# Merseyside Fire and Rescue Service

# Assessment of Staffing Levels and Shift Patterns in the Mobilising and Communication Centre

# DRAFT

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# 1.  Introduction

Merseyside Fire and Rescue Service's (MF&RS) Mobilising and Communication Centre (MACC) receives and processes emergency calls for the area of Merseyside. There are currently 40 Whole Time Equivalents (WTE) employed in it, with the majority working a 2-2-4 shift system.

In addition to dealing with emergency calls, MACC also undertakes a number of administrative functions, including collating and processing information on officer availability, handling non emergency calls and updating databases, including incident logs.

Process Evolution has been working with MF&RS since 2004, providing supporting evidence to a range of strategic and tactical decisions in relation to resource deployment. In 2005, it undertook a review of MACC which demonstrated that MACC could be run with fewer staff without compromising the service level (i.e. timeliness in dealing with calls). These efficiency savings could be realised through realignment of shift patterns to match resource availability more closely to demand.

Due to circumstances at the time, the full extent of the change required and hence the savings has yet to be realised. However, since 2005, call volumes have declined significantly in the wake of MF&RS's pro-active community safety initiatives. With continuing uncertainty over the timing of the introduction of Regional Control, MF&RS therefore wishes to re-examine its current staffing of MACC in order to assess the potential for further efficiency savings.

This report documents the findings of Process Evolution's assessment on the staffing levels and makes recommendations based on several possible staffing solutions. The document is structured as follows:

- Section 2 states the objectives and provides a summary of the approach taken

- Section 3 provides an overview of the analysis undertaken and examines current workload

- Section 4 consists of the detail around the proposed solutions and the modelling results

- Section 5 provides a summary and conclusions for the work

## 2.  Objectives

The objectives of the project were to:

- Determine the workload undertaken by MACC staff, taking into account:

    o   Emergency call volumes

    o   Other telephone calls

    o   Other work undertaken by MACC staff (both within MACC and elsewhere)

- Compare the level of staff currently deployed in MACC to service this workload both overall and by hour of week, taking into account abstractions

- Make recommendations on overall staffing levels and shift patterns in order to ensure that the workload is serviced in a cost effective manner.

The approach taken has utilised Process Evolutions proven 'evidence based decision making' process and has comprised several stages including:

**Data analysis** – to understand current workload and identify any trends in demand

**Simulation** – to carry out '*what-if?*' modelling in order to test alternative resource levels and profiles through the day and week. This has included use of our Call Profiler simulation software.

**Shift pattern design** – in order to develop shift patterns that meet the desired resource profile. This involved the use of our XIMES shift pattern design software.

# 3. Data Analysis

This section contains the detailed findings from our analysis. The data underpinning the analysis has been obtained from a mixture of sources including data from operational systems, ad hoc spreadsheets maintained by MF&RS and interviews with key staff members. The main data set was provided by Paul Terry from the Knowledge and Information department and covers a 2 year period from 1/4/2008 to 31/3/2010.

## 3.1. Call Volume

The chart below shows the number of calls from the data set. Each category is a separate call queue:

**Call Volumes by Call Queue Type 1/4/2008 - 31/3/2010**
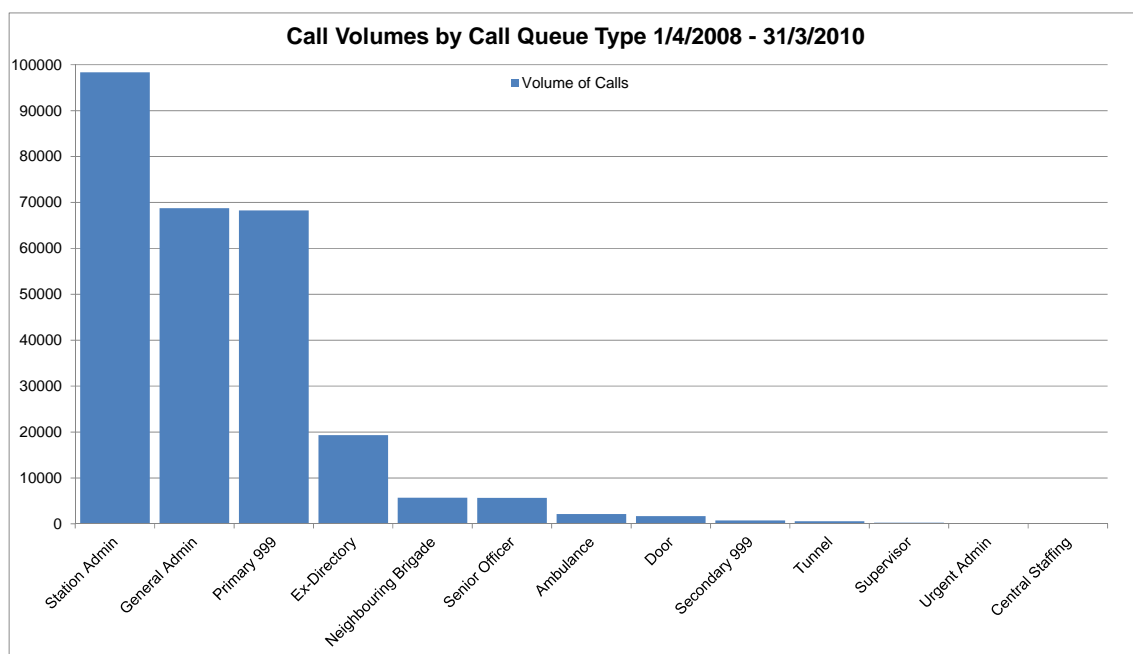


- Station Admin accounts for 36% of calls in this graph.

However, it is worth noting that from the 453,810 records from the dataset there were 181,958 additional records that are not included in the graph above that were blank and had no call queue name. After discussion with the MF&RS knowledge and information department, it was discovered that these calls could be attributed to outgoing calls or those calls that were made as a direct dial in. Further analysis shows that a portion of these calls were 'answered' therefore enabling the assumption that those that had been answered were direct dial in calls and those that were not answered must be outbound calls.

Certain call types have different priorities within MACC so in advance of the modelling phase, the different call types have been grouped into the following workstreams:

| Workstream | Queue types included |
|---|---|
| Priority | Ambulance, Ex-directory, Neighbouring Brigade, Primary 999, Secondary 999, Seniour Officer, Tunnel, Urgent Admin |
| General Admin | General Admin |
| Station Admin | Station Admin |
| DDI / Outbound calls | Blank Queue name |
| Other | Central Staffing, Door, Supervisor |

The chart below shows the call volumes by each workstream type:



**Call Volumes by Workstream Type 1/4/2008 - 31/3/2010**
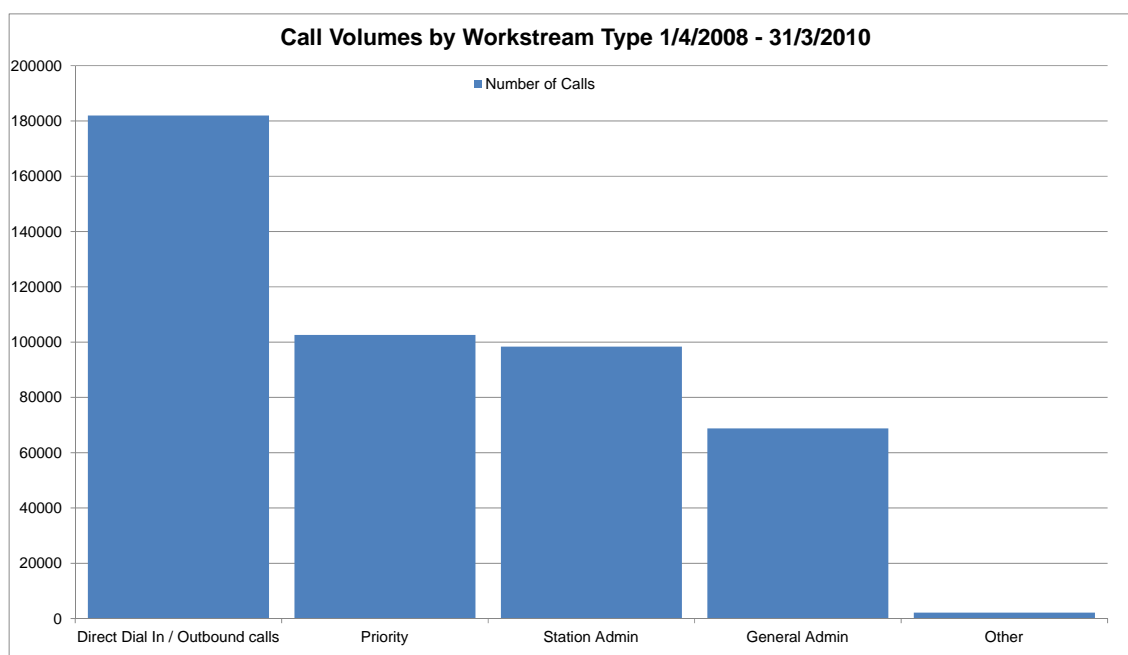
- With this classification, the call types that are given a high priority total more than the station admin calls.

- Priority Calls account for 22.6% of the calls from the data set.

## 3.2. Seasonality

The chart below shows the total call volumes by each moth of the two year data set:

**Total Call Volume April '08 - March '10**
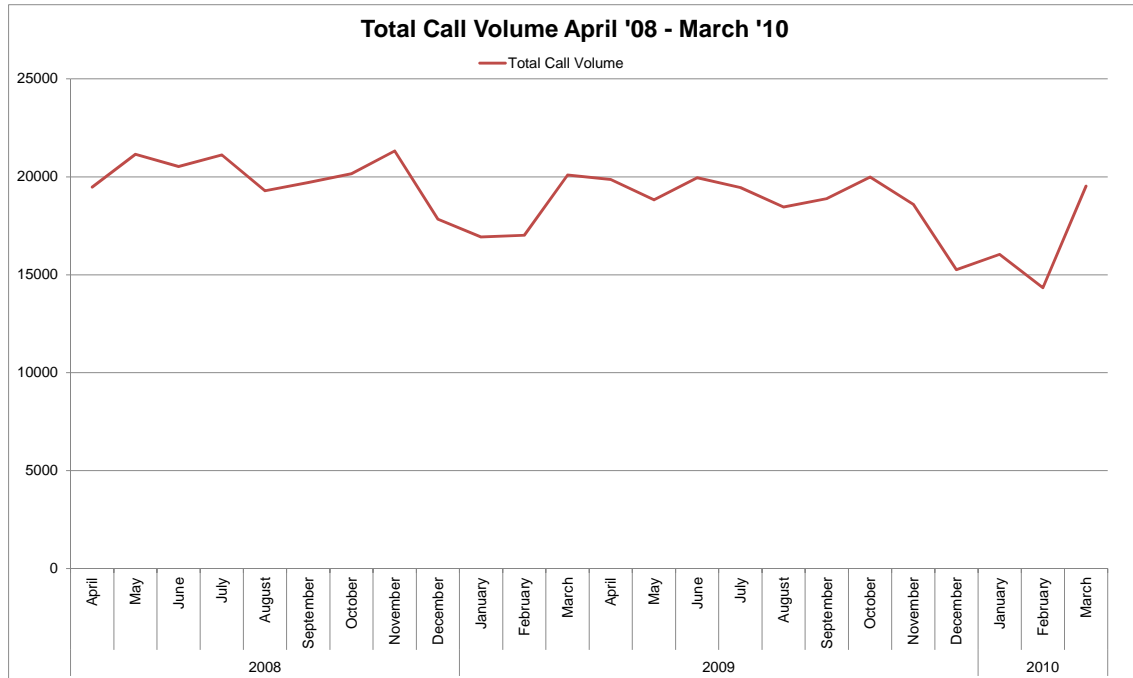
- There appears to be a general downward trend and reduction in call volumes.

- There are two notable dips in call volumes over the winter months (December – February) with an associated upturn in March.

The chart below shows the seasonality by each workstream type:

**Call Type Volumes April '08 - March '10**
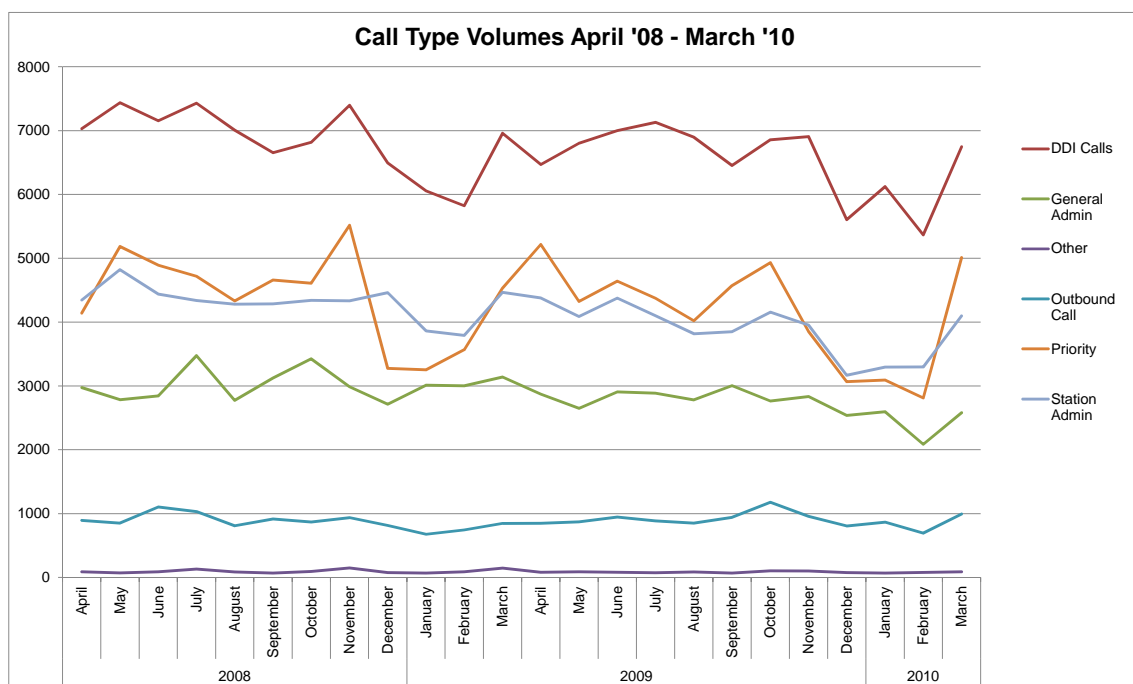
- DDI and Station Admin call volumes seem to loosely follow the trend of the Priority calls volume.

- General Admin, Outbound and Other calls have a less variable profile

### *3.3.    Demand Profiles*

The charts in this section examine the proportion of call demand that occurs in each hour of the week; this information is important when seeking to align resource availability to the times at which it is required.

The chart below shows the total call volume by hour of week:
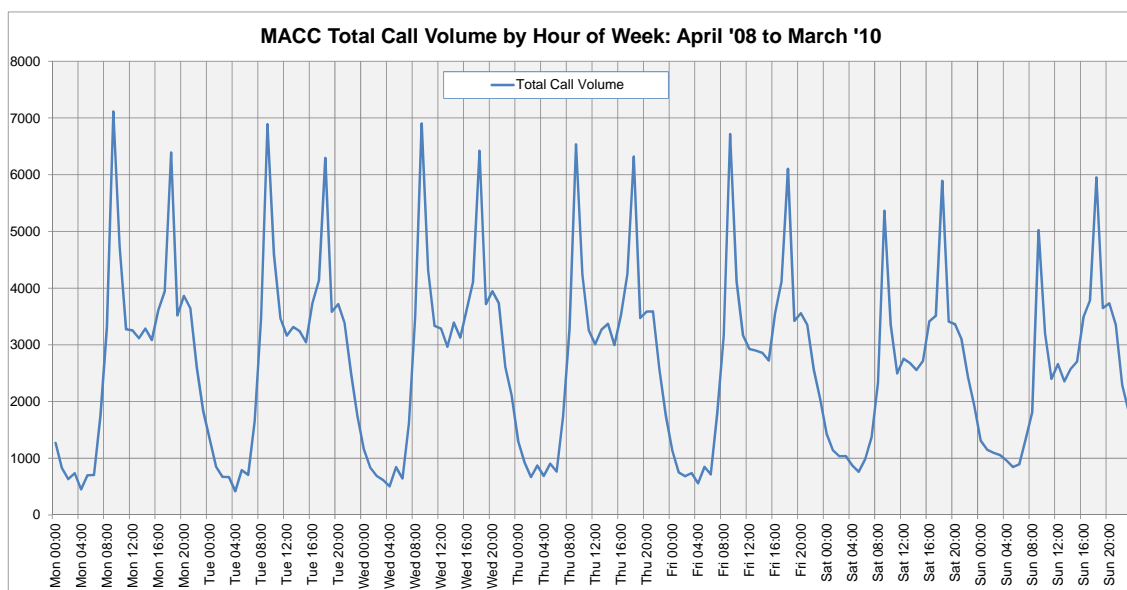


- This chart shows that the hourly profile is pretty constant from day to day with the two daily peaks at 0900 and 1800 hours and a smaller third peak/blip at around 2000 hours.

- There is slightly less demand on Saturdays and Sundays

- Overall Wednesdays are the busiest and Sundays are the quietest days.

The chart below shows the call volumes for just the priority workstream:

**MACC Priority Call Volume by Hour of Week: April '08 to March '10**
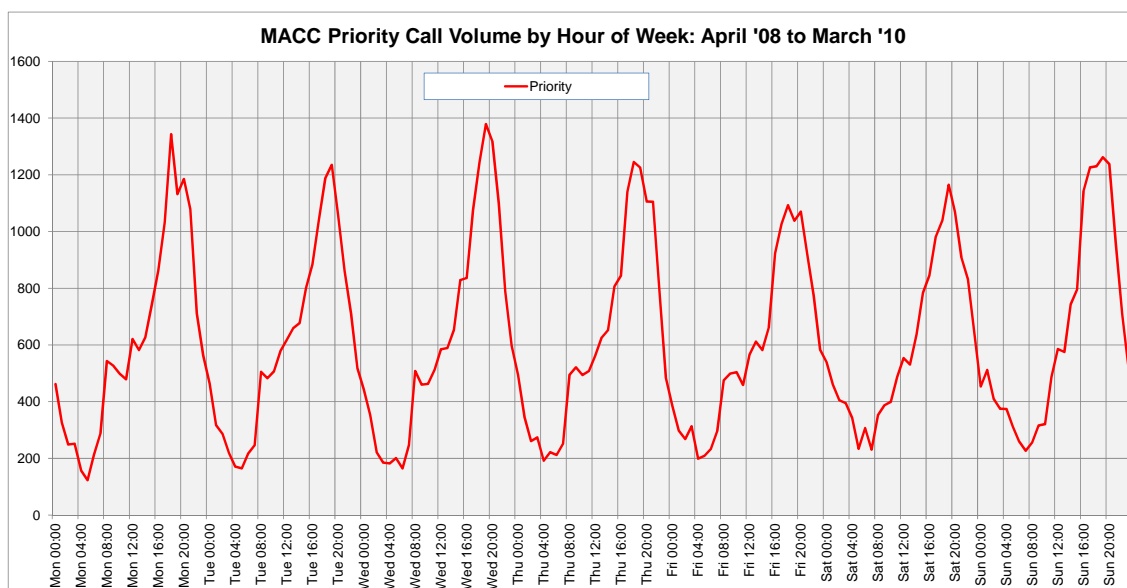


- This shows a more familiar demand curve that tends to peak around early evening

- For priority calls, Sundays are actually the busiest

The chart below shows the profile for Station Admin calls:

**MACC Station Admin Call Volume by Hour of Week: April '08 to March '10**
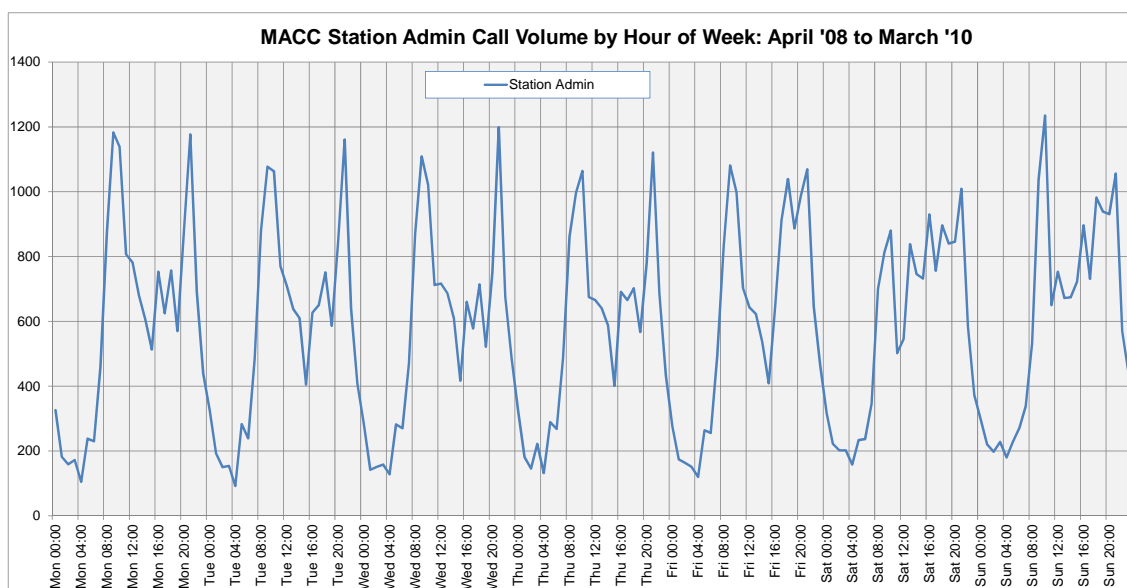


- Daily peaks at 0900 and 2100 hours

- Consistent volumes day to day with little variance between them

The chart below shows the volume of outbound calls:



MACC Outbound Call Volume by Hour of Week: April '08 to March '10
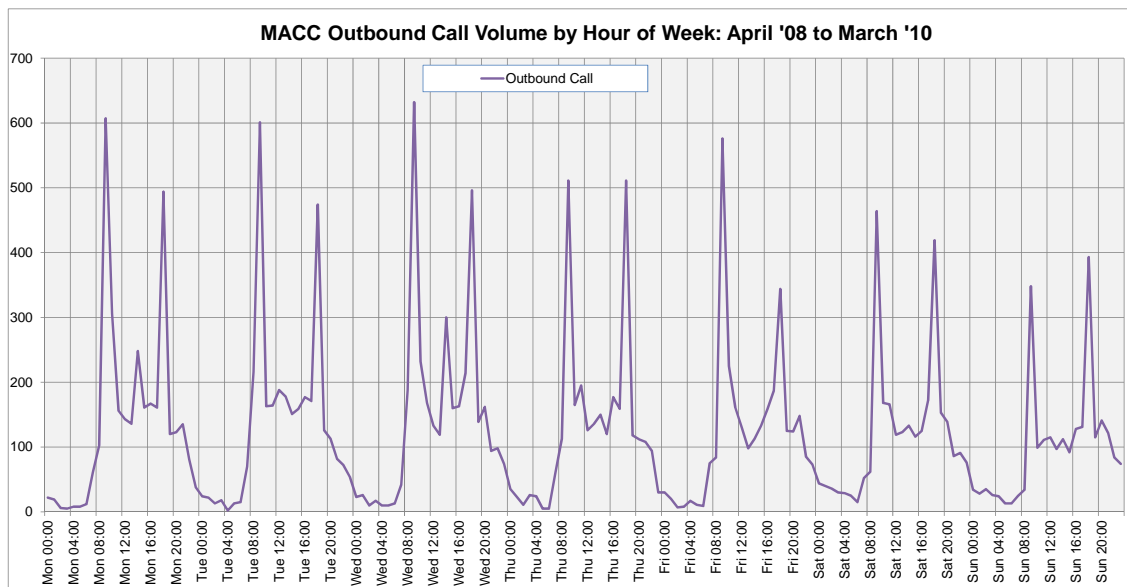
- Here you can see the 0900 and 1800 hour peaks that are reflected in the Total Volume profile on page 7

- Slightly fewer outbound calls at the weekend, again Wednesday is the busiest day.

The chart below shows the comparison of total call volume against the current resource levels available from the current shift pattern:



MACC Total Call Volume versus Available Resource
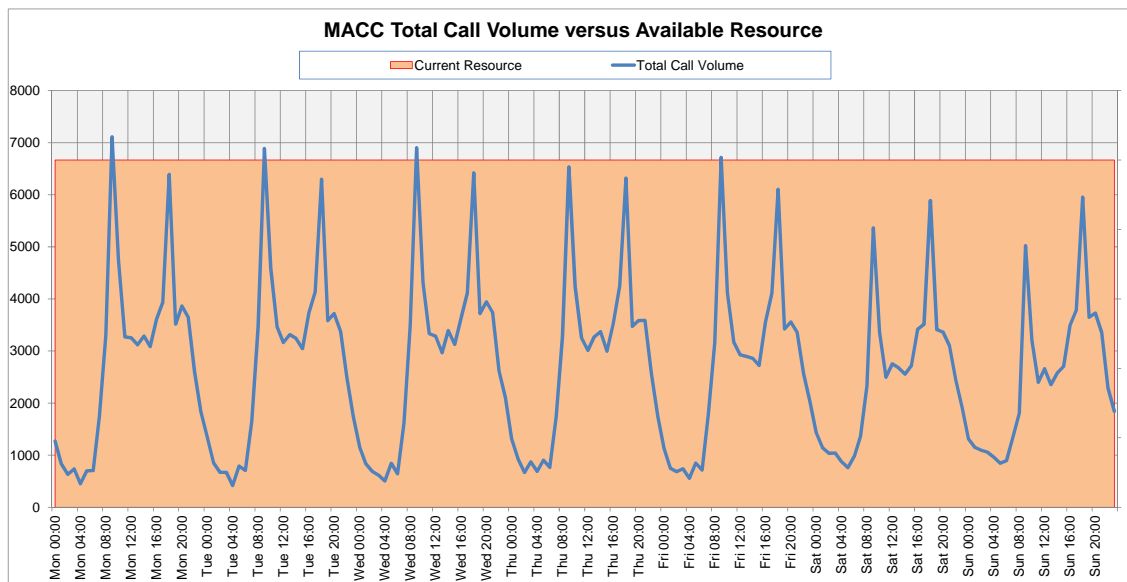
- The current shift pattern provides blanket cover

- It meets current demand spikes but provides excess cover at other times particularly over the night.

## 3.4. Performance and process timings

The table below shows how many seconds it takes for each workstream type to be answered:

| Workstream type | Seconds to answer call | | | | | | |
|---|---|---|---|---|---|---|---|
| | 0-10 | 22 - 20 | 21 - 30 | 31 - 40 | 41 - 50 | 51 - 60 | >60 |
| DDI | 67.9% | 23.9% | 5.5% | 1.2% | 0.9% | 0.2% | 0.4% |
| General Admin | 92.7% | 6.1% | 0.9% | 0.2% | 0.1% | 0.0% | 0.0% |
| Other | 83.3% | 13.0% | 2.9% | 0.7% | 0.1% | 0.0% | 0.0% |
| Priority | 97.4% | 1.9% | 0.5% | 0.2% | 0.1% | 0.0% | 0.0% |
| Station Admin | 93.5% | 5.5% | 0.8% | 0.2% | 0.0% | 0.0% | 0.0% |

- 97.4% of priority calls are answered within 10 seconds

The table below shows the average length of time each type of call has to wait in a queue before being answered by each day of the week (1/4/2009 – 31/3/2010):

| Workstream type | Monday | Tuesday | Wednesday | Thursday | Friday | Saturday | Sunday |
|---|---|---|---|---|---|---|---|
| Priority | 2.95 | 3.04 | 3.00 | 3.36 | 2.92 | 2.97 | 2.90 |
| Station Admin | 4.88 | 4.82 | 4.78 | 4.80 | 4.90 | 4.80 | 4.75 |
| General Admin | 4.93 | 4.95 | 4.98 | 4.90 | 5.18 | 5.11 | 4.92 |
| Other | 7.01 | 6.10 | 7.31 | 7.34 | 6.96 | 6.52 | 7.47 |
| DDI | 9.32 | 9.18 | 9.19 | 9.28 | 9.52 | 9.70 | 9.60 |

- On average priority calls are answered in around 3 seconds

- Direct Dial In calls are clearly given the lowest priority

The table below shows the average duration of each call type:

| Workstream type | Average Call Duration (seconds) |
|---|---|
| DDI | 61.1 |
| General Admin | 48.0 |
| Other | 22.0 |
| Outbound Call | 14.6 |
| Priority | 62.1 |
| Station Admin | 74.3 |

- On average Station Admin calls last the longest.

# 4.  Scenario Evaluation

This section contains the results from modelling several different resourcing options using the Process Evolution Call Centre Profiler and the XIMES software to propose shift patterns.

The overriding project objective was to evaluate the current workload undertaken by MACC staff and make recommendations on overall staffing levels and shift patterns in order to ensure that the workload is serviced in a cost effective manner. Based on this objective, three options have been constructed and tested using the Process Evolution methodology:

- Scenario 1 – A demand led 'best fit' shift pattern in order to closely match resource levels to actual call demand.

- Scenario 2 – A solution designed to provide a similar yet more cost effective solution to current work practices

- Scenario 3 – A middle ground solution between the current shift pattern and a best fit resource profile.

Scenarios have been run for a period of 52 weeks based on actual data from the period 1st April 2009 to 31st March 2010.

## 4.1.  Scenario 1:  Demand led shift pattern – 30 staff

This scenario utilises a workable shift pattern that is designed to try and match the profile of call workload as closely as practically possible.  The chart below shows the total call workload against the resource levels available from the scenario one shift pattern:
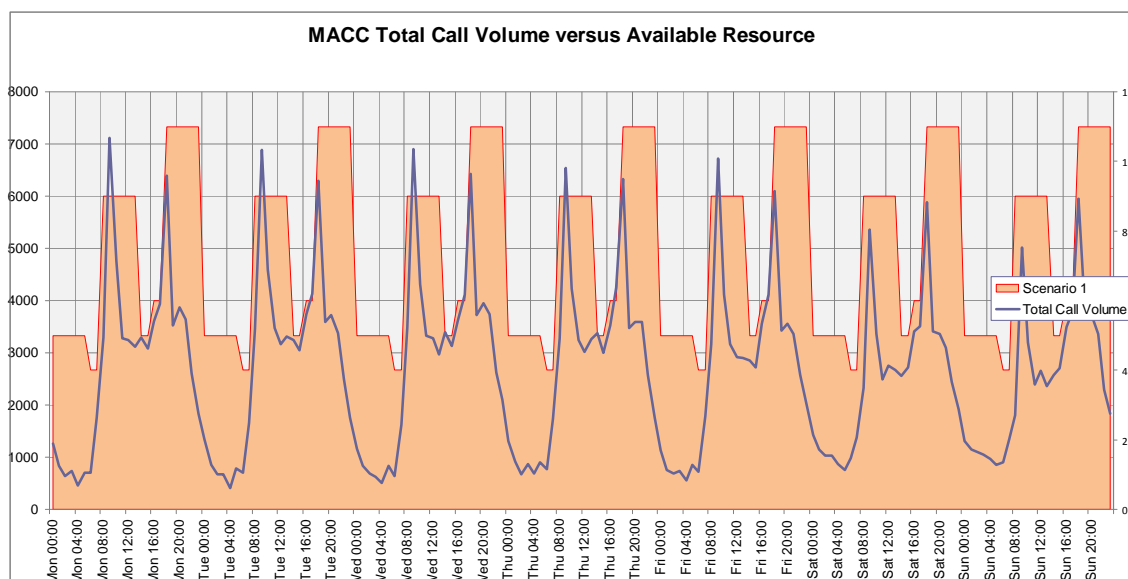


- Provides a close match of profile to the peaks in demand

- Still maintains cover during the middle of the day (afternoon / early evening) when most priority calls occur

- Goes some way to reduce staff levels during the quieter early hours period

### 4.1.1. Scenario 1 Shift Structure

Scenario one compromises a 4 shift pattern spread over a 30 week rota and requires 30 staff.  It consists of 6 shift groups (A-F) each with 5 staff.  The diagram below shows the 'core' baseline pattern for the staff (note this is an intermediary stage to aid explanation and is developed further below to generate the overall pattern:

| Group | Mon (1) | Tue | Wed | Thu | Fri | Sat | Sun |
|---|---|---|---|---|---|---|---|
| A | M1 | M1 | E1 | E1 | E1 | | |
| B | | M2 | M2 | M2 | M2 | E1 | E1 |
| C | | | M1 | M1 | N1 | N1 | N1 |
| D | N1 | | | | M1 | M1 | M1 |
| E | E1 | E1 | | | | M2 | M2 |
| F | M2 | N1 | N1 | N1 | | | |

The pattern above will always provide 5 staff scheduled onto each of the 4 shifts:

- M1 Morning shift 1     0630 – 1400
- M2 Morning shift 2     0800 – 1600
- E1 Evening shift     1600 – 2330
- N1 Night shift     1730 – 0630

However, in order to provide the profile shown in the graph above, we actually need 6 staff sheduled onto the E1 shift and 4 onto the M1 shift.  To achieve this, we look at the individuals within the teams.  Where a full team (of 5) is currently scheudled onto a M1 shift in the pattern above, one staff member actually performs an E1 shift instead, thus providing the coverage we require but keeping team based working.  These changes are shown in the diagram below, with the individiual team members now shown (e.g. B1 – B5 are the 5 individuals in team B):

| Group | W1 Mon | Tue | Wed | Thu | Fri | Sat | Sun | W2 Mon | Tue | Wed | Thu | Fri | Sat | Sun | W3 Mon | Tue | Wed | Thu | Fri | Sat | Sun | W4 Mon | Tue | Wed | Thu | Fri | Sat | Sun | W5 Mon | Tue | Wed | Thu | Fri | Sat | Sun | W6 Mon | Tue | Wed | Thu | Fri | Sat | Sun |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| A.1 | M1 | M1 | E1 | E1 | E1 | | | | M2 | M2 | M2 | M2 | E1 | E1 | | | M1 | M1 | N1 | N1 | N1 | N1 | | | | M1 | M1 | M1 | E1 | E1 | | | | M2 | M2 | M2 | N1 | N1 | N1 | | | |
| A.2 | E1 | E1 | E1 | E1 | E1 | | | | M2 | M2 | M2 | M2 | E1 | E1 | | | M1 | M1 | N1 | N1 | N1 | N1 | | | | M1 | M1 | M1 | E1 | E1 | | | | M2 | M2 | M2 | N1 | N1 | N1 | | | |
| A.3 | M1 | M1 | E1 | E1 | E1 | | | | M2 | M2 | M2 | M2 | E1 | E1 | | | E1 | E1 | N1 | N1 | N1 | N1 | | | | M1 | M1 | M1 | E1 | E1 | | | | M2 | M2 | M2 | N1 | N1 | N1 | | | |
| A.4 | M1 | M1 | E1 | E1 | E1 | | | | M2 | M2 | M2 | M2 | E1 | E1 | | | M1 | M1 | N1 | N1 | N1 | N1 | | | | E1 | E1 | E1 | E1 | E1 | | | | M2 | M2 | M2 | N1 | N1 | N1 | | | |
| A.5 | M1 | M1 | E1 | E1 | E1 | | | | M2 | M2 | M2 | M2 | E1 | E1 | | | M1 | M1 | N1 | N1 | N1 | N1 | | | | M1 | M1 | M1 | E1 | E1 | | | | M2 | M2 | M2 | N1 | N1 | N1 | | | |
| B.1 | | M2 | M2 | M2 | M2 | E1 | E1 | | | M1 | M1 | N1 | N1 | N1 | N1 | | | M1 | M1 | M1 | E1 | E1 | | | E1 | E1 | | | | M2 | M2 | M2 | N1 | N1 | N1 | | | M1 | M1 | E1 | E1 | E1 |
| B.2 | | M2 | M2 | M2 | M2 | E1 | E1 | | | E1 | E1 | N1 | N1 | N1 | N1 | | | M1 | M1 | M1 | E1 | E1 | | | E1 | E1 | | | | M2 | M2 | M2 | N1 | N1 | N1 | | | E1 | E1 | E1 | E1 | E1 |
| B.3 | | M2 | M2 | M2 | M2 | E1 | E1 | | | M1 | M1 | N1 | N1 | N1 | N1 | | | M1 | M1 | M1 | E1 | E1 | | | E1 | E1 | | | | M2 | M2 | M2 | N1 | N1 | N1 | | | M1 | M1 | E1 | E1 | E1 |
| B.4 | | M2 | M2 | M2 | M2 | E1 | E1 | | | M1 | M1 | N1 | N1 | N1 | N1 | | | M1 | M1 | M1 | E1 | E1 | | | E1 | E1 | | | | M2 | M2 | M2 | N1 | N1 | N1 | | | M1 | M1 | E1 | E1 | E1 |
| B.5 | | M2 | M2 | M2 | M2 | E1 | E1 | | | M1 | M1 | N1 | N1 | N1 | N1 | | | E1 | E1 | E1 | E1 | E1 | | | E1 | E1 | | | | M2 | M2 | M2 | N1 | N1 | N1 | | | M1 | M1 | E1 | E1 | E1 |
| C.1 | | M1 | M1 | N1 | N1 | N1 | N1 | | | M1 | M1 | M1 | E1 | E1 | | | M2 | M2 | M2 | N1 | N1 | N1 | | | M1 | M1 | E1 | E1 | E1 | | | | M2 | M2 | M2 | M2 | E1 | E1 | | | |
| C.2 | | E1 | E1 | N1 | N1 | N1 | N1 | | | M1 | M1 | M1 | E1 | E1 | | | M2 | M2 | M2 | N1 | N1 | N1 | | | E1 | E1 | E1 | E1 | E1 | | | | M2 | M2 | M2 | M2 | E1 | E1 | | | |
| C.3 | | M1 | M1 | N1 | N1 | N1 | N1 | | | M1 | M1 | M1 | E1 | E1 | | | M2 | M2 | M2 | N1 | N1 | N1 | | | M1 | M1 | E1 | E1 | E1 | | | | M2 | M2 | M2 | M2 | E1 | E1 | | | |
| C.4 | | M1 | M1 | N1 | N1 | N1 | N1 | | | M1 | M1 | M1 | E1 | E1 | | | M2 | M2 | M2 | N1 | N1 | N1 | | | M1 | M1 | E1 | E1 | E1 | | | | M2 | M2 | M2 | M2 | E1 | E1 | | | |
| C.5 | | M1 | M1 | N1 | N1 | N1 | N1 | | | E1 | E1 | E1 | E1 | E1 | | | M2 | M2 | M2 | N1 | N1 | N1 | | | M1 | M1 | E1 | E1 | E1 | | | | M2 | M2 | M2 | M2 | E1 | E1 | | | |
| D.1 | N1 | | | M1 | M1 | M1 | E1 | E1 | | | M2 | M2 | M2 | N1 | N1 | N1 | | | M1 | M1 | E1 | E1 | E1 | | | | M2 | M2 | M2 | M2 | E1 | E1 | | | | M1 | M1 | N1 | N1 | N1 |
| D.2 | N1 | | | M1 | M1 | M1 | E1 | E1 | | | M2 | M2 | M2 | N1 | N1 | N1 | | | E1 | E1 | E1 | E1 | E1 | | | | M2 | M2 | M2 | M2 | E1 | E1 | | | | M1 | M1 | N1 | N1 | N1 |
| D.3 | N1 | | | M1 | M1 | M1 | E1 | E1 | | | M2 | M2 | M2 | N1 | N1 | N1 | | | M1 | M1 | E1 | E1 | E1 | | | | M2 | M2 | M2 | M2 | E1 | E1 | | | | M1 | M1 | N1 | N1 | N1 |
| D.4 | N1 | | | M1 | M1 | M1 | E1 | E1 | | | M2 | M2 | M2 | N1 | N1 | N1 | | | M1 | M1 | E1 | E1 | E1 | | | | M2 | M2 | M2 | M2 | E1 | E1 | | | | M1 | M1 | N1 | N1 | N1 |
| D.5 | N1 | | | E1 | E1 | E1 | E1 | E1 | | | M2 | M2 | M2 | N1 | N1 | N1 | | | M1 | M1 | E1 | E1 | E1 | | | | M2 | M2 | M2 | M2 | E1 | E1 | | | | M1 | M1 | N1 | N1 | N1 |
| E.1 | E1 | E1 | | | | M2 | M2 | M2 | N1 | N1 | N1 | | | M1 | M1 | E1 | E1 | E1 | | | | M2 | M2 | M2 | M2 | E1 | E1 | | | | M1 | M1 | N1 | N1 | N1 | N1 | | | M1 | M1 | M1 |
| E.2 | E1 | E1 | | | | M2 | M2 | M2 | N1 | N1 | N1 | | | E1 | E1 | E1 | E1 | E1 | | | | M2 | M2 | M2 | M2 | E1 | E1 | | | | M1 | M1 | N1 | N1 | N1 | N1 | | | M1 | M1 | M1 |
| E.3 | E1 | E1 | | | | M2 | M2 | M2 | N1 | N1 | N1 | | | M1 | M1 | E1 | E1 | E1 | | | | M2 | M2 | M2 | M2 | E1 | E1 | | | | M1 | M1 | N1 | N1 | N1 | N1 | | | E1 | E1 | E1 |
| E.4 | E1 | E1 | | | | M2 | M2 | M2 | N1 | N1 | N1 | | | M1 | M1 | E1 | E1 | E1 | | | | M2 | M2 | M2 | M2 | E1 | E1 | | | | M1 | M1 | N1 | N1 | N1 | N1 | | | M1 | M1 | M1 |
| E.5 | E1 | E1 | | | | M2 | M2 | M2 | N1 | N1 | N1 | | | M1 | M1 | E1 | E1 | E1 | | | | M2 | M2 | M2 | M2 | E1 | E1 | | | | M1 | M1 | N1 | N1 | N1 | N1 | | | M1 | M1 | M1 |
| F.1 | M2 | N1 | N1 | N1 | | | | M1 | M1 | E1 | E1 | E1 | | | | M2 | M2 | M2 | M2 | E1 | E1 | | | M1 | M1 | N1 | N1 | N1 | N1 | | | M1 | M1 | M1 | E1 | E1 | | | | M2 | M2 |
| F.2 | M2 | N1 | N1 | N1 | | | | E1 | E1 | E1 | E1 | E1 | | | | M2 | M2 | M2 | M2 | E1 | E1 | | | M1 | M1 | N1 | N1 | N1 | N1 | | | M1 | M1 | M1 | E1 | E1 | | | | M2 | M2 |
| F.3 | M2 | N1 | N1 | N1 | | | | M1 | M1 | E1 | E1 | E1 | | | | M2 | M2 | M2 | M2 | E1 | E1 | | | E1 | E1 | N1 | N1 | N1 | N1 | | | M1 | M1 | M1 | E1 | E1 | | | | M2 | M2 |
| F.4 | M2 | N1 | N1 | N1 | | | | M1 | M1 | E1 | E1 | E1 | | | | M2 | M2 | M2 | M2 | E1 | E1 | | | M1 | M1 | N1 | N1 | N1 | N1 | | | E1 | E1 | E1 | E1 | E1 | | | | M2 | M2 |
| F.5 | M2 | N1 | N1 | N1 | | | | M1 | M1 | E1 | E1 | E1 | | | | M2 | M2 | M2 | M2 | E1 | E1 | | | M1 | M1 | N1 | N1 | N1 | N1 | | | M1 | M1 | M1 | E1 | E1 | | | | M2 | M2 |

Each member of the team rotates through the five line for that team (making it a 30 week full rotation for each individual).  So individual A1, for example, is scheduled onto the 6 weeks shown in their line.  In week 7, they take on the line shown as A2, starting with 5xE1 shifts and follow this line for weeks 7-12.  In week 13, they take on the line shown as A3 and so on.  After 30 weeks, they will be at the end of line A5 and hence return back to the start.

The shift pattern was entered into the simulation model and run over a virtual full year.  Based on the april '09 to March '10 dataset, it gave the folowing performance:

| SCENARIO | | Baseline | Scenario 1 |
|---|---|---|---|
| **Description** | | Base model to represent current performance | 4 shift system. Best match to demand |
| **Staff Numbers** | | 40 | 30 |
| **Targets** | Priority Calls within 10 seconds | 97.7% | 93.8% |
| | Station Admin Calls within 20 seconds | 98.0% | 94.5% |
| | General Admin Calls within 20 seconds | 97.5% | 93.3% |
| | Other Calls within 20 seconds | 96.4% | 92.9% |
| **Abandonments** | Priority | 0.1% | 0.8% |
| | Station Admin | 0.3% | 1.5% |
| | General Admin | 0.1% | 0.9% |
| | Other | 1.7% | 2.8% |
| **Overall average queue (sec)** | Priority | 1.23 | 4.79 |
| | Station Admin | 1.31 | 4.22 |
| | General Admin | 2.49 | 8.66 |
| | Other | 2.11 | 6.58 |
| **Utilisation** | | 36.3 | 40.2 |

The improved match of resource levels to the demand profile means that a high performance can still be maintained even with fewer resources.  This is shown by a higher staff utilisation rate.

## 4.2.  Scenario 2: Minimal change solution – 32 staff

This scenario attempts to keep working practices as similar as possible to current day working practices whilst improving cost effectiveness.  The chart below shows the total call workload against the resource levels available from the scenario 2 shift pattern:
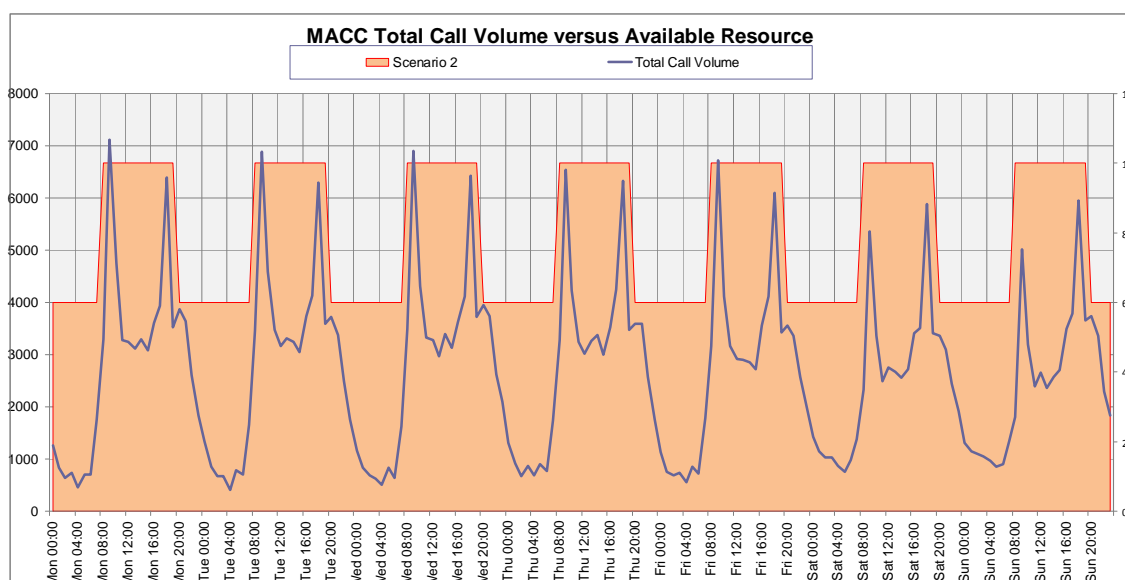


- Covers the two peaks in call workload, and an improvement over current levels (see chart on page 10)

- Not as effective at reducing staff at quiet timews

### 4.2.1. Scenario 2 Shift Structure

Scenario two compromises a 2 shift pattern spread over a 32 week rota and requires 32 staff. It consists of 4 shift groups (A-D) each team being split into 4 subgroups of 2 staff (hence each 'line' of the rota below represents 2 individuals):



The core of the pattern is identical to the current pattern – i.e. DDNN followed by 4 rest days. However, in order to better match demand, every fourth time this sequence repeats, staff now work four D12 shifts instead, thus providing 2 extra staff on D12 and 2 fewer on D and N every day. D12 is a 12-hour shift designed to cover the two peak periods in the early morning and evening and the overlaps between the start and end of the D and N shifts. The start and end times could however be flexed if required. Further, the D and N shift could also be flexed provided the 24 hours in any day are covered; for example, they could be set to 0700-1900 and 1900-0700 if 12 hour shifts throughout are preferred.

The three shifts are as follows:

- D Day shift          0830 - 1730
- N Night shift        1730 – 0830
- D12 shift            0800 - 2000

### 4.2.2. Scenario 2 Performance

The shift pattern was entered into the simulation model and run over a virutal full year. Based on the april '09 to March '10 dataset, it gave the folowing performance:

| SCENARIO | | Baseline | Scenario 2 |
|---|---|---|---|
| **Description** | | Base model to represent current performance | 2 shift sytem. Similar to current shift |
| **Staff Numbers** | | 40 | 32 |
| **Targets** | Priority Calls within 10 seconds | 97.7% | 95.1% |
| | Station Admin Calls within 20 seconds | 98.0% | 95.8% |
| | General Admin Calls within 20 seconds | 97.5% | 96.6% |
| | Other Calls within 20 seconds | 96.4% | 96.3% |
| **Abandonments** | Priority | 0.1% | 0.4% |
| | Station Admin | 0.3% | 1.0% |
| | General Admin | 0.1% | 0.3% |
| | Other | 1.7% | 1.7% |
| **Overall average queue (sec)** | Priority | 1.23 | 3.24 |
| | Station Admin | 1.31 | 3.09 |
| | General Admin | 2.49 | 3.64 |
| | Other | 2.11 | 2.44 |
| **Utilisation** | | 36.3 | 39.3 |

Priority calls are kept within the 90% within 10 seconds target, whilst maintaining a shift pattern that is familiar to all staff.

## 4.3. Scenario 3: Middle road solution

This scenario is designed to be a middle ground between scenario 1 and scenario 2 by trying to increase the hours of cover with higher than minimum staffing whilst trying to maintain a desirable shift pattern. The chart below shows the total call workload against the resource levels available from the scenario three shift pattern:
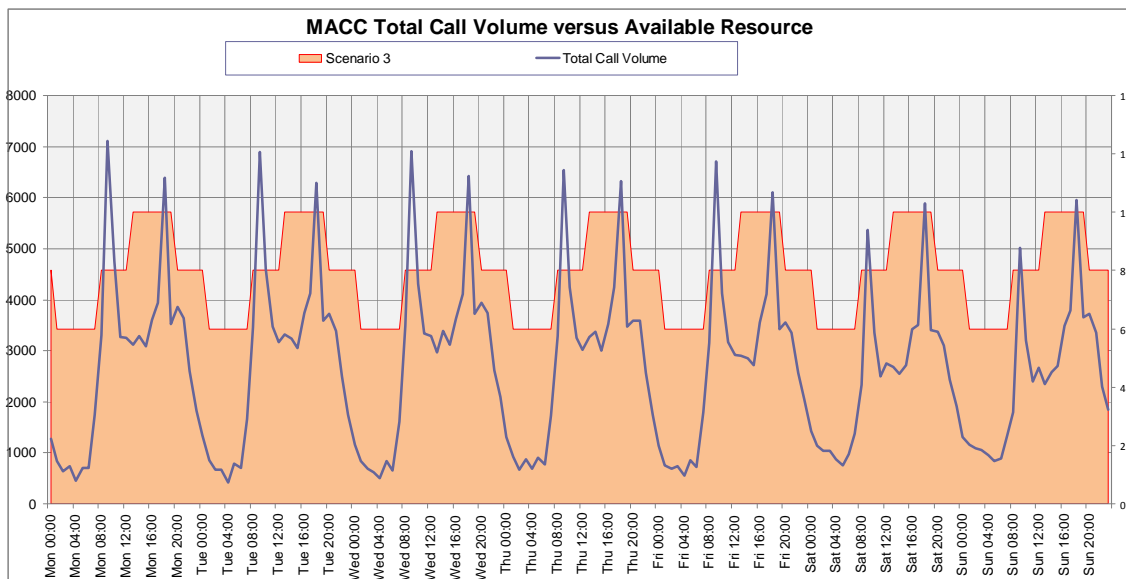


- Provides some increased cover around demand peaks for priority calls if not overall call workload.

- Spreads out the times at which higher than minimum cover is provided

- Less effective at meeting the morning peak in overall demand

### 4.3.1. Scenario 3 Shift Structure

Scenario three compromises a 4 shift pattern spread over a 32 week rota and requires 32 staff. It consists of 4 shift groups (A-D) each with 8 staff. As with the other options presented above, whilst the teams are often scheduled onto the same shifts, there are variations for each individual within the team to provide a better match to demand. The rota follows a similar 4 on, 4 off pattern as per the current pattern.

The diagram below shows a snapshot of the full roster:



The four main shifts are as follows:

- D Day shift          0830 - 1730

- N Night shift          1730 – 0830

- D1 Day shift          0800 – 2000

- L1 Late shift         1300 – 0100

### 4.3.2. Scenario 3 Performance

The shift pattern was entered into the simulation model and run over a virutal full year.  Based on the april '09 to March '10 dataset, it gave the following performance:

| SCENARIO | | Baseline | Scenario 3 |
|---|---|---|---|
| | Description | Base model to represent current performance | 4 shift system. Middle road |
| | Staff Numbers | 40 | 32 |
| Targets | Priority Calls within 10 seconds | 97.7% | 96.3% |
| | Station Admin Calls within 20 seconds | 98.0% | 96.3% |
| | General Admin Calls within 20 seconds | 97.5% | 95.6% |
| | Other Calls within 20 seconds | 96.4% | 92.4% |
| Abandonments | Priority | 0.1% | 0.3% |
| | Station Admin | 0.3% | 0.7% |
| | General Admin | 0.1% | 0.4% |
| | Other | 1.7% | 3.5% |
| Overall average queue (sec) | Priority | 1.23 | 2.14 |
| | Station Admin | 1.31 | 2.53 |
| | General Admin | 2.49 | 4.79 |
| | Other | 2.11 | 5.16 |
| Utilisation | | 36.3 | 39.2 |

Priority Calls are still answered within 10 seconds on 96.3% of occasions.

## *4.4.  Self-Rostering*

As well as each scenario having its own specially designed rota, there is also the possibility to use a self-rostering system.  Self-rostering essentially does away with the idea of a fixed rota that staff must adhere to, and instead uses an hour building system for each member of staff to decide which shifts they wish to work in order to reach a set amount of hours over a designated period.

Self rostering is easier to apply to and manage with simpler shift patterns, and below is a brief description of how the system could work for scenarios 2 and 3:

### 4.4.1. Scenario 2 self-rostering

Scenario 2 consists of three main shifts: 9 hour and 12 hour day shifts and a 15 hour night shift which equates to 21 shift periods over a week.  If the self-rostering is implemented, staff can pick the shifts they wish to work in order to achieve a total of 336 hours over an 8 week period (8 x 42) instead of working a set 42 hours each and every week.  In essence the shift pattern shown for scenario 2 (page 15) can still be used to inform how many resources are required on each shift each day, but this is summarised below with numbers after abstraction shown in brackets:

- D Day shift         0830 – 1730  6 staff daily rostered (5 actually on shift)

- N Night shift         1730 – 0830  6 staff daily rostered (5 actually on shift)

- D12 shift           0800 – 2000  4 staff daily rostered (3 actually on shift)

### 4.4.2. Scenario 3 self-rostering

Scenario 3 could also potentially fit to a self-rostering system. It has four main shifts: an 8 hour morning shift, a 12 hour day shift and a 9.5 hour night shift. This equates to 21 shift periods over each week, of which staff would again get to pick which shifts they wanted to work over an 8 week period in order to total 320 hours each.  The rota shown on page 17 provides the framework for how many staff are needed on each shift but is summarised below:

- D Day shift              0830 – 1730  6 staff daily rostered (5 actually on shift)

- N Night shift          1730 – 0830  6 staff daily rostered (5 actually on shift)

- D1 shift                0800 – 2000  2 staff daily rostered (1 actually on shift)

- L1 shift                 1300 – 0100  2 staff daily rostered (2 actually on shift)

In practice the hours of the D/N shifts could be varied as long as they provide 24/7 even cover between them. Similarly, the D1/L1 shifts need to guarantee one person on cover between 0800-0100 with flexibility as to how the surplus person is deployed.

# 5. Summary and Conclusions

This section summarises the key findings from the analysis and simulation, and the conclusions we have drawn from them.

*Analysis*

- Admin calls account for the largest proportion of MACC workload

    o Station admin accounting for 36.2% and general admin 25.3%

- Primary 999 calls account for 25.1%

- Call volumes appear to be reducing year by year

- The peaks in priority calls are very different to the peaks in admin calls, but both are fairly consistent throughout the week

*Evaluation*

- The current shift pattern and resourcing profiles do not match workload demand

- Current resource levels are providing excellent performance with 96.3% of all calls answered within 20 seconds

    o 97.4% of priority calls answered within 10 seconds

- A shift pattern that better matches the peaks and troughs in demand can retain high performance whilst improving staff utilisation.

*Conclusions*

The Merseyside Fire and Rescue Service's Mobilising and Control Centre currently offers excellent performance. It has the capability to utilise a more focussed working pattern which maintains a high levels of service, caters for peak demand and yet can be delivered more efficiently. The three proposed solutions offer a resourcing profile that matches workload demands much more closely than present by eliminating surplus cover when it is not required. The three scenarios gave good performance and are compared in the table below:

| SCENARIO | | Actual | Scenario 1 | Scenario 2 | Scenario 3 |
|---|---|---|---|---|---|
| | Description | Performance 1/4/09 - 31/3/10 | 4 shift system. Best match to demand | 2 shift sytem. Similar to current shift | 3 shift system. Middle ground |
| | Staff Numbers | 40 | 30 | 32 | 32 |
| **Targets** | Priority Calls within 10 seconds | **97.4%** | 93.8% | 95.1% | 96.3% |
| | Station Admin Calls within 20 seconds | **99.0%** | 94.5% | 95.8% | 96.3% |
| | General Admin Calls within 20 seconds | **98.8%** | 93.3% | 96.6% | 95.6% |
| | Other Calls within 20 seconds | **96.3%** | 92.9% | 96.3% | 92.4% |
| **Overall average queue (sec)** | Priority | **3.02** | 4.79 | 3.24 | 2.14 |
| | Station Admin | **4.82** | 4.22 | 3.09 | 2.53 |
| | General Admin | **4.99** | 8.66 | 3.64 | 4.79 |
| | Other | **6.94** | 6.58 | 2.44 | 5.16 |

- All three scenarios provide performance in excess of 90% for each target measure

- Scenario three offers the highest performance with the greatest efficiency savings with potential for a 20% reduction in staff

- Scenario two provides a solution with minimal disruption to current practice

- Self-rostering could be applied to all, but would be easier to manage on scenarios two and three.

- Self-rostering has the benefit of providing flexibility and a good work-life balance to staff, and it often leads to no drop in cover if posts become vacant as other staff are often willing to fill vacancies and abstractions. Further, it provides greater resilience to cover core shifts under the leaner solutions proposed.