Proposed Prisoner Handling Team for FCID Investigations Team

Data Analytics Lab

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This project aims to recommend the best size of a Prisoner Handling Team to be based within Custody blocks.

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1 Introduction

The Force Criminal Investigation Department (FCID) Investigations team manages secondary investigations for cases relating to geographically based violent and acquisitive volume crime (VVA), which do not come under the remit of other investigations teams (such as Serious, Complex or High Harm). Secondary investigations consist of processes such as interviewing witnesses, interrogating potential sources of further intelligence such as CCTV, telephone or financial records, and police and partner intelligence databases. Volume crime is defined as 'any crime which, through its sheer volume, has a significant impact on the community and the ability of the local police to tackle it. Volume crime often includes priority crimes such as street robbery, burglary and vehicle-related criminality, but can also apply to criminal damage or assaults.' (ACPO, 2009).

The greatest level of VVA crime within West Midlands Police (WMP) sits in the central hub, covering two Neighbourhood Policing Units (NPUs) – Birmingham East (BE) and Birmingham West (BW). As well as managing secondary investigations for these cases, a significant proportion of investigators' time is spent dealing with people in custody (PIC). The increased demand of PIC and associated in-custody investigations has led to reduced time available for secondary investigations. This inefficiency leads to a poorer quality of service offered to victims and the wider community. The demand of PIC has increased and changed since the current operating model was put in place around three years ago.

Current FCID Investigations teams are based at three locations. Perry Barr Custody Block and Bourneville Lane for BW and Stechford for BE. Where the investigation team is not based at the same location, investigators must travel to and from a custody block in order to complete the prisoner-focused tasks such as in custody investigations. This travelling takes up time and reduces efficiency. There are three teams at each of the locations, working a 3x3x3 shift pattern of early shifts (0700-1500) and late shifts (1400-2300).

This report aims to understand the current demand faced by FCID Investigation teams in BW and BE, in order to suggest the most efficient staffing levels for a proposed prisoner handling team. Section 2 will introduce and outline the project and its aims in more detail. Section 3 will give an overview of how data was prepared and selected, the exploratory data analysis and the methodology used. Section 4 contains the project output.

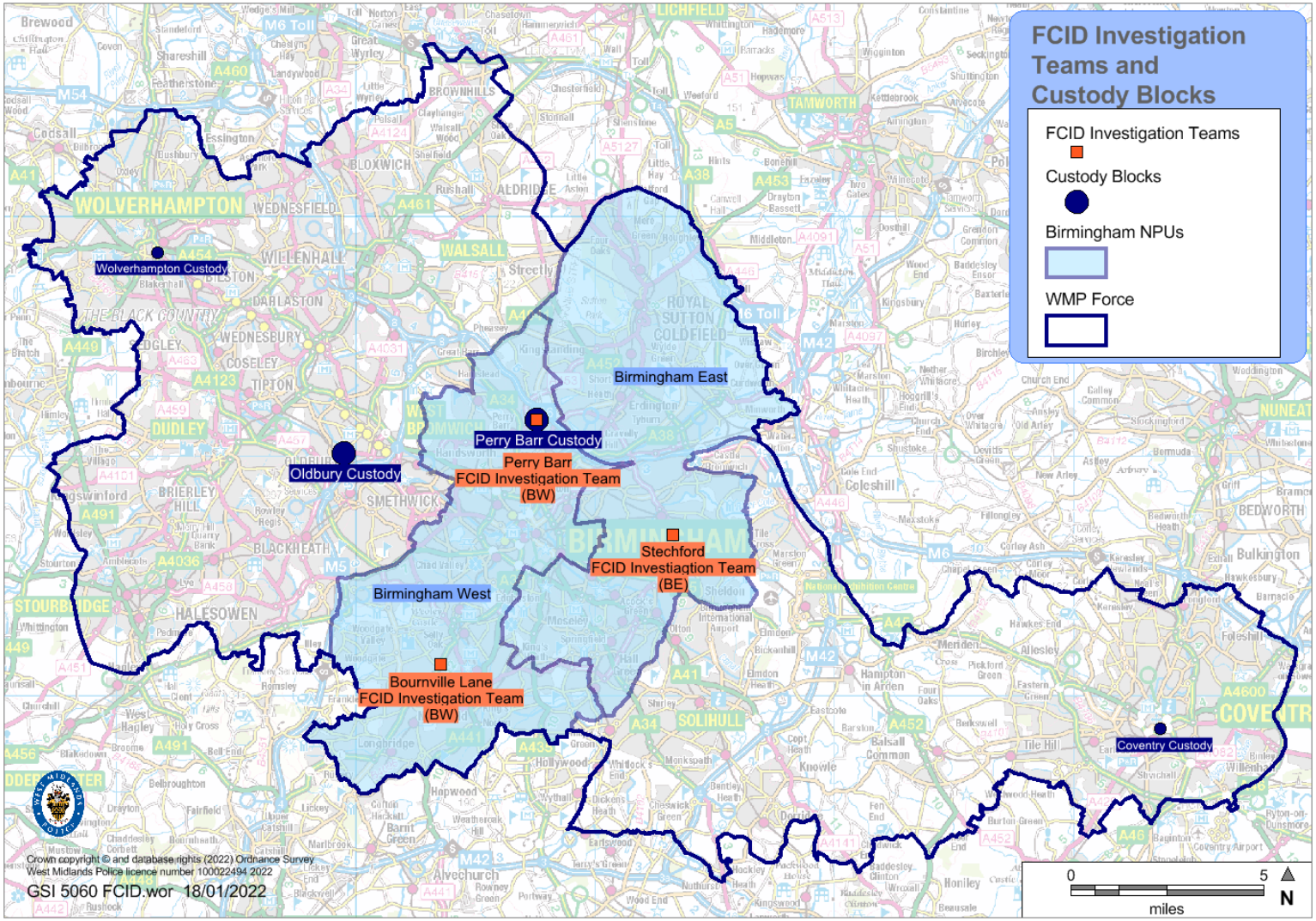

Figure 1: Map showing locations of Custody Blocks and current FCID Investigation Teams as the current operating model, in relation to the Birmingham West and Birmingham East NPUs and the WMP Force region.

2 Project

2.1 Overview

In the current operating model for BE and BW FCID Investigations Teams, officers must manage reactive prisoner demand and associated in-custody investigations, as well as complete secondary investigations for prior crimes they have managed. The high level of demand from prisoners coming into custody has led to competing priorities of these two tasks and subsequently caused a reduction in efficiency. As a result of recruitment uplift, the FCID department now includes a significant number of student officers who have limited practical experience of building court files to the required standard. This is leading to a further reduction in efficiency.

In order to relieve the demand on the FCID Investigations Teams, it is proposed that a dedicated prisoner handling team (PHT) is created to manage demand. This proposal is for either a combined team managing demand from both BE and BW, or a prisoner handling team solely for BW. The perceived benefit of this is that officers who remain on the investigations team are less likely to be disrupted by prisoner tasks, and efficiency of prisoner handling will increase.

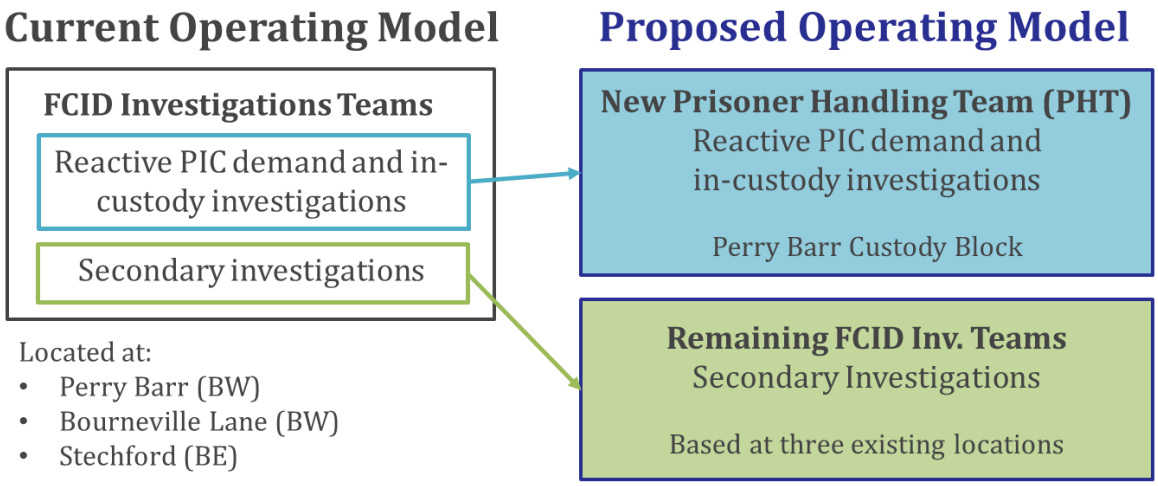

Figure 2: Current and Proposed Operating Model for the FCID Investigation Team

This project aims to recommend the most economic deployment of resources for the new PHT. These recommendations will enable the FCID Senior Leadership Team to decide on the structure of the team, allowing reallocation of resources and the creation of the PHT. To understand expected demand levels on the proposed PHT, current demand levels experienced by FCID Investigations teams are used.

The project seeks to:

- Analyse historical and current demand for prisoners relevant to FCID investigation teams.
- Recommend staffing levels required to manage the demand expected for the proposed Prisoner Handling Team.

2.2 Data Sources

Data was sourced from Connect, the WMP integrated operational system that contains and links together data from custody, crimes, cases and other systems. Connect is still a fairly new system to the force, going live on 7th April 2021. Some information from after this date is recorded in a slightly different way to information pre-Connect meaning that when looking over a longer time span there may be some discrepancies in figures before and after Connect.

The main structure of the data used in this project is the custody records. The custody record includes arrival and release times, dates, custody reference number and custody facility information along with other related data. From the custody records, cases and crimes can be linked where they are associated. This allows the custody reference numbers to act as a unique value.

The time period of data used for this project was from May 2021 to December 2021. Data going back to January 2018 was available (see section 5.1 in appendix) however due to the Connect changeover and the unprecedented year we saw in 2020, it was decided that the data from May – December 2021 was most representative of the current conditions faced by WMP. Therefore, unless otherwise stated, figures presented in this report are using data from May 2021 to December 2021.

3 Methodology

3.1 Data Preparation

Daily prisoner demand was seen as the main factor influencing the required prisoner handling team size. Therefore, the measure of demand used in this project was number of people in custody (PIC) per day, which were relevant to the current FCID Investigation teams. Historical and current demand levels were calculated to understand expected demand. Custody records were used to count the number of PIC, with each unique custody reference number counting as one PIC. A custody record is created for any detainee who is arrested and taken to a police station.

3.1.1 Relevant Custody Records

3.1.1.1 Officer in Charge (OIC)

To identify custody records relevant to the current FCID Investigation teams, custody records were linked with the associated crime, case or where possible, both. The crime and case records each contained details of the Officer in Charge (OIC). An OIC is assigned to a crime or case depending on where the offence took place. Every OIC belongs to a unit depending on which team they work in. Units considered relevant under the current operating model were as follows:

- FCID INV BVILLE T1 / T2 / T3
- FCID INV SUPV BVILLE T1 / T2 / T3
- FCID INV PERRYB T1 / T2 / T3
- FCID INV SUPV PERRYB T1 / T2 / T3
- FCID INV STECH T1 / T2 / T3
- FCID INV SUPV STECH T1 / T2 / T3

3.1.1.2 Arrest Record

Custody records that were not linked to a crime or case were instead linked to the arrest record. If the arrest was non-PACE (Police and Criminal Evidence Act 1984), not PNC recordable (Police National Computer) or contained any of the selected keywords (Table 1) in the 'reason for arrest offence', the record was excluded.

Table 1: Selected keywords contained in the 'reason for arrest offence' field from the arrest record. Custody records were excluded when they contained any of these.

Abduction	Child	Immigration	Murder	Rape
Bail	Driving	Indecent	Firearms	Sexual
Breach	Human	Kidnapping	Prison	Warrant

These keywords were searched for in the field using regular expressions. This searching process removed any custody records which came under the remit of other teams such as Complex, High Harm Team or the Public Protection Unit (PPU), but allowed a more thorough count of possibly relevant PIC.

After these two processes were completed, 95% of relevant records were due to the custody record linking to a crime or case where the OIC was from a relevant unit (63% crime (with or without case), 32% case only), with the remaining 5% being marked as relevant due to the reason for arrest. The total number of relevant records available for this time period was 2,422, from a possible total of 14,092 records.

3.2 Exploratory Data Analysis

3.2.1 Demand at Perry Barr Custody Block

Overall demand at Perry Barr Custody Block (Figure 3) sees on average 48 PIC per day.

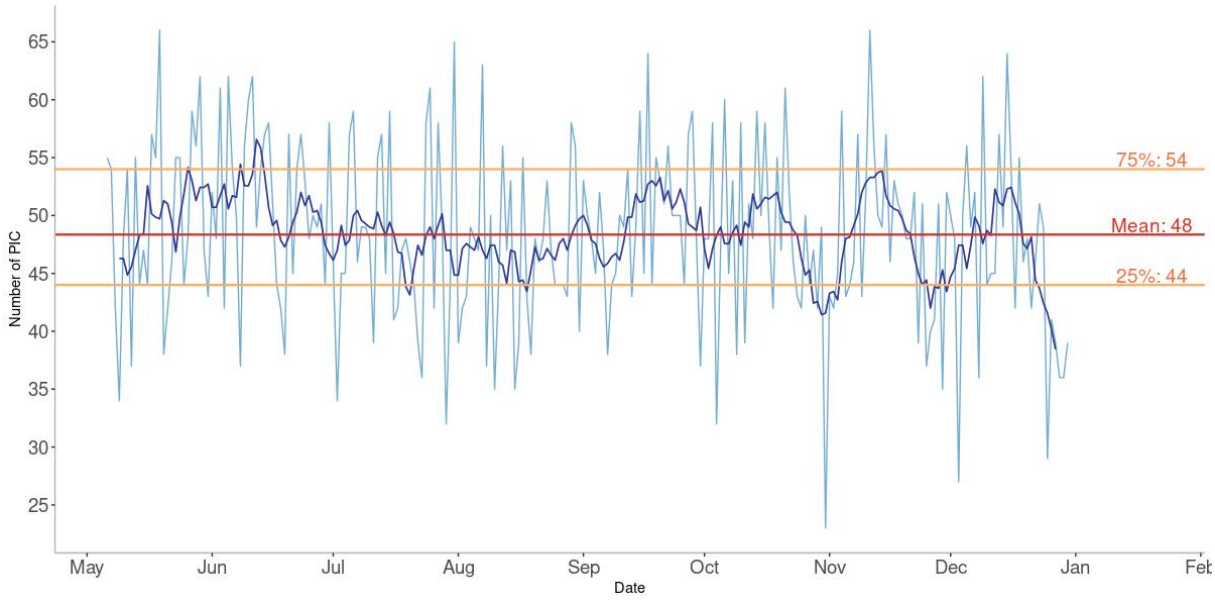

Figure 3: Number of people in custody per day at Perry Barr Custody Block. Light blue line shows raw data, darker blue line represents a 7-day moving average of PIC per day.

On average there are 16.94 PIC per day at Perry Barr Custody Block who are relevant to BW and BE FCID teams (Figure 4). Out of all PIC at Perry Barr Custody Block, 36% are relevant to the current FCID Investigation Team, with the remaining proportion being excluded offences and records relevant to other teams.

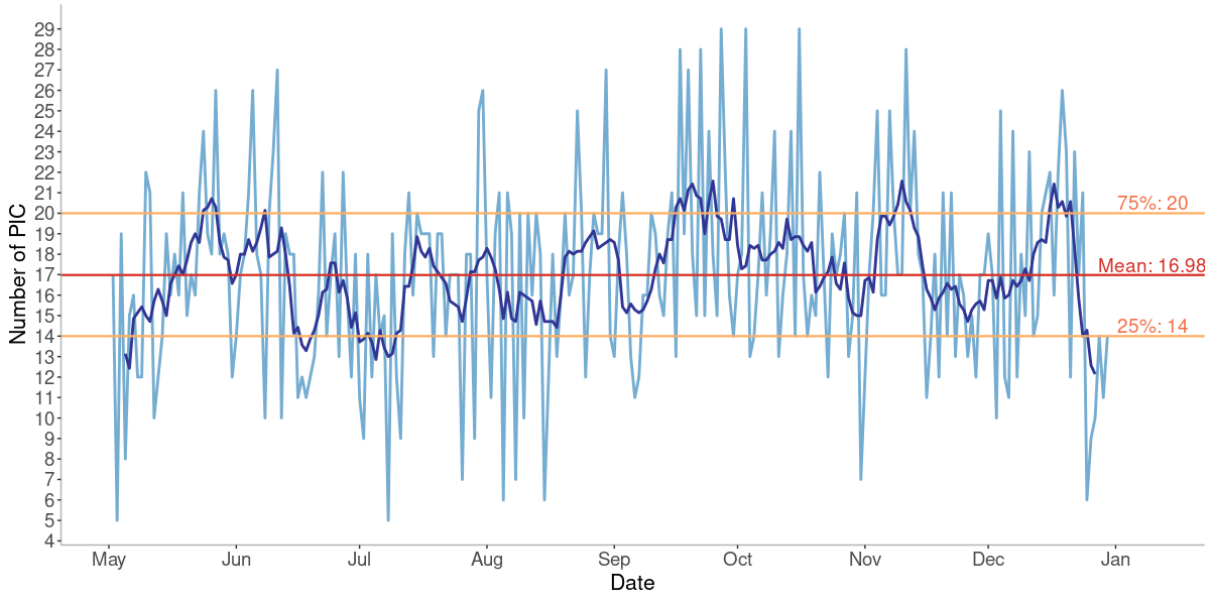

Figure 4: Number of people in custody per day at Perry Barr Custody Block, relevant to both BW and BE, May 2021 to December 2021. Light blue line shows raw data, darker blue line represents a 7-day moving average of PIC per day.

Breaking this down to only include records relevant to BW gives an average of 9.79 PIC per day. This is equivalent to 20% of all PIC at Perry Barr and 58% of relevant PIC at Perry Barr.

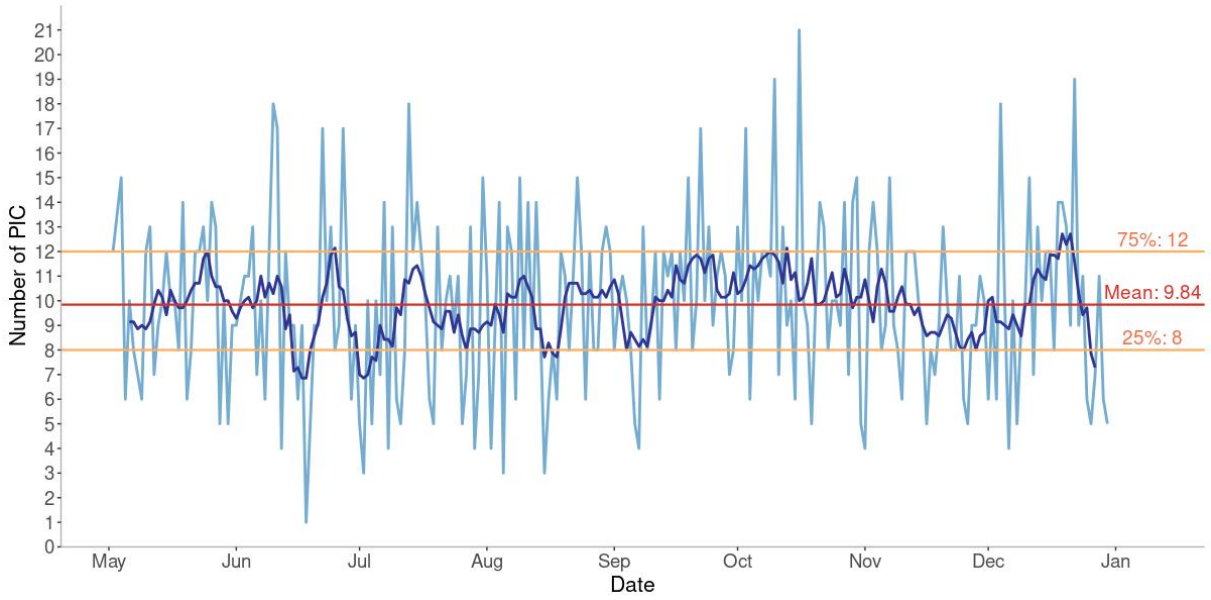

Figure 5: Number of people in custody per day at Perry Barr Custody Block, relevant only to BW, May 2021 to December 2021. Light blue line shows raw data, darker blue line represents a 7-day moving average of PIC per day.

3.2.2 Other Custody Block Locations

Not all prisoners relevant to the FCID Investigation team go to Perry Barr Custody Block. To understand the effect that the new prisoner handling team would have on the current operational model, the split of custody locations for relevant records can be calculated. Using all records relevant to BW and BE, the proportion of prisoners going to each custody block from each team is shown below.

Table 2: Proportions of prisoners located at each custody block, for each of the three FCID Investigation teams, over the time period May 2021 – December 2021

	BW Perry Barr FCID Investigation Team	BW Bourneville FCID Investigation Team	BE Stechford FCID Investigation Team	Total
Perry Barr Custody Block	**35.78%**	4.82%	**34.51%**	75%
Oldbury Custody Block	4.33%	**13.41%**	1.83%	20%
Other	0.77%	0.48%	4.07%	5%

Out of all relevant records, three quarters of prisoners are located at Perry Barr Custody Block, which is the proposed location for the new prisoner handling team. Of records from Perry Barr Custody Block, the lowest proportion of prisoners (6%) are those relating to BW Bourneville team. The split between the BW Perry Barr (48%) and BE Stechford (46%) teams is fairly even. It is important to remember that other prisoners are located at Perry Barr who are not relevant to this project, and therefore are not included in the calculations.

Looking only at the Bourneville team, 26% of relevant prisoners are located at Perry Barr Custody Block, with 72% at Oldbury Custody Block and the remaining 2% at other locations. This suggests that this team would see less benefit from the proposed prisoner handling team due to the majority of their prisoners being located at Oldbury, rather than Perry Barr Custody Block. If this project is successful, there is scope to expand the findings of this report to include prisoner demand at Oldbury Custody Block.

For the following analysis, data was filtered to only include custody records from the Perry Barr Custody Block (custody facility code = 'CC') as the proposed PHT is to be located at this custody block.

3.2.3 People in Custody (PIC)

Custody records were split into two groups depending on which shift they were relevant to. This allowed a better understanding of the number of resources required at each time period of the day. Shift times for the Early and Late shifts are 0700-1500 and 1400-2300 respectively. For the purposes of this analysis, it was assumed that any custody records with a station arrival time after 1500h would be dealt with by officers on the late shift. In addition to this it was assumed that arrivals between 2300h and 0700h were dealt with by the early shift.

3.2.3.1 BW and BE – PIC per shift, day of week and hour

On average across the time period, for BW and BE the number of PIC arriving during the early shift was 9.62 PIC and for the late shift 7.15 PIC. This demand was further broken down over days of the week (Figure 6). The average demand seen during the early shift on Saturday and Sunday was at least 3 PIC higher than the late shifts of those days. A potential reason for this increased demand is that the early shift includes hours from 11pm on Friday, likely incorporating any arrests arising from the night time economy. The early shift is on average busier across all days, probably due to the longer time period of custody records included in the early shift.

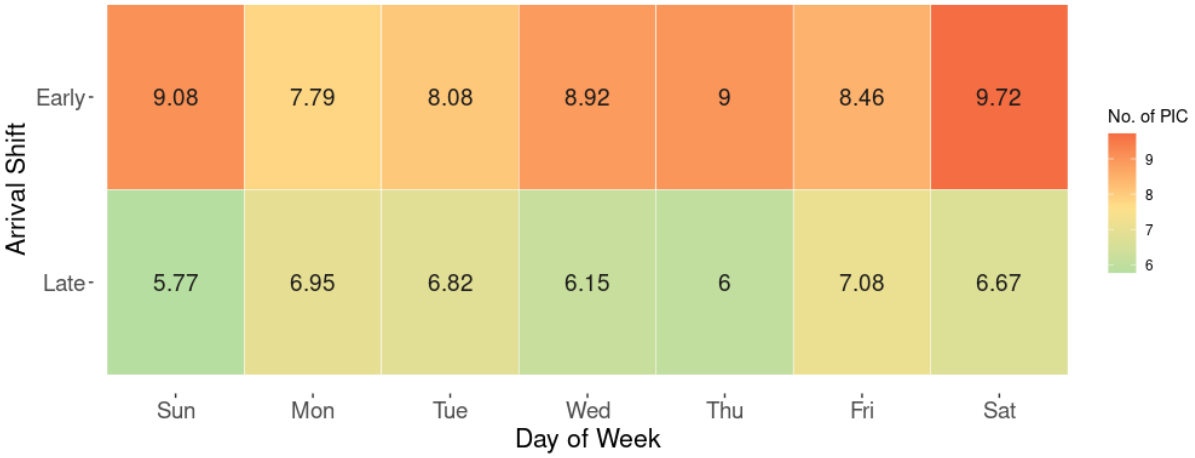

Figure 6: Number of PIC per shift, over each day of the week for BW and BE.

Demand per hour, averaged over each day of the week was also calculated by averaging number of PIC arriving at each hour of the day over the number of weeks of available data (Figure 7). It is clear that some times of the day see higher numbers of PIC than others. There is a band of increased demand between approximately 3pm and 6pm on all days of the week. The late hours of Friday and Saturday and early morning hours of Saturday and Sunday also see increased demand. This again is likely due to arrests following offences committed within the night time economy. There is also a small area of higher than average demand seen at approximately 9am-10am Monday to Thursday. This demand is showing arrival times into the custody block after PIC have been arrested, those PIC arriving between 11pm and 7am will not have any FCID processes started until after 7am when the current early shift starts.

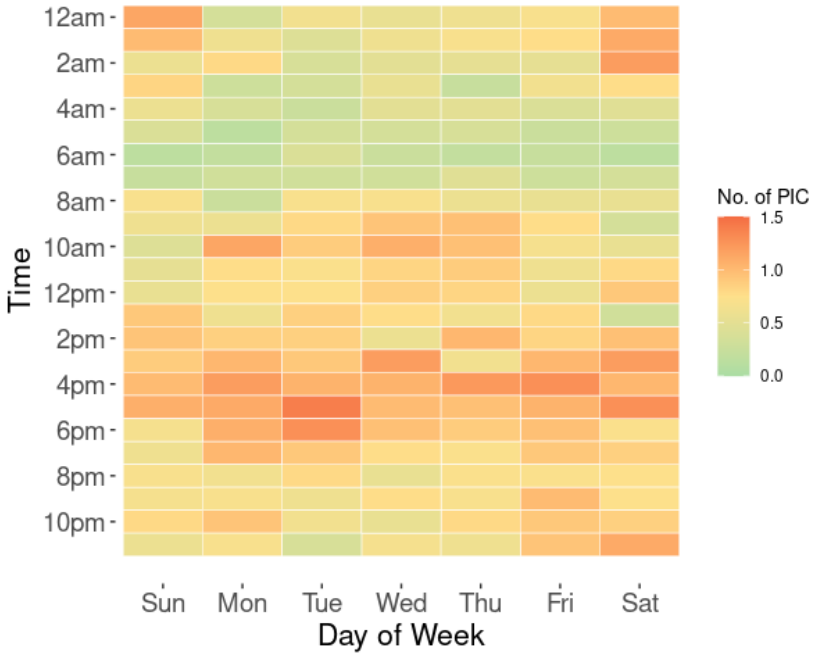

Figure 7: Number of PIC per hour, over each day of the week for BW and BE.

3.2.3.2 BW Only – PIC per shift, day of week and hour

When considering only relevant PIC to BW, the number arriving during the early shift time period was 6.00 PIC and for the late shift 3.87 PIC. This is slightly over half of the demand seen for BW combined with BE. The same patterns are seen with demand levels for only BW when broken down over days of the week and hours of the day as were seen with the combined PHT (Figure 6 vs Figure 8 and Figure 7 vs Figure 9).

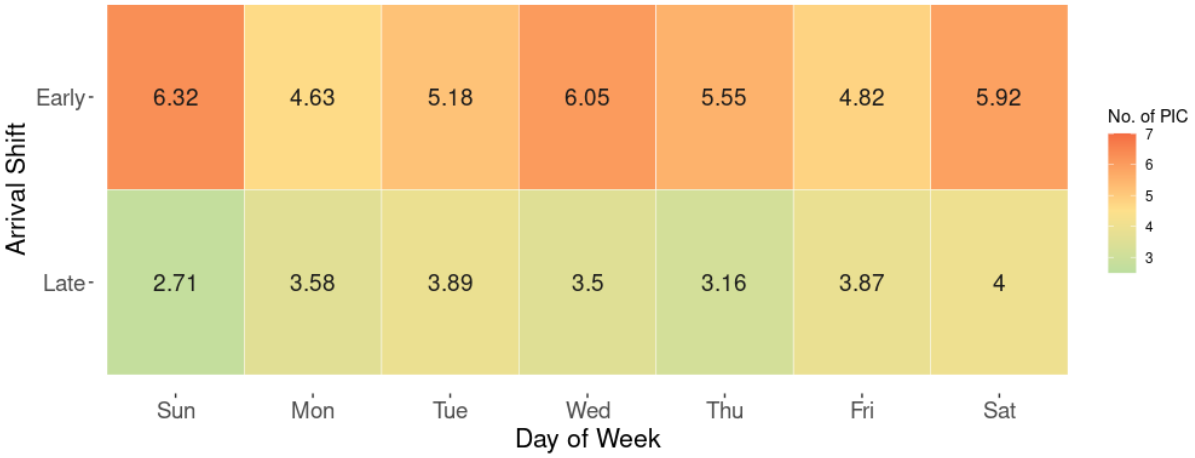

Figure 8: Number of PIC per shift, over each day of the week only for BW.

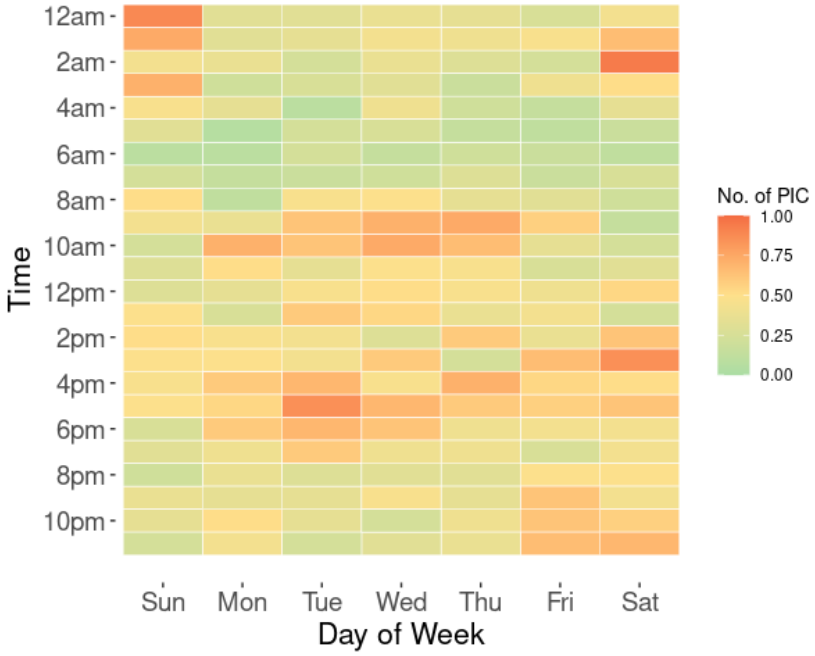

Figure 9: Number of PIC per hour, over each day of the week, only for BW.

3.3 Scenario Modelling

3.3.1 Monte Carlo Simulation

Because there is no data relating to a Prisoner Handling Team (as it has not been in existence), the methodology used to assess the potential size of the team uses information from the data and from subject matter experts in order to assess the possibility space of demand for such a team. Monte Carlo simulation is a computational method that uses repeated random sampling from a sequence of probability distributions in order to estimate the most optimum value of an unknown quantity (Kroese et al. 2014). The method defines possible inputs and then randomly generates them from a probability distribution before aggregating the results to form an estimation of the optimum result.

In this project the possible inputs were defined as: number of PIC per day, time to process each PIC and number of officers required per PIC. The unknown quantity that was being optimised by this method was the total number of officers required per day for the proposed PHT. Number of officers refers to the number of officers required on duty, not including any additional resources required to maintain the shift pattern or include annual leave. The total number of officers required to make the team function as a unit is discussed in section 4 (Project Output – Suggested Staffing Levels).

Two probability distributions were then created, one for the number of PIC per day and another for the time to process each PIC. These were multiplied together to create an estimated distribution for required work per day for the PHT. Required work is a measure of how many hours work are required by the team, on any given day, over both shifts.

The first distribution was created by taking 10,000 random samples using the mean and standard deviation of PIC demand per day between May 2021 and December 2021. This used a truncated normal distribution function with a lower limit of 1 and an upper limit reflecting the maximum number of PIC seen in one day (29 for BW+BE combined and 21 for BW only). This echoes the earlier seen timeline graphs of PIC per day with more days having number of PIC between 14 and 20 and less days having less than 14 PIC or more than 20 PIC (Figure 10, Left).

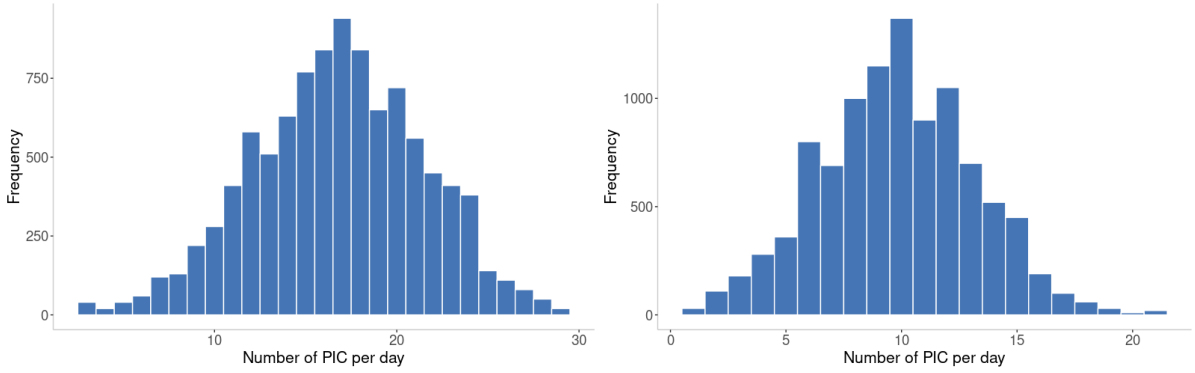

Figure 10: Histogram showing distribution of number of PIC per day. Left = BW+BE Combined. Right = BW Only.

The second distribution was created using a combination of three uniform distributions to give estimated processing time per PIC. Again, 10,000 samples were randomly drawn where it was assumed that 85% of PIC would require 4-8 hours processing time, with 5% requiring 1.5-4 hours, and 10% requiring 8-12 hours. These assumptions were decided upon using information from subject matter experts on prisoner handling times. Unfortunately, this data was not available in the WMP systems. It should be noted that prisoner processing time is not the same as custody duration. Custody duration was not considered an accurate measure of processing time because there may be cases where a prisoner spends longer in custody than average due to being initially unfit for interview.

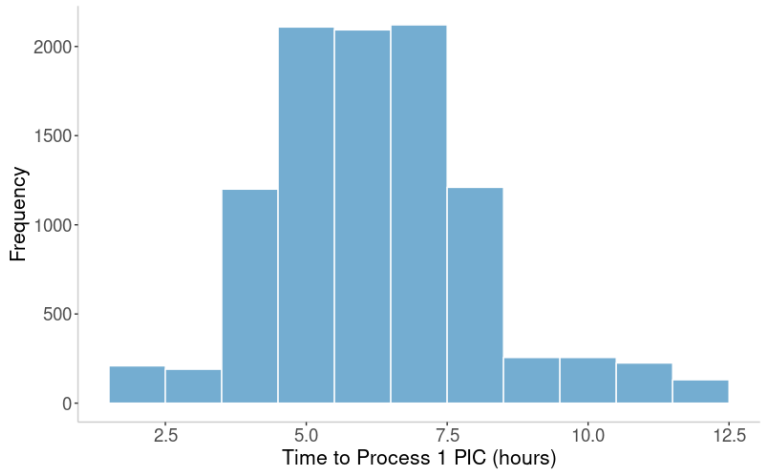

Figure 11: Histogram showing processing time distribution, the same distribution is used for BW+BE and BW only calculations.

The result of multiplying these distributions creates a separate distribution of required work per day (hours). This reflects the total time per day required to process the prisoners that are in custody. It has been assumed that each PIC only requires one officer. The distribution for required work per day (Figure 12) takes the same shape for BW+BE and BW only. As there are overall less PIC for a BW only PHT than the combined team, the upper limit of required work is lower.

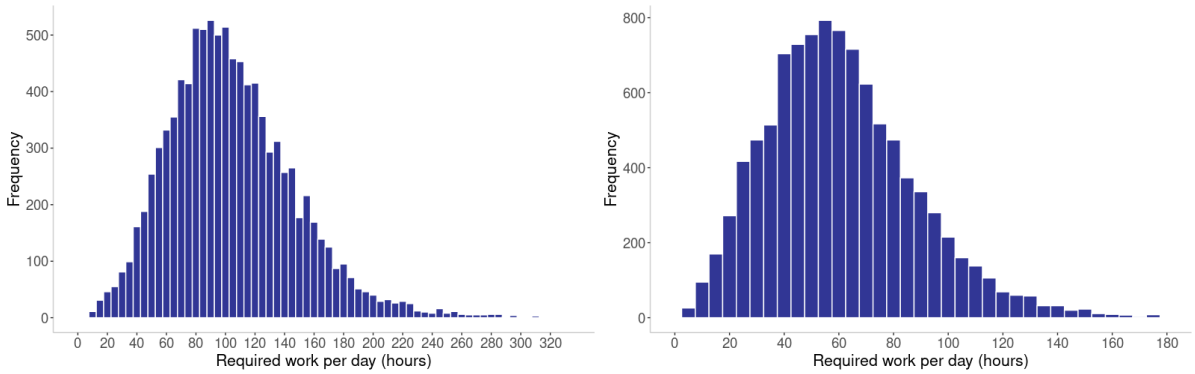

Figure 12: Histogram showing required work per day (total for all officers). Left = BW+BE combined PHT. Right = BW Only.

3.3.2 Required Work and Cost Differences

From the distribution of required work, we can infer the mean and percentiles of required work per shift, for each suggested number of officers. Shifts are 8 hours in length, but officer breaks and administration time at the beginning and end of each shift need to be accounted for. Allowing 30 minutes break, and 30 minutes at the beginning and the end of the shift for admin tasks, 6.5 hours remain. It is assumed that in order to be most cost effective, officers should be utilising as close to 6.5 hours as they can on tasks directly related to prisoner handling. Any values of required work over 6.5 hours suggest overutilisation of resources for the given number of officers. For required work values below 6.5 hours, there is a suggestion of underutilisation of resources resulting in reduced cost efficiency of the operating model.

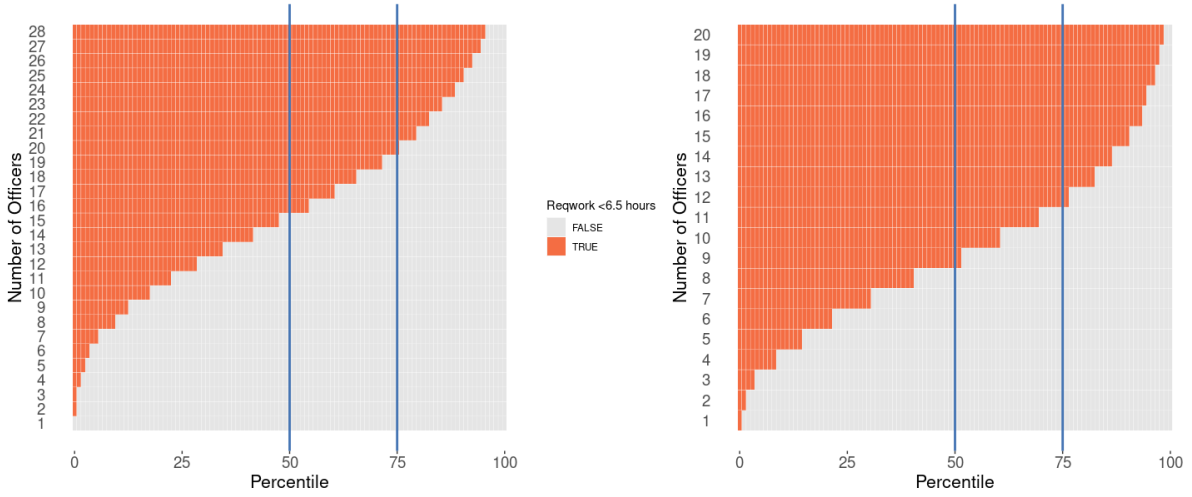

Figure 13: Number of Officers vs Percentile. Orange shows at which percentile less than 6.5 hours of work per officer are required in order to fulfil proposed PHT workload. Left: For BW+BE. Right: For BW Only.

For each number of officers, the percentile at which less than 6.5 hours of work are required can be calculated. Using 20 officers as an example (Figure 13, Left), it can be seen that on any given day there is a 75% chance that under 6.5 hours of work will be required by each officer. The remaining 25% (upper quartile) suggests that there is a possibility of (busier) days where more work is required than resources available.

In order to suggest the most cost-efficient number of officers for the PHT, cost was included in the analysis. Using an hourly rate for officers, two cost values were calculated:

$$\boldsymbol{Officer\ cost} = number\ of\ officers * shift\ length\ (hours) * hourly\ rate\ (£)$$

$$\boldsymbol{Prisoner\ cost} = number\ of\ prisoners * required\ work\ per\ prisoner * hourly\ rate(£)$$

The difference between these two costs per day should be minimised for the most cost-efficient operating model. The idea was to minimise times where there are too many PIC for number of officers, equally to minimise times when the opposite is true. The required work per officer value also needs to be considered as the most cost-efficient operating model may lead to the amount of required work being higher than the shift time.

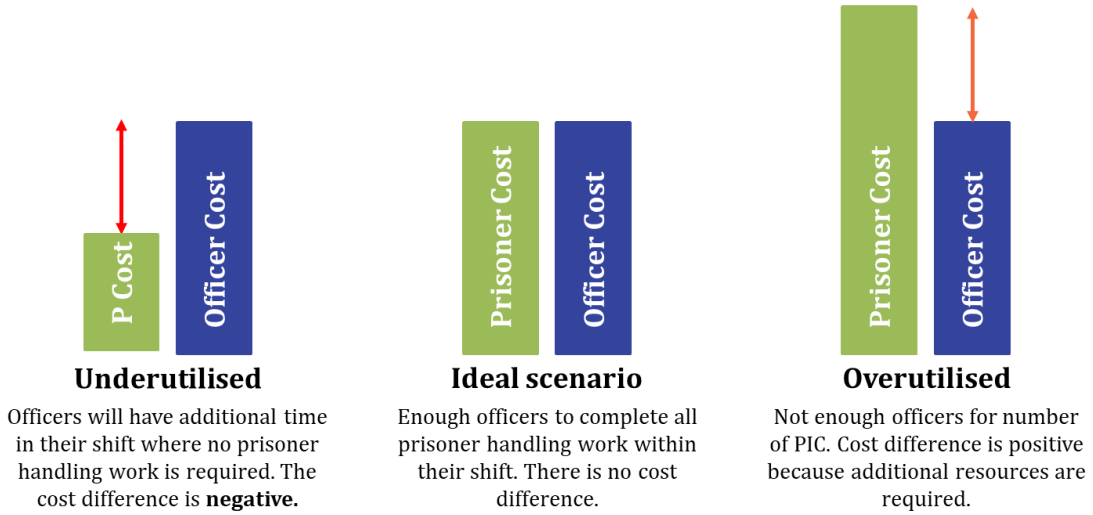

Figure 14: The concept of cost minimisation between Prisoner Cost and Officer Cost.

3.3.2.1 BW and BE – Required Work and Cost Differences Scenarios

Using different scenarios of number of officers per day, an average (mean) value of required work per officer can be calculated (

Table 3). For each number of officers (here ranging from 12 to 21), the number of hours each officer would have to work directly on prisoner handling tasks in order to complete the required quantity of work has been calculated. It is important to again note shift length here, allowing for breaks and admin time as previously mentioned leaves **6.5 hours** remaining for prisoner handling tasks.

Looking at Table 3, the lower 25% value in the left-hand column can be viewed as quieter days, where the given value or less work would be required from each officer. The upper 25% value in the right-hand column can be seen as busier days, where the given value or more work would be required from each officer.

An overall shift length of 8 hours is based upon the shift length of the current FCID Investigation teams. The current 'late' shift spans 9 hours; however, the two shifts overlap by 1 hour and for the purposes of this analysis it has been assumed that the late shift only take on prisoners after 1500h. If a 9-hour shift was considered more appropriate for the PHT, 7.5 hours of that shift could be utilised for prisoner handling tasks, when considering breaks and admin time. All of the following figures and analysis are based off a day formed from two 8-hour shifts, but should a longer 9-hour shift be possible, alternative officer numbers can be inferred from the figures and tables provided using 7.5 hours as the optimum, not 6.5 hours.

Taking an example from

Table 3 of 12 officers:

- On an average day, with 12 officers on duty, each officer would be required to complete 8.70 hours of prisoner handling tasks. This value is well above the maximum achievable time of 6.50 hours. Having only 12 officers on duty per day

on the PHT would result in over-stretched staff and inefficiencies due to backlogs.

- On a quieter day, 6.22 hours or less would be spent by each officer on prisoner handling tasks. This value is below 6.50 hours and therefore possible and utilising the resources to their full potential.
- On a busier day, 10.78 hours or more would need to be spent on prisoner handling tasks in order to get through the required workload. This is even further above the optimum length of 6.50 hours.

This suggests that 12 officers could only manage demand for a BW+BE combined PHT on quiet days (25% of the time).

*Table 3: Probability of required work, per officer (hours) for 12 to 21 officers per day, considering all BW and BE relevant PIC per day at Perry Barr Custody Block. Values in **bold** indicate they are 6.5 hours or below. These values show number of officers per day, across both shifts.*

	Probability of required work, per officer (hours)		
No. of Officers	Lower 25% below:	Mean	Upper 25% above:
12	**6.22**	8.70	10.78
13	**5.74**	8.03	9.95
14	**5.33**	7.46	9.24
15	**4.97**	6.96	8.62
16	**4.66**	**6.52**	8.08
17	**4.39**	**6.14**	7.61
18	**4.14**	**5.80**	7.18
19	**3.93**	**5.49**	6.81
20	**3.73**	**5.22**	**6.47**
21	**3.55**	**4.97**	**6.16**

Taking these values (Table 3) and multiplying them by the number of officers and the hourly rate of an officer will give the value for **officer cost**. Combining these with an approximation of prisoner cost will allow the calculation of a cost difference which can be minimised. **Prisoner cost** in this instance is approximated using the distribution of required work per day, multiplied by the hourly officer cost. These cost differences are shown in Table 4.

Table 4: Probability of Cost Differences (£) for scenarios with 16 to 20 officers.

	Probability of cost difference (£)		
No. of Officers	Lower 25% below:	Mean	Upper 25% above:
16	-877	10	753
17	-1069	-182	562
18	-1266	-375	365
19	-1455	-572	176
20	-1651	-763	-18

Ideally the mean cost difference should be as close to 0 as possible (minimised). Negative cost differences indicate that resources are underutilised and there will be time during the shift where no prisoner handling work is required. Positive cost differences indicate resources are over-stretched, and more resources are required to the value of the difference. The cost difference scenarios for 16 to 20 officers shows that increasing the number of officers reduces the mean cost difference, making it more negative. This represents an increasing level of under utilisation of officer's time.

The mean cost difference for 16 officers is £10 which is the value closest to 0 (

	Probability of required work, per officer (hours)		
No. of Officers	Lower 25% below:	Mean	Upper 25% above:
12	**6.22**	8.70	10.78
13	**5.74**	8.03	9.95
14	**5.33**	7.46	9.24
15	**4.97**	6.96	8.62
16	**4.66**	**6.52**	8.08
17	**4.39**	**6.14**	7.61
18	**4.14**	**5.80**	7.18
19	**3.93**	**5.49**	6.81
20	**3.73**	**5.22**	**6.47**

21	**3.55**	**4.97**	**6.16**

Taking these values (Table 3) and multiplying them by the number of officers and the hourly rate of an officer will give the value for **officer cost**. Combining these with an approximation of prisoner cost will allow the calculation of a cost difference which can be minimised. **Prisoner cost** in this instance is approximated using the distribution of required work per day, multiplied by the hourly officer cost. These cost differences are shown in Table 4.

Table 4). On quieter days (lower 25% value) there would be a negative cost difference, and on busier days (upper 25% value) there would be a positive cost difference. Having 16 officers provides a fairly balanced situation, where the mean number falls close to zero. Looking at the scenario with 20 officers, all cost differences are negative, this suggests that on all but the very busiest of days, having 20 officers would lead to times where the team is underutilised. However, alongside the cost differences, the required work values must be considered before the suggested staffing levels can be produced.

3.3.2.2 BW Only – Required Work and Cost Difference Scenarios

When considering only BW, the values of required work per officer for scenarios ranging from 7 to 13 officers are shown in Table 5. The lower 25% value in the left-hand column can be viewed as quieter days, where the given value or less work would be required from each officer. The upper 25% value in the right-hand column can be seen as busier days, where the given value or more work would be required from each officer.

*Table 5: Probability of required work, per officer (hours) for 7 to 13 officers per day, considering only BW relevant PIC per day at Perry Barr Custody Block. Values in **bold***

	Probability of required work, per officer (hours)		
No. of Officers	Lower 25% below:	Mean	Upper 25% above:
7	**5.92**	8.70	10.95
8	**5.18**	7.61	9.58
9	**4.61**	6.77	8.52
10	**4.15**	**6.09**	7.66
11	**3.77**	**5.54**	6.97
12	**3.46**	**5.07**	**6.39**
13	**3.19**	**4.68**	**5.90**

indicate they are 6.5 hours or below.

For Birmingham West only, cost difference scenarios with 9, 10, 11 or 12 officers are shown below. Again, the same pattern is seen where increasing the number of officers reduces the mean cost difference.

Table 6: Probability of Cost Difference (£) for scenarios with 9 to 12 officers for BW only.

	Probability of cost difference (£)		
No. of Officers	Lower 25% below:	Mean	Upper 25% above:
9	-507	**72**	542
10	-700	**-122**	346
11	-895	-315	**154**
12	-1087	-511	**-39**

Values in Table 6 represent the cost difference between prisoner cost and officer cost for each number of officers. As before, the mean cost difference should ideally be as close to £0 as possible. Providing 9 officers per day gives the cost difference closest to £0. With 12 officers the upper 25% value for cost difference is closest to 0, suggesting

that on busier days 12 officers would be a more appropriate number. These numbers follow the same pattern as the cost differences seen for BW+BE combined, however the differences between them are smaller due to the smaller PIC demand for BW only.

4 Project Output – Suggested Staffing Levels

Considering required work per day, number of officers and the cost difference between prisoner and officer cost, some suggestions of staffing levels for the proposed prisoner handling team can be created.

4.1 BW and BE Combined Prisoner Handling Team

Minimum requirement of 16 officers (PCs) + 4 Sergeants <u>per day</u>

If this was split into shifts:

- 8 PCs + 2 DS per early shift
- 8 PCs + 2 DS per late shift
- *(8 PCs + 2 DS on rest days)*

Having a minimum of 16 officers (PCs) on duty per day would provide enough officers to manage prisoner demand on an average day, with each officer needing to complete the optimum 6.5 hours of work. On busier days (approximately 25% of the time) it has been assumed that the sergeants could step in to assist with direct prisoner handling tasks. Alternatively, officers from another team may be required on these busier days. On quiet days (approx. 25% of the time) 12 officers or less would be required on this team, leaving at least 4 officers able to assist with excluded offences or other tasks (

Table 3).

Table 7: Summary table of required work and cost differences for 16, 19 and 20 officers.

No. of Officers	Mean Required Work (hours)	Upper 25% Required Work (hours)	Mean Cost Difference (£)	Upper 25% Cost Difference (£)
16	**6.52**	8.08	**10**	753
19	5.49	6.81	-572	**176**
20	5.22	**6.47**	-763	**-18**

4.1.1 Total Team Size – BW+BE Combined PHT

Based on the information provided to us by Workforce Planning we can calculate the total requirement for the prisoner handling team as a whole, across the 3x3x3 shift pattern. It has been assumed that the annual leave rate is 20%, sickness is 5% and other reasons for absence (such as vacancies) is 5%, giving a total rate of abstraction of 30%. To allow for this, we can multiply the above figures, which give the minimum number of officers required **on-duty** per day, by a factor of 1.43 = ($\frac{100\%\ officers\ required\ per\ shirt}{70\%\ average\ attendance}$).

$8\ PCs\ per\ shift * 1.43 = 11.44\ PCs\ per\ shift$

$= 11\ PCs\ required\ per\ shift\ to\ ensure\ no\ less\ than\ 8\ will\ be\ in\ attendance$

$= 11 * 3 =$ **33 *PCs required for the team*** $(+$ **6 *sergeants***$)$

4.2 BW Only Prisoner Handling Team

Minimum requirement of 10 officers (PCs) + 2 Sergeants <u>per day</u>

- 5 PCs + 1 DS per early shift
- 5 PCs + 1 DS per late shift
- *(5 PCs + 1 DS on rest days)*

Table 8: Summary table of required work and cost differences for 10 and 12 officers.

No. of Officers	Mean Required Work (hours)	Upper 25% Required Work (hours)	Mean Cost Difference (£)	Upper 25% Cost Difference (£)
9	6.77	8.52	**72**	542
10	**6.09**	7.66	**-122**	346
12	5.07	**6.39**	-511	**-39**

Although 9 officers provided the most economical cost difference, the average amount of required work per officer was above the value of 6.5 hours, suggesting that on an average day 9 officers would not be sufficient to fulfil the required quantity of work (Table 8). With the addition of one more officer per day to make a total of 10, the average level of required work per day would be just over 6 hours. Having 2 sergeants on the team per day and assuming they would be able to step in and take on prisoner handling tasks when required allows the team numbers to stretch to a total of 12. For busier days this would mean that the required work per officer would still be below the value of 6.5 hours.

4.2.1 Total Team Size – BW Only PHT

Using the same approach as described in section 4.1.1, total team size for a BW Only PHT can be calculated. With 5 officers given as the minimum number required, this can be multiplied by the factor of 1.43 to give the required number of officers taking into account absences.

$$5\ PCs\ per\ shift * 1.43 = 7.15\ PCs\ per\ shift$$

$$= 7\ PCs\ required\ per\ shift\ to\ ensure\ no\ less\ than\ 5\ will\ be\ in\ attendance$$

$$= 7 * 3 = \mathbf{21\ PCs\ required\ for\ the\ team}\ (+\ \mathbf{3\ sergeants})$$

4.3 Conclusion

From analysis of historical and current prisoner demand for the FCID Investigation teams based in BW and BE NPUs, it can be said that prisoner demand fluctuates daily but stays within a stable range over time. Three quarters of prisoners relevant to the current FCID investigation teams are located at Perry Barr Custody Block. The proposed prisoner handling team, if based at Perry Barr, and covering both BE and BW areas could handle demand with between 16 and 20 officers working per day. If the PHT was set up to handle only BW prisoners, then between 10 and 12 officers per day would be required. These figures are suggested to satisfy prisoner demand up to the 3rd quartile and offer the most sensible resource allocation. Where demand falls above this level, extra staff may be required for additional support. To permanently staff at higher levels than the 3rd quartile would not be cost effective to the organisation. Considering absences and using the formula provided to us by Workforce Planning the total number of officers required for a combined BE and BW prisoner handling team is 33 in addition to 6 sergeants. For a prisoner handling team covering demand only at BW, 21 officers and 3 sergeants would be required in total.

5 APPENDIX

5.1 Custody Records per Day 2018-2021

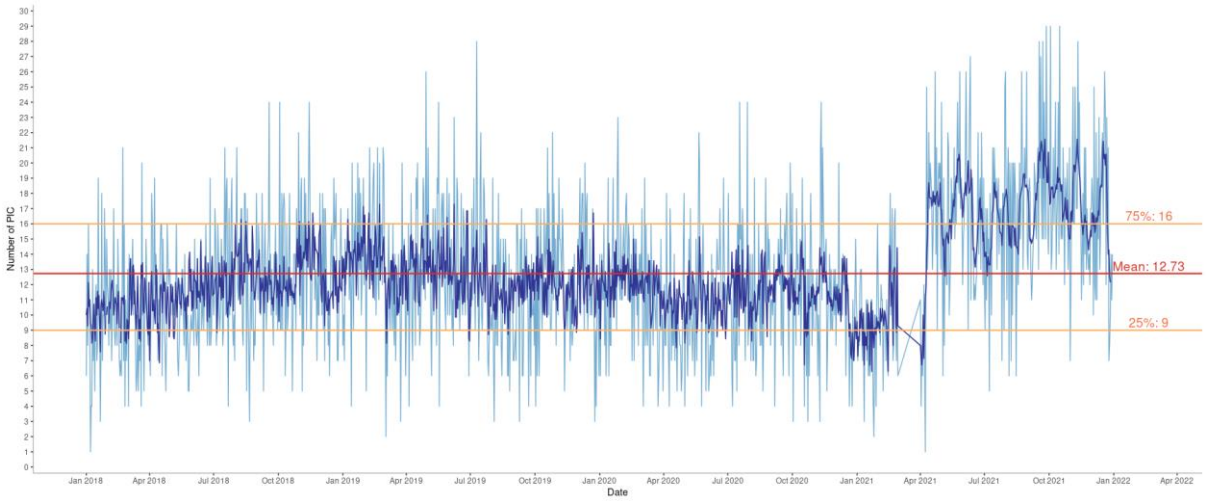

Figure 15: PIC per day, BW and BE, 2018 to 2021. Light blue line shows raw data, darker blue line represents a 7-day moving average of PIC per day.

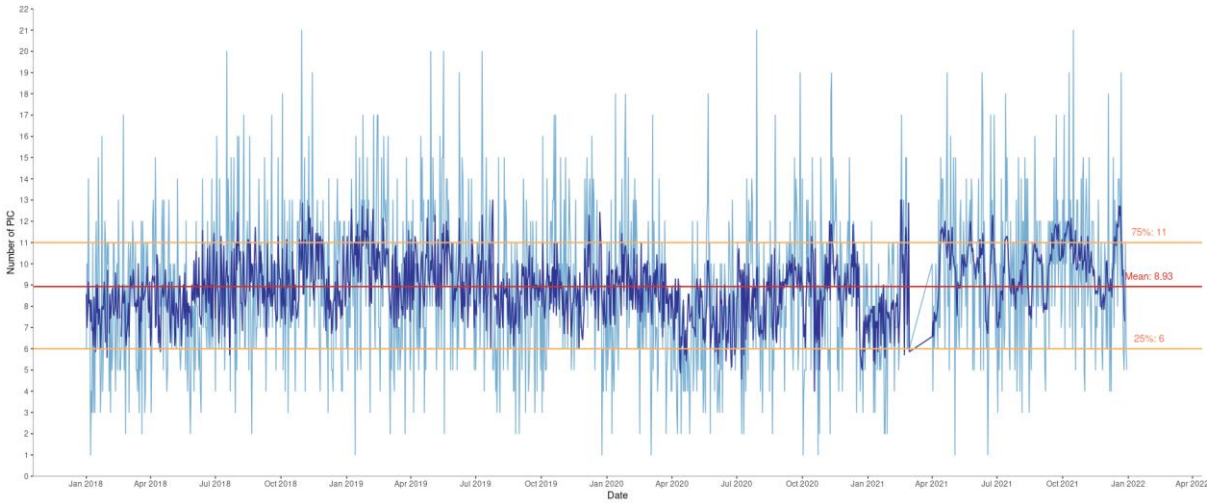

Figure 16: PIC per day, BW only, 2018 to 2021. Light blue line shows raw data, darker blue line represents a 7-day moving average of PIC per day.

6 References

ACPO (2009) Practice Advice on the Management of Priority and Volume Crime (The Volume Crime Management Model) (Second Edition) https://library.college.police.uk/docs/acpo/VCMM-191109.pdf

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