT
[Area Codes],
[LA (2019 boundaries)],
LSOA,
[All Ages] as Population_Count
INTO Crimes.AllPersons
FROM dbo.Mid_2018_Persons
```

T3-5.2 VIEWS

Some views embedded in Stored Procedures can also be found in this task

Code T3-6c (Create view after Joining Great Manchester Street and Allpersons)

```
DROP VIEW IF EXISTS Crimes.vCrimeAndPopulation
go
CREATE VIEW Crimes.vCrimeAndPopulation AS
SELECT a.[Crime ID] as Crime_ID, a.[LSOA_Area] as LSOA_Area, a.[LSOA code] as LSOA_code, a. [LSOA
Name] as LSOA_Name, a.[Month], a.GeoLocation,
a.Longitude, a.Latitude, a.[Location], a.[Crime type] as Crime_Type, a.[Last outcome category] as
Last_Outcome_Category, b.[Population_Count]
FROM dbo.Greater_Manchester_Street a
JOIN Crimes.AllPersons b
ON a.[LSOA code] = b.[Area Codes]
```

Code T3-6d (Create View for Crime Count with GeoLocation)

```
create or alter view Crimes.vName_geo_crimecount as
select LSOA_Area, avg(longitude) as [avg_longitude], avg(latitude) as [avg_latitude], count(LSOA_name)
as Crime_count
from Crimes.vCrimeAndPopulation
group by lsoa_Area
go
select * from Crimes.vName_geo_crimecount
```

Code T3-d (Get area crimes per 1000 people)

```
create or alter view crimes.vLsoa_namePopulation as
select distinct lsoa_name, population_count
from Crimes.vCrimeAndPopulation

go

Create or Alter view Crimes.vLSOAareaNameCrimeAvg as
select SUBSTRING(a.lsoa_name,1,(LEN(a.lsoa_name)-5)) AS [LSOA_Area], a.Lsoa_name As LSOA_Name,
a.crime_count as Crime_count, b.population_count as population_count,
cast((Crime_count/population_count)*1000 as decimal(8,3)) as Crime_per_1000_people
from crimes.[vFinalLSOA_Namecount] a
join crimes.vLsoa_namePopulation b
On a.Lsoa_name = b.Lsoa_name

go

select top 20 LSOA_Area, sum(Crime_count) as Total_crime_count, sum(population_count) as
Total_population_count,
cast((sum(Crime_count)*1000/sum(population_count))as decimal(8,3)) as [Average Crime/1000 People
by area]
from Crimes.vLSOAareaNameCrimeAvg
group by LSOA_Area
order by [Average Crime/1000 People by area] desc
```

Code T3-6l (GET VEHICLE CRIMES COUNT IN GREATER MANCHESTER)

```
CREATE OR ALTER VIEW Crimes.vVehicleCrimeManchester as
select * from Crimes.vCrimeAndPopulation
where crime_type = 'Vehicle Crime'
go
select * from Crimes.vVehicleCrimeManchester
```

Code T3-6k (View for Anti-Social Crimes location in Salford)

```
CREATE OR ALTER VIEW Crimes.vAntiSocial as
select * from Crimes.antiSocial('Salford', 'Anti-social behaviour')
go
select * from Crimes.vAntiSocial
```

T3-5.3 STORED PROCEDURES

Code T3-6e (Stored procedure to get the crime count per month)

```
DROP PROCEDURE IF EXISTS Crimes.spColumncountGroup
go
CREATE PROCEDURE Crimes.spColumncountGroup
	@column nvarchar(100)
AS
BEGIN
	DECLARE @query nvarchar(max)
	SET @query =
		'create or ALTER view Crimes.[vFinal'+@column+'Count] as
		select TOP 20 ['+@column+'], count(['+@column+']) as [Crime_Count]
		from Crimes.vCrimeAndPopulation
		group by ['+@column+']
		order by [Month]'
	exec sp_executesql @query
END
go
EXEC Crimes.spColumncountGroup 'Month'
go
select * from Crimes.vFinalMonthCount
```

Code T3-6f (Stored Procedure to create view, select column and return count, Crime Type column selected)

```
DROP PROCEDURE IF EXISTS Crimes.spColumncountGroup
go
CREATE PROCEDURE Crimes.spColumncountGroup
	@column nvarchar(100)
AS
BEGIN
	DECLARE @query nvarchar(max)
	SET @query =
		'create or ALTER view Crimes.[vFinal'+@column+'Count] as
		select TOP 20 ['+@column+'], count(['+@column+']) as [Crime_Count]
		from Crimes.vCrimeAndPopulation
		group by ['+@column+']
		order by [Crime_Count] desc'
	exec sp_executesql @query
END
go
EXEC Crimes.spColumncountGroup 'Crime_Type'
go
select * from crimes.[vFinalCrime_Typecount]
```

T3-5.4 USER DEFINED FUNCTIONS

Code T3-6j (CREATE FUNCTION TO SELECT AREA AND CRIME TYPE

```
create or alter function Crimes.antiSocial(
@area nvarchar(50),
@crime nvarchar(100)
)
returns table as
return
        select LSOA_Area, GeoLocation, Longitude, Latitude, Crime_Type
        from Crimes.vCrimeAndPopulation
        Where LSOA_Area = @area and Crime_Type = @crime
```

T3-7 REPORT DESIGN

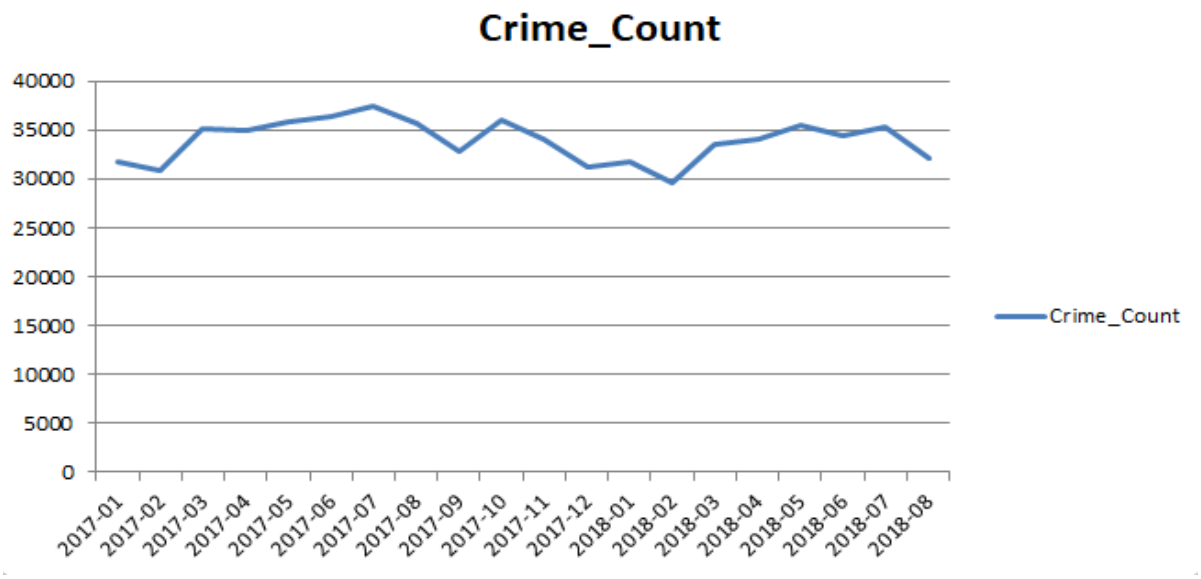
This section covers the various ways in which reported crimes in Greater Manchester can be analysed. This report was designed in such a way that the codes were written in T-SQL, and then an ODBC connection was created, and through that Excel was fed the data. Microsoft Excel and Power BI were then used to visualise the data, and then screenshots were taken of the results and they were fed back into the report.

GENERAL OVERVIEW

First, this report begins by looking at the trend from Jan 2017 to Dec 2018. The figure below shows the crime trend-line over the years. As can be seen, there has been a sinusoidal movement over the months with the crime rate peaking in July 2017, reaching its lowest point in February 2018 before going back up.

[Code T3-6e]

Month	Crime_Count
2017-01	31670
2017-02	30784
2017-03	35094
2017-04	34878
2017-05	35890
2017-06	36397
2017-07	37480
2017-08	35658
2017-09	32768
2017-10	35990
2017-11	34052
2017-12	31233
2018-01	31774
2018-02	29609
2018-03	33434
2018-04	34120
2018-05	35478
2018-06	34386
2018-07	35333
2018-08	32184

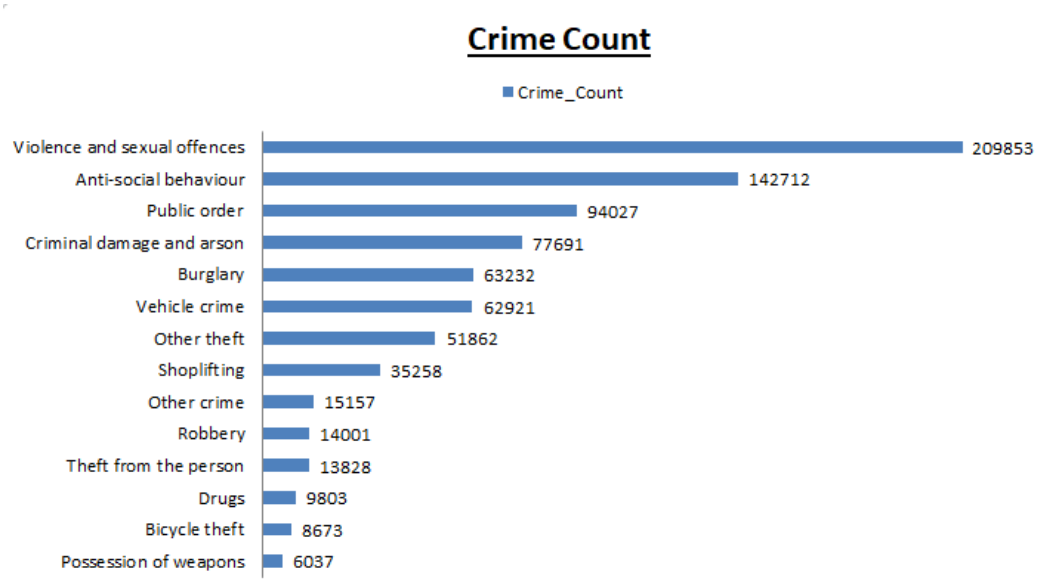


CRIME TYPE

Next report is a peep into the types of crimes that are being committed and the number of each of these crimes. It can be seen clearly that Violence and Sexual is the most frequently committed, while possession of weapons is the least committed crime in Greater Manchester.

The most frequent crimes in Greater Manchester and their count [Code T3-6f]

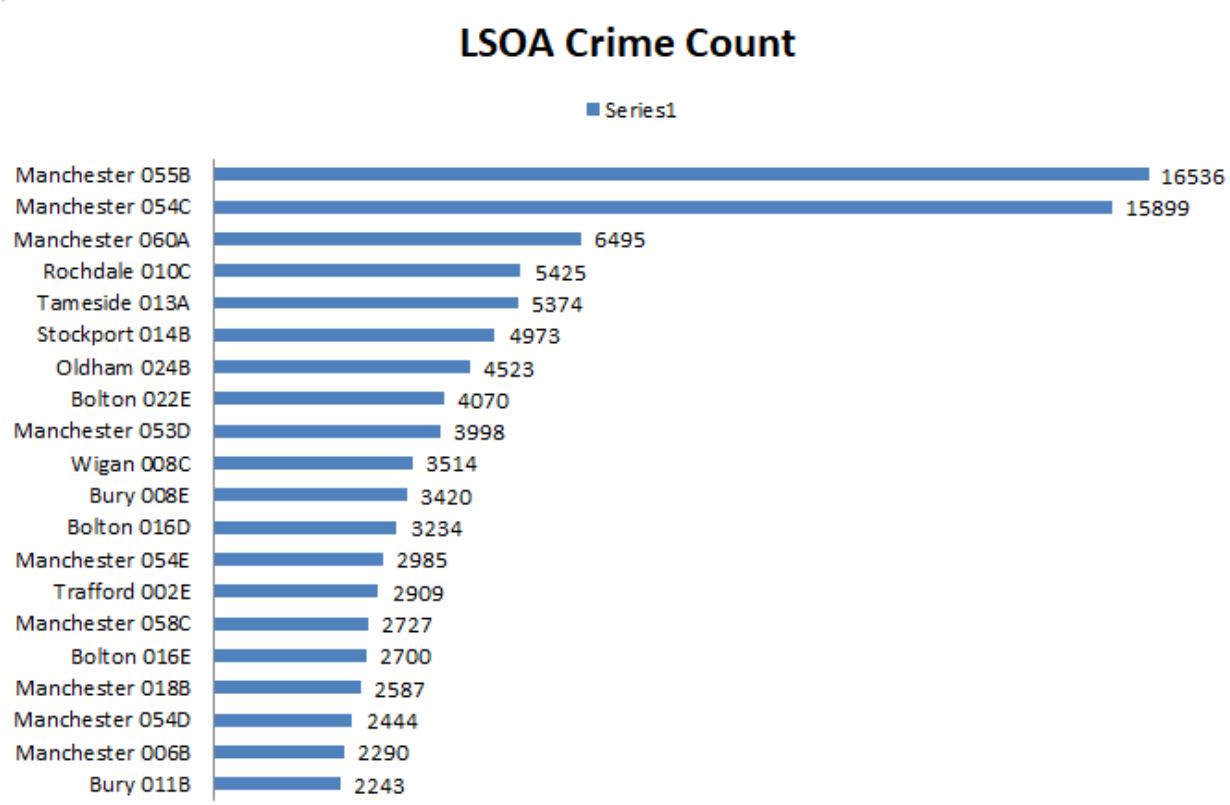
Crime_Type	Crime_Count
Violence and sexual offences	209853
Anti-social behaviour	142712
Public order	94027
Criminal damage and arson	77691
Burglary	63232
Vehicle crime	62921
Other theft	51862
Shoplifting	35258
Other crime	15157
Robbery	14001
Theft from the person	13828
Drugs	9803
Bicycle theft	8673
Possession of weapons	6037



LOWER LAYER SUPER OUTPUT AREA

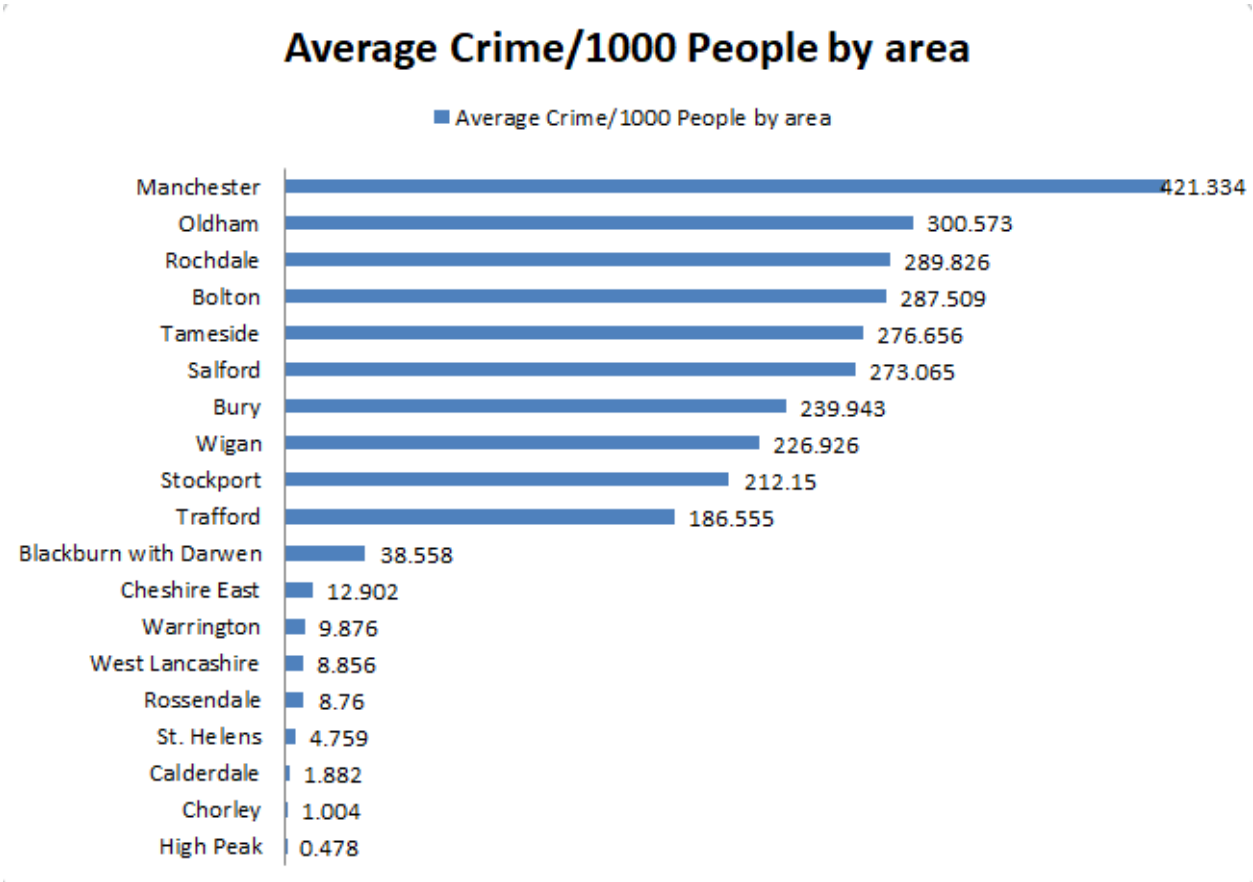
Which can be described as a geographical area assigned a code such that statistics in England and Wales can be implemented in small areas.
(https://www.datadictionary.nhs.uk/nhs_business_definitions/lower_layer_super_output_area.html)

Knowing the type of crime and their rates is not enough, it is also important to know the Areas and the amount of crimes being committed in these areas. [Code T3-6g]



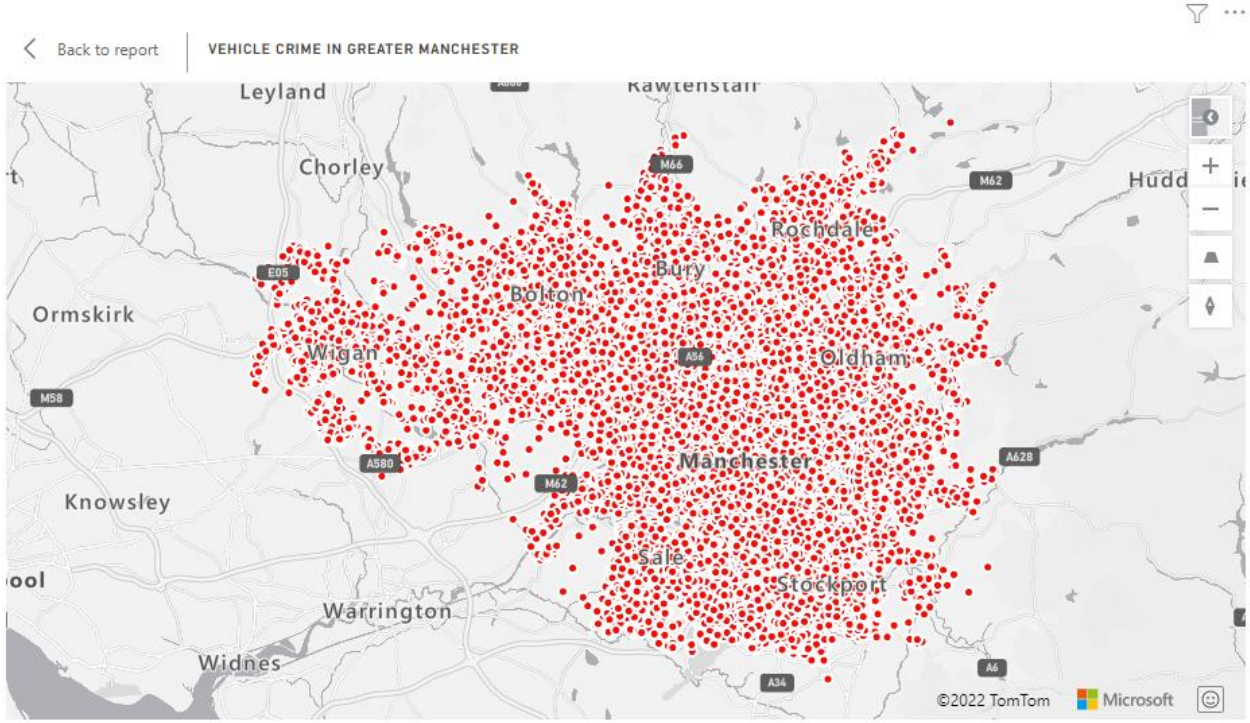
AREAS CRIME PER POPULATION

The image below gives an accurate count of each area crime per 1000 people in Greater Manchester. [CodeT3-6h]



VEHICLE CRIMES IN GREATER MANCHESTER

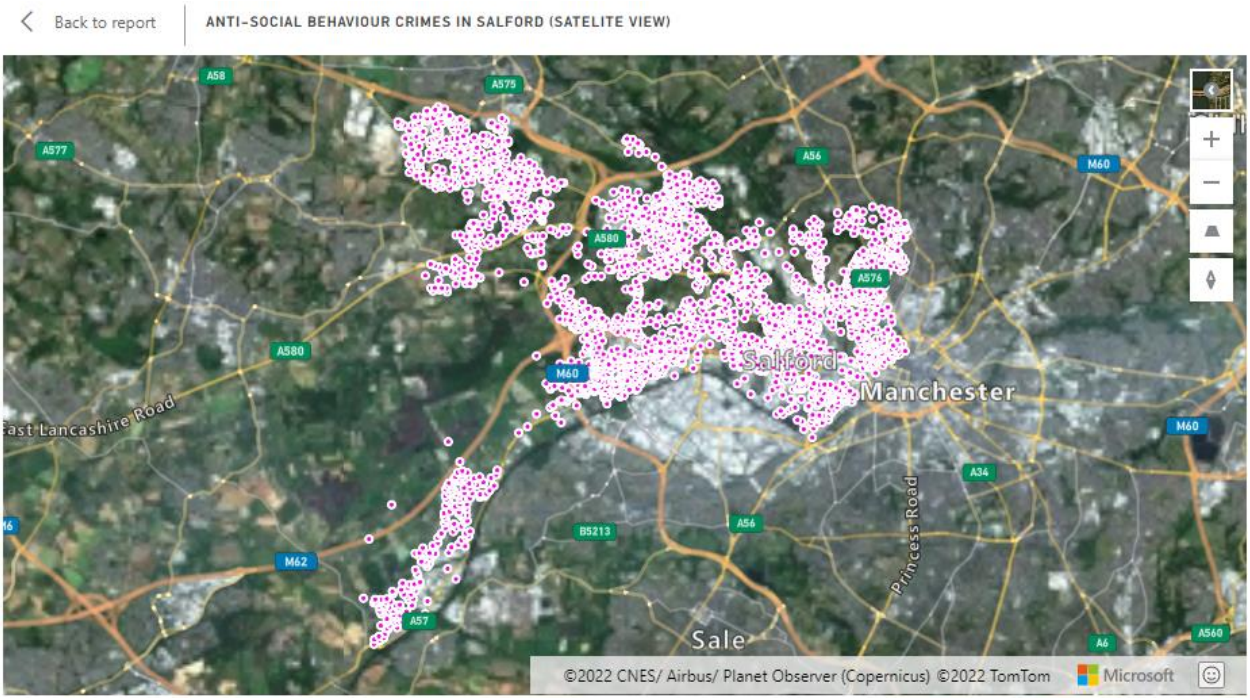
The map below displays the vehicle crime and their location in Greater Manchester. It uses [Code T3-6i]



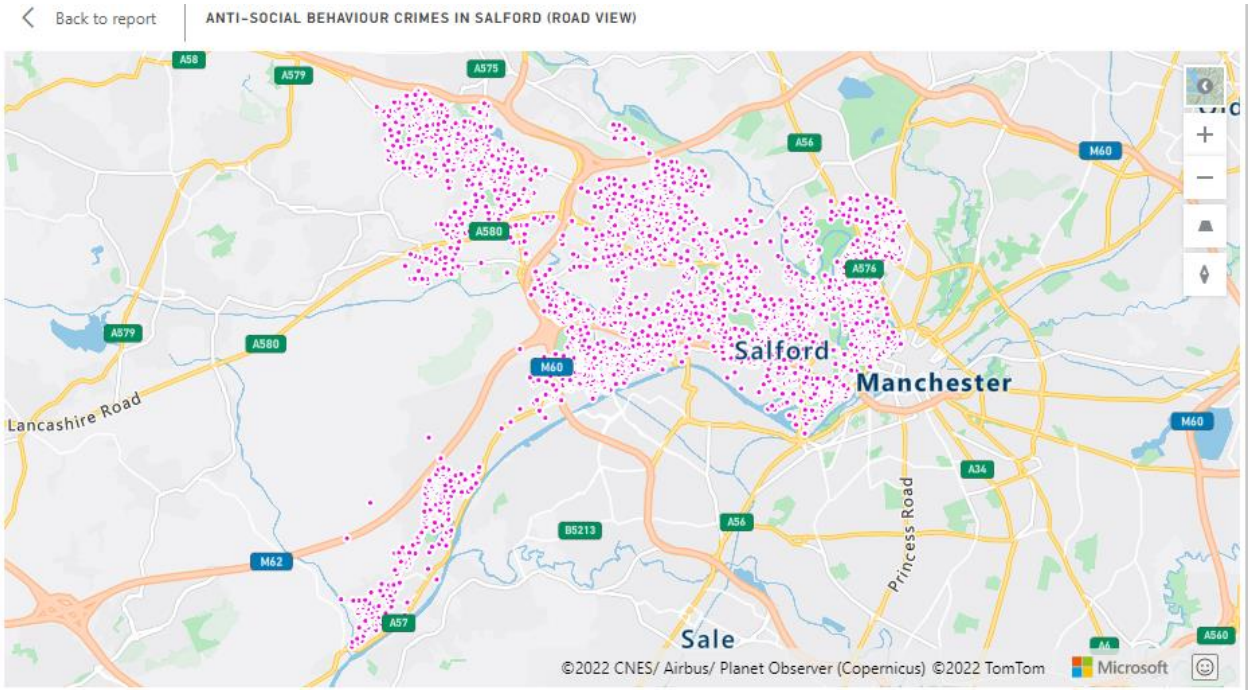
ANTI-SOCIAL BEHAVIOUR CRIMES IN SALFORD

Done using [Code T3-6j] & [Code T3-6k]

SATELITE VIEW:



ROAD VIEW:



T3-8 DATABASE SECURITY

It was critical for database security that backups were taken on a regular basis. Although automated backups were considered, manual backups were performed at 12-15 hour intervals for complete control and oversight of the backup process.

Physical security of the database is just as vital as cyber security, so the backups were kept secure at all times to avoid unwanted access and/or theft.

T3-9 DATABASE BACKUP AND RESTORE STRATEGY

As stated in the previous section Database Security, the backup strategy applied was a manual backup strategy, as time was dedicated towards the proper, timely and regular backup.

It was done by right-clicking on the database > Tasks > Back Up…

T3-10 DATA SCIENCE/BUSINESS INTELLIGENCE TECHNIQUES

The Data Science/Business Intelligence Techniques used was a combination of Microsoft Excel and Power BI. The files were transferred into these tools and after visualizations were done on them the screenshots were taken and then recorded in this report.

T3-11 DATA PRIVACY, ETHICAL AND LEGAL ISSUES

When dealing with data, privacy and ethics should be paramount. The data in this dataset contains personal information about children, and even though they are anonymous, ethics dictate that it should be kept strictly on a need-to-know basis.

Throughout the course of this work, that has been kept in mind as stringent measures were ensured so that leaks would not happen.

Consent has also been given by all involved in the data, and before the dataset was gotten, strict checks were employed to verify exactly what the data was to be used for.

T3-12 CONCLUSION

With the results derived from this report, information can be gathered and utilized as deemed fit. With uses ranging from further research, to just being aware of the environment.

REFERENCES

1) Data downloads | data.police.uk. (2011). Police.uk. https://data.police.uk/data/
2) Lower layer super output area. (n.d.). NHS Data Model and Dictionary. https://www.datadictionary.nhs.uk/nhs_business_definitions/lower_layer_super_output_area.html