

# HA Variable Crewing Implementation Study

## Draft Business Case

**March 2009**

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# Contents

| <b>Section</b>                                     | <b>Page</b> |
|--|-------------|
| <b>Executive Summary</b>                           | <b>1</b>    |
| <b>1. Introduction</b>                             | <b>3</b>    |
| <b>2. Project Brief</b>                            | <b>5</b>    |
| <b>3. Identifying and Costing Spare Resource</b>   | <b>6</b>    |
| Overview   | 6           |
| Methodology  | 6           |
| Assumptions  | 6           |
| Existing Traffic Officer Service Operations        | 6           |
| Operational Assessment of Variable Crewing         | 6           |
| Analysis of Costs and Benefits of Variable Crewing | 6           |
| <b>4. Business Case</b>                            | <b>6</b>    |
| Cost Benefit Summary                               | 6           |

## List of Tables

|   |   |
|---|---|
| Table 3.1 – Traffic Officers in All Regions                                     | 6 |
| Table 3.2 – Existing Traffic Officer Patrols by Outstation                      | 6 |
| Table 3.3 – Proposed Model for Patrols Using Variable Crewing: Early Shift      | 6 |
| Table 3.4 – Traffic Officer Patrols, Existing Situation and with Variable Crews | 6 |
| Table 3.5 – Traffic Officer Numbers, Existing Situation and with Variable Crews | 6 |
| Table 3.6 – Potential Cost Savings Under Variable Crewing (2007 prices)         | 6 |
| Table 3.7 – Cost of Staff Training for Variable Crewing                         | 6 |
| Table 4.1 – Cost Benefit Analysis for Variable Crewing: 2002 prices             | 6 |

## List of Figures

|  |   |
|--|---|
| Figure 0.1 – Traffic Officer Patrols, Existing Situation and with Variable Crews | 1 |
| Figure 0.2 – Traffic Officer Numbers, Existing Situation and with Variable Crews | 1 |
| Figure 3.1 – Traffic Officer Patrols, Existing Situation and with Variable Crews | 6 |
| Figure 3.2 – Traffic Officer Numbers, Existing Situation and with Variable Crews | 6 |

# Executive Summary

The Highways Agency commissioned Atkins to examine the feasibility of using variable crewed patrols on the existing Traffic Officer Service network. This has the potential to free up staff resources for deployment elsewhere. Variable crewed patrols were assessed during the 'early' and 'late' shifts; one dual crew was assumed to continue to patrol at all times, with the other patrols being undertaken by single-crewed patrols. In addition, it was assumed one extra single crewed patrol would operate on each variable crewed shift.

The proposed impact to both Traffic Officer patrol numbers and to actual Traffic Officer staff numbers under variable crewing are shown in Figure 0.1 and Figure 0.2 respectively. These clearly indicate that variable crewing has the potential to provide additional network patrols with fewer on-road staff. This may free up staff to undertake patrols on other parts of the network.

Figure 0.1 – Traffic Officer Patrols, Existing Situation and with Variable Crews

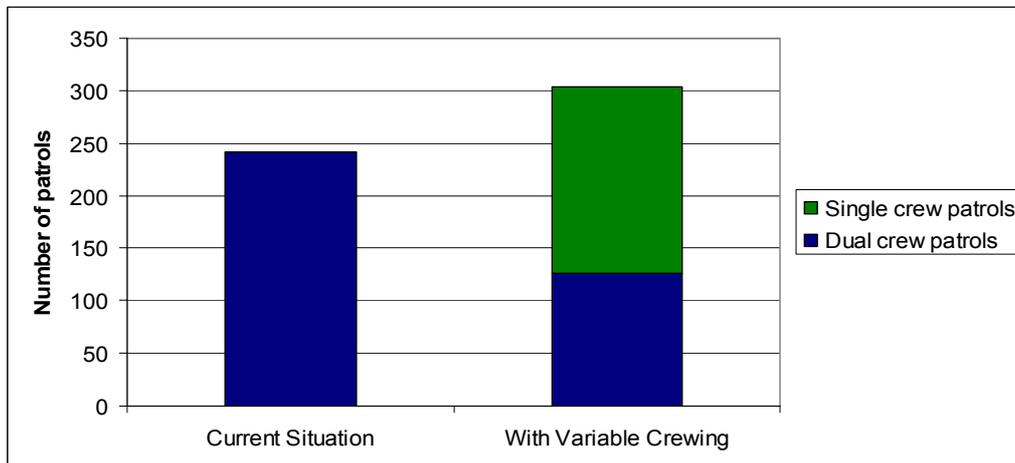
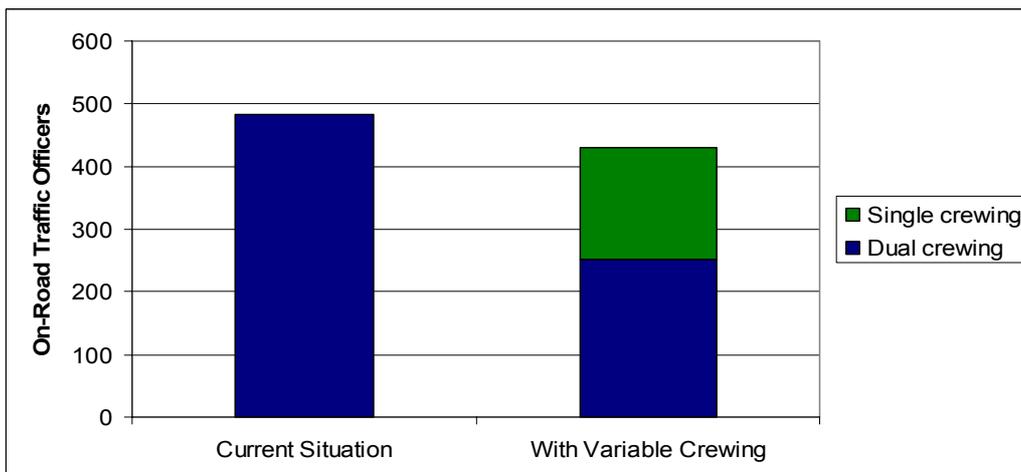


Figure 0.2 – Traffic Officer Numbers, Existing Situation and with Variable Crews



A high level business case was undertaken which compared the costs of implementing variable crewing; namely the staff training time and the additional vehicular costs, with the savings in staff hours over a five year period. This resulted in a BCR of 1.71 (in 2002 prices).

Additional benefits of the proposed variable crewing scheme include the following:

- The net present value (NPV) of variable crewing is £7.7 million of benefits, delivered in the first five years of implementation;
- The NPV calculation accounts for and includes the initial implementation costs of staff training at £2.4m, along with the on-going additional vehicle cost of £2.6m per annum
- Up to 11% less staff are forecast to be utilised on the existing network, with 33% more patrols in operation – although it is emphasised that the effectiveness of single crew patrols has yet to be fully proven;
- An on-going staff cost saving of £5.4m per annum is forecast once variable crewing is fully implemented;
- The staff saving cost (assuming redundancy is not favourable) would facilitate the redeployment of 11% of the existing staff. This redeployment may offer other, as yet unquantified, benefits to the Average Vehicle Delay or APTR rollout.

# 1. Introduction

## Context

- 1.1 The Traffic Officer Service (TOS) was introduced in 2004, and the programme has delivered significant benefits to operating efficiency on the highway network. An evaluation of the project was completed in September 2008, demonstrating that the following benefits had been achieved during the 2006/7 financial year:
- Savings in reducing incident related congestion: £27.2m;
  - Value of more reliable journeys: £13.6m;
  - Savings from safety related costs: £9.7m; and
  - Savings in freed up police time: £29.9m.
- 1.2 The success of the Traffic Officer Service has prompted plans to extend the service across 40% of the remaining All Purpose Trunk Road (APTR) network (Highways Agency: Extending the TOS onto the All Purpose Trunk Road Network, 2007).
- 1.3 The Highways Agency commissioned Atkins to examine the potential to use variable crewed patrols on existing TOS network, which may free up staff resources for deployment elsewhere. This project is considered as an 'enabler', to facilitate the extension of the TOS, and cost savings will not be translated into staff redundancies.
- 1.4 The key issues involved in the development of the business case for the rollout of variable crewing include:
- A detailed knowledge of the cost changes involved for this scheme; and
  - Understanding the operational model for variable crews, and the impact this could have on the effectiveness of the TOS.
- 1.5 The brief for this project stated that the feasibility study for variable crewing should only cover the areas that are currently patrolled: areas of the network that are not currently patrolled by the TOS are out of the scope of this work.

## The purpose of this report

- 1.6 In the light of the discussion above, the methodology was framed around the core requirements of the 'Business Case for Rollout of Variable Crewing' briefing document, supplied by the Highways Agency in December 2008. This report develops a business case for the rollout of variable crewing on the motorway and APTR network that is currently patrolled by the TOS.

## Structure of this report

- 1.7 The report is split into the following sections;
- Section 2 – Project Brief. Covering the initial proposal and project inception meeting where the brief was clarified;

- Section 3 – Identifying and Costing Spare Resource. This includes operational assessment of the current patrolling pattern, the potential for using single crewed vehicles, and the costs involved in this change. Outputs include the number of staff shifts released by variable crewing, the cost saving that this represents and the cost of staff training;
- Section 4 – Business Case. This includes the economic and financial implications of variable crewing.

## 2. Project Brief

### Initial Proposal (tender document)

- 2.1 The original brief was set out in the proposal prepared by Atkins' Jonathan Foster-Clark in December '08. Based on the current TOS model, the study would develop another model for variable crewing, taking into account the constraints of a single crewed patrol. This would also plan how many more patrols could be carried out on the network, and what the corresponding benefits would be.
- 2.2 The brief specifically stated that the analysis would not include consideration of the benefits that could be achieved by rolling the TOS onto the sections of the APTR that are not currently covered.

### Project Inception Meeting

- 2.3 On the 18<sup>th</sup> February 2009, the project inception meeting took place, with Phil Gooderham, Joe Castle and Tom Davidson in attendance.
- 2.4 The original brief was discussed in relation to the data that is available. It became clear that the current operational model for the TOS is not currently available and detailed information on a breakdown of all costs is limited.
- 2.5 In light of this discussion, it was decided to re-scope the brief as detailed below.

### Brief

- 2.6 Following the inception meeting, the brief for the project was simplified to request the following analysis;-
- Model the potential for variable crewing allowing the same coverage of the network currently provided;
  - Establish the number of staff made available by the variable crewing model;
  - Monetise the benefit for the freed resources, this is to be based purely on the cost of employing staff and is calculated pro-rata based on the number of resources saved;
  - Investigate the cost of training and assessing all current Traffic Officers for variable crewing;
  - Prepare a business case based on a cost benefit analysis of the freed resources and the training required.

### Review of Existing Documentation

- 2.7 A review of existing documents has been carried out, covering any previous studies regarding the Traffic Officer Service, and potential projects for the future. The following documents have been reviewed;
- Highways Agency / ACPO: Business case for developing the Highways Agency as a network operator, PA Consulting, October 2003.

- Highways Agency: Extending the Traffic Officer Service onto the All Purpose Trunk Road (APTR) Network, PA Consulting, March 2007.
- Traffic Operations Performance Report 07/08, Highways Agency, December 2007.
- Highways Agency SSR National Framework Contract: Review of the Capability Gap in Vehicles and Equipment at Road Traffic Incidents, Atkins, March 2008.
- Highways Agency Traffic Officer Service: Review of Crewing Levels, Halcrow / TRL, August 2008.

2.8 These documents were used to gain a detailed understanding of the work of the TOS, and anticipate some of the issues that will be involved in the business case for variable crewing. Of particular use was the Traffic Operations Performance Report 07/08, and the costs used in this business case have been taken from this document.

## 3. Identifying and Costing Spare Resource

### Overview

- 3.1 This section examines the existing operational system for the TOS, assessing how this model is best adapted to incorporate variable crewing.

### Methodology

- 3.2 The analysis initially focused on understanding the proposed operational model for variable crewing: Under what criteria and where on the network it could apply, and any potential constraints in how single crews could intervene. A list of assumptions were developed, which are central to the analysis that has been undertaken.
- 3.3 Initially the existing TOS model was examined, to develop an understanding of the number of on-road and off-road staff at each outstation. This model was adapted, using the assumptions as to how the proposed variable crewing model would operate. In this way the variable crewing model was developed.
- 3.4 A high level business case for variable crewing was developed, using the following core inputs:
- The costs of introducing variable crewing, including vehicle and administration/ training costs;
  - The benefits of variable crewing were estimated based on the number of that can be freed up from the existing TOS patrols.

### Assumptions

- 3.5 The following assumptions were made in the analysis;
- At least one dual-crewed vehicle will continue to operate from each outstation, during the times that are currently patrolled;
  - For the purposes of this analysis, a single crewed patrol is assumed to deliver the same level of service as a dual patrol crew in 70% of incidences;
  - One additional patrol will operate for all shifts that include single-crewed vehicles. For example, an existing shift with four patrols (eight staff dual crewed) is assumed to operate in the future with five patrols comprising of six staff (one dual crew and four single crews);
  - There are currently circa 1200 on-road staff in the TOS, and any reduction in costs is assumed to be pro-rata;
  - Fuel and vehicle costs are assumed to increase in proportion to the number of extra patrols required;
  - Current equipment in the vehicles will suffice, and can be operated by a single occupant. Costs will therefore remain the same;

- Training and assessing staff for variable crewing is assumed to take four weeks. It is assumed that there is enough redundancy in the system to allow this without the requirement for extra staff, due to the 'cover' periods in the Traffic Officer shift pattern. The training will not impact on the current operations of the TOS;
- No additional costs have been included for the variable crew training, as the four weeks of training is assumed to be absorbed into the existing budget;
- Training of all Traffic Officers for variable crewing is estimated to take 18 months;
- Variable crewing will not impact on staff turnover;
- Single crewing staff will not receive any financial incentives;
- For the purposes of this analysis an average cost for a Traffic Officer has been calculated, based on the national staffing costs and total staff numbers;
- Costs are taken from the 'HA Traffic Operations Performance Report 07/08'. These are based on national costs for employing all Traffic Officer staff;
- The project start date is assumed to be 1 April 2010, and training for variable crewing is assumed to commence on this date; and
- The potential benefits that are likely to arise from staff being freed up due to variable crewing were not included in this analysis.

## Existing Traffic Officer Service Operations

- 3.6 A total of 1614 staff are currently employed in the TOS, distributed across England in seven regions. The total number of on-road and off-road staff for each region is summarised in Table 3.1. Off-road staff includes managers, administrative staff, and those working in the Regional Control Centres. The total number of on-road staff amounts to approximately 1200, which includes both on-road managers and Traffic Officers.

Table 3.1 – Traffic Officers in All Regions

| Region               | Off-Road    | On-Road     |
|----------------------|-------------|-------------|
| West Midlands        | 72          | 147         |
| South East           | 71          | 172         |
| North West           | 88          | 221         |
| North East           | 70          | 137         |
| East                 | 79          | 237         |
| South West           | 50          | 136         |
| East Midlands        | 42          | 92          |
| <b>Total</b>         | <b>472</b>  | <b>1142</b> |
| <b>Overall Total</b> | <b>1614</b> |             |

- 3.7 Traffic Officers currently operate in dual crews for all patrols. There are four different shifts during which on-road staff patrol, as follows;
- Early shift: 6am – 2pm;
  - Late shift: 2pm – 10pm;
  - Double day shift: 6am – 10pm (West Midlands and South West regions only);
  - Night shift; 10pm – 6am.
- 3.8 As outlined in paragraph 3.5, it is assumed that variable crewing, with some single-crewed vehicles, will only operate during the ‘early’ and ‘late’ shifts. All ‘night’ and ‘double day’ shifts will continue to operate with dual crewed patrols.
- 3.9 The information as provided by the Highways Agency shows the number of patrols operating for each shift, for all regions and outstations. Table 3.1 summarises the number of patrol vehicles that currently operate from each outstation. Note that these patrols are all dual patrols, so two Traffic Officers are assigned to each patrol.

Table 3.2 – Existing Traffic Officer Patrols by Outstation

| RCC       | Outstation     | Number of Patrol Vehicles |          |           |           |
|-----------|----------------|---------------------------|----------|-----------|-----------|
|           |                | Early                     | Day      | Late      | Night     |
| WM        | Ansty          | 2                         | 1        | 2         | 1         |
| WM        | Hilton Park    | 3                         | 1        | 3         | 1         |
| WM        | Longbridge     | 2                         | 1        | 2         | 1         |
| WM        | Strensham      | 2                         | 1        | 2         | 1         |
| WM        | Quinton        | 2                         | 1        | 2         | 1         |
| <b>WM</b> | <b>Total</b>   | <b>11</b>                 | <b>5</b> | <b>11</b> | <b>5</b>  |
| SE        | Coldharbour    | 4                         | -        | 4         | 2         |
| SE        | Dartford SE    | 2                         | -        | 2         | 1         |
| SE        | Easton Lane    | 4                         | -        | 4         | 2         |
| SE        | Heston SE      | 1                         | -        | 1         | 0         |
| SE        | Weatherhill    | 3                         | -        | 3         | 2         |
| <b>SE</b> | <b>Total</b>   | <b>14</b>                 | <b>-</b> | <b>14</b> | <b>7</b>  |
| NW        | Rob Lane       | 4                         | -        | 4         | 2         |
| NW        | Milnrow        | 4                         | -        | 4         | 2         |
| NW        | Samlesbury     | 4                         | -        | 4         | 2         |
| NW        | Knutsford      | 3                         | -        | 3         | 2         |
| NW        | Cumbria        | 3                         | -        | 3         | 1         |
| NW        | Lowhurst       | 1                         | -        | 1         | 1         |
| <b>NW</b> | <b>Total</b>   | <b>19</b>                 | <b>-</b> | <b>19</b> | <b>10</b> |
| NE        | Barton         | 2                         | -        | 2         | 1         |
| NE        | Calder Park    | 3                         | -        | 3         | 2         |
| NE        | Carrville      | 2                         | -        | 2         | 1         |
| NE        | Hartshead Moor | 1                         | -        | 1         | 0         |
| NE        | Sprotbrough    | 4                         | -        | 4         | 2         |
| <b>NE</b> | <b>Total</b>   | <b>12</b>                 | <b>-</b> | <b>12</b> | <b>6</b>  |
| E         | Chieveley      | 3                         | -        | 3         | 2         |
| E         | Dartford East  | 2                         | -        | 2         | 1         |
| E         | Heston East    | 3                         | -        | 3         | 2         |
| E         | Milton Common  | 2                         | -        | 2         | 1         |
| E         | South Mimms    | 4                         | -        | 4         | 2         |
| E         | Toddington     | 3                         | -        | 3         | 2         |
| E         | Whittlesford   | 3                         | -        | 3         | 2         |
| <b>E</b>  | <b>Total</b>   | <b>20</b>                 | <b>-</b> | <b>20</b> | <b>12</b> |
| SW        | Almondsbury    | 4                         | 1        | 4         | 3         |

| RCC       | Outstation                   | Number of Patrol Vehicles |          |           |           |
|-----------|------------------------------|---------------------------|----------|-----------|-----------|
|           |                              | Early                     | Day      | Late      | Night     |
| SW        | Chelston                     | 3                         | 1        | 3         | 2         |
| SW        | Stanton St Quintin           | 2                         | 1        | 2         | 1         |
| <b>SW</b> | <b>Total</b>                 | <b>9</b>                  | <b>3</b> | <b>9</b>  | <b>6</b>  |
| EM        | Felley                       | 2                         | -        | 2         | 2         |
| EM        | Shepshed                     | 3                         | -        | 3         | 0         |
| EM        | Watford Gap                  | 2                         | -        | 2         | 2         |
| <b>EM</b> | <b>Total</b>                 | <b>7</b>                  | <b>-</b> | <b>7</b>  | <b>4</b>  |
|           | <b>National Total</b>        | <b>92</b>                 | <b>8</b> | <b>92</b> | <b>50</b> |
|           | <b>Total per 24hr period</b> | <b>242</b>                |          |           |           |

- 3.10 The total number of daily patrols is 242 across the four shifts, requiring 484 on-road Traffic Officers per 24 hour period.
- 3.11 All outstations currently employ patrols for both the early and late shifts, with only the West Midlands and South West using the 'double day' shift. The number of patrols on the night shift varies considerably, with some areas having no patrolling at all. These variations are due to variations in traffic flow and the nature of incidents within each region.

### Operational Assessment of Variable Crewing

- 3.12 The existing patrol operations, as summarised in Table 3.2 were used as the basis for developing the proposed operational model for variable crewing. Table 3.3 summarises the existing number of vehicle patrols and associated staff at each outstation, and the proposed equivalents under the variable crewing scenario. For simplicity purposes Table 3.3 only summarises changes to the 'early' shift. Identical changes are proposed to the 'late' shift, which currently operates the same patrols as the early shift.
- 3.13 As summarised in paragraph 3.5, the following assumptions were made:
- There will always be one vehicle per outstation that is dual crewed for both the 'early' and 'late' shifts;
  - All other existing patrols are proposed to operate with single crews; and
  - One additional patrol will operate at each outstation where single crewing is proposed to operate.

**Table 3.3 – Proposed Model for Patrols Using Variable Crewing: Early Shift**

| RCC | Outstation  | Existing TO patrols | Proposed TO Patrols |        | Existing TO staff | Proposed TO staff | Freed up TO staff |
|-----|-------------|---------------------|---------------------|--------|-------------------|-------------------|-------------------|
|     |             |                     | Dual                | Single |                   |                   |                   |
| WM  | Ansty       | 2                   | 1                   | 2      | 4                 | 4                 | 0                 |
| WM  | Hilton Park | 3                   | 1                   | 3      | 6                 | 5                 | 1                 |
| WM  | Longbridge  | 2                   | 1                   | 2      | 4                 | 4                 | 0                 |

| RCC       | Outstation         | Existing TO patrols | Proposed TO Patrols |           | Existing TO staff | Proposed TO staff | Freed up TO staff |
|-----------|--------------------|---------------------|---------------------|-----------|-------------------|-------------------|-------------------|
|           |                    |                     | Dual                | Single    |                   |                   |                   |
| WM        | Strensham          | 2                   | 1                   | 2         | 4                 | 4                 | 0                 |
| WM        | Quinton            | 2                   | 1                   | 2         | 4                 | 4                 | 0                 |
| <b>WM</b> | <b>Total</b>       | <b>11</b>           | <b>5</b>            | <b>11</b> | <b>22</b>         | <b>21</b>         | <b>1</b>          |
| SE        | Coldharbour        | 4                   | 1                   | 4         | 8                 | 6                 | 2                 |
| SE        | Dartford SE        | 2                   | 1                   | 2         | 4                 | 4                 | 0                 |
| SE        | Easton Lane        | 4                   | 1                   | 4         | 8                 | 6                 | 2                 |
| SE        | Heston SE          | 1                   | 1                   | 0         | 2                 | 2                 | 0                 |
| SE        | Weatherhill        | 3                   | 1                   | 3         | 6                 | 5                 | 1                 |
| <b>SE</b> | <b>Total</b>       | <b>14</b>           | <b>5</b>            | <b>13</b> | <b>28</b>         | <b>23</b>         | <b>5</b>          |
| NW        | Rob Lane           | 4                   | 1                   | 4         | 8                 | 6                 | 2                 |
| NW        | Milnrow            | 4                   | 1                   | 4         | 8                 | 6                 | 2                 |
| NW        | Samlesbury         | 4                   | 1                   | 4         | 8                 | 6                 | 2                 |
| NW        | Knutsford          | 3                   | 1                   | 3         | 6                 | 5                 | 1                 |
| NW        | Cumbria            | 3                   | 1                   | 3         | 6                 | 5                 | 1                 |
| NW        | Lowhurst           | 1                   | 1                   | 0         | 2                 | 2                 | 0                 |
| <b>NW</b> | <b>Total</b>       | <b>19</b>           | <b>6</b>            | <b>18</b> | <b>38</b>         | <b>30</b>         | <b>8</b>          |
| NE        | Barton             | 2                   | 1                   | 2         | 4                 | 4                 | 0                 |
| NE        | Calder Park        | 3                   | 1                   | 3         | 6                 | 5                 | 1                 |
| NE        | Carrville          | 2                   | 1                   | 2         | 4                 | 4                 | 0                 |
| NE        | Hartshead Moor     | 1                   | 1                   | 0         | 2                 | 2                 | 0                 |
| NE        | Sprotbrough        | 4                   | 1                   | 4         | 8                 | 6                 | 2                 |
| <b>NE</b> | <b>Total</b>       | <b>12</b>           | <b>5</b>            | <b>11</b> | <b>24</b>         | <b>21</b>         | <b>3</b>          |
| E         | Chieveley          | 3                   | 1                   | 3         | 6                 | 5                 | 1                 |
| E         | Dartford East      | 2                   | 1                   | 2         | 4                 | 4                 | 0                 |
| E         | Heston East        | 3                   | 1                   | 3         | 6                 | 5                 | 1                 |
| E         | Milton Common      | 2                   | 1                   | 2         | 4                 | 4                 | 0                 |
| E         | South Mimms        | 4                   | 1                   | 4         | 8                 | 6                 | 2                 |
| E         | Toddington         | 3                   | 1                   | 3         | 6                 | 5                 | 1                 |
| E         | Whittlesford       | 3                   | 1                   | 3         | 6                 | 5                 | 1                 |
| <b>E</b>  | <b>Total</b>       | <b>20</b>           | <b>7</b>            | <b>20</b> | <b>40</b>         | <b>34</b>         | <b>6</b>          |
| SW        | Almondsbury        | 4                   | 1                   | 4         | 8                 | 6                 | 2                 |
| SW        | Chelston           | 3                   | 1                   | 3         | 6                 | 5                 | 1                 |
| SW        | Stanton St Quintin | 2                   | 1                   | 2         | 4                 | 4                 | 0                 |
| <b>SW</b> | <b>Total</b>       | <b>9</b>            | <b>3</b>            | <b>9</b>  | <b>18</b>         | <b>15</b>         | <b>3</b>          |
| EM        | Felley             | 2                   | 1                   | 2         | 4                 | 4                 | 0                 |

| RCC       | Outstation           | Existing TO patrols | Proposed TO Patrols |           | Existing TO staff | Proposed TO staff | Freed up TO staff |
|-----------|----------------------|---------------------|---------------------|-----------|-------------------|-------------------|-------------------|
|           |                      |                     | Dual                | Single    |                   |                   |                   |
| EM        | Shepshed             | 3                   | 1                   | 3         | 6                 | 5                 | 1                 |
| EM        | Watford Gap          | 2                   | 1                   | 2         | 4                 | 4                 | 0                 |
| <b>EM</b> | <b>Total</b>         | <b>7</b>            | <b>3</b>            | <b>7</b>  | <b>14</b>         | <b>13</b>         | <b>1</b>          |
|           | <b>Overall Total</b> | <b>92</b>           | <b>34</b>           | <b>89</b> | <b>184</b>        | <b>157</b>        | <b>27</b>         |

3.14 Using the assumptions stated, approximately 72% of the patrols during the 'early' shift would be single crewed, with 34 dual patrols 89 single-crewed. This proportion varies between regions, with the West Midlands and East Midlands regions having a larger percentage of dual-crewed patrols. The number of patrols in each scenario, for each shift, is shown in Table 3.4

**Table 3.4 – Traffic Officer Patrols, Existing Situation and with Variable Crews**

| Shift        | Existing TO Patrols | Proposed TO Patrols |        |
|--------------|---------------------|---------------------|--------|
|              |                     | Dual                | Single |
| Early        | 92                  | 34                  | 89     |
| Double Day   | 8                   | 8                   | -      |
| Late         | 92                  | 34                  | 89     |
| Night        | 50                  | 50                  | -      |
| <b>Total</b> | <b>242</b>          | <b>304</b>          |        |

3.15 Under the proposed variable crewing scenario, 178 single crewed staff would operate patrols, accounting for 59% of the total on-road staff requirements. A further 126 staff would continue to operate as dual crewed. The number of staff required for the existing and proposed situation is shown in Table 3.5.

**Table 3.5 – Traffic Officer Numbers, Existing Situation and with Variable Crews**

| Shift        | Existing TO Staff | Proposed TO Staff |
|--------------|-------------------|-------------------|
| Early        | 184               | 157               |
| Double Day   | 16                | 16                |
| Late         | 184               | 157               |
| Night        | 100               | 100               |
| <b>Total</b> | <b>484</b>        | <b>430</b>        |

3.16 The respective changes to both Traffic Officer Patrols and Traffic Officer Staff number requirements are shown graphically in Figures 3.1 and 3.2.

Figure 3.1 – Traffic Officer Patrols, Existing Situation and with Variable Crews

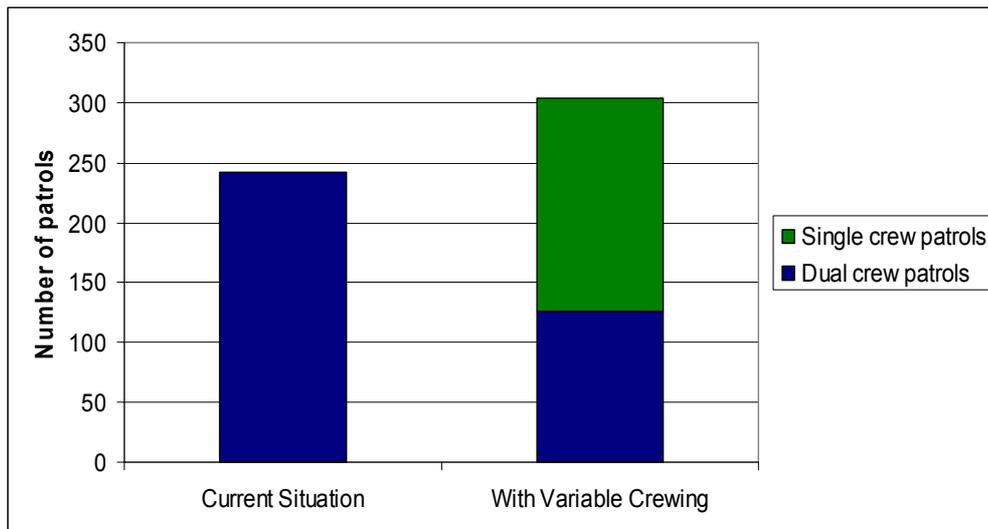
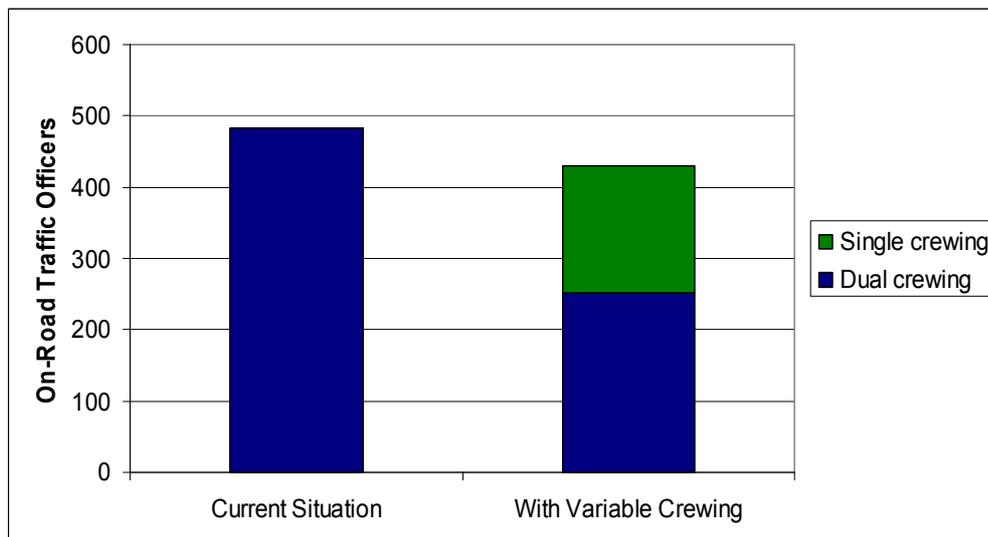


Figure 3.2 – Traffic Officer Numbers, Existing Situation and with Variable Crews



3.17 There are currently a total of 484 on-road Traffic Officers required each day for the TOS. Under the proposed variable crewing scenario, it is estimated daily staffing requirements would reduce by 54 staff, to 430 staff. Therefore, variable crewing would enable the area that is currently patrolled by the TOS to be operated by 11% less staff. This provides the opportunity to expand the existing TOS operations onto the wider network.

### Analysis of Costs and Benefits of Variable Crewing

#### Reduced Staff Time

3.18 Variable crewing has the potential to reduce the number of staff required by 11%. The reduction in staff numbers was monetised using the pay and allowance costs from the HA Traffic Operations Performance Report 07/08. This estimation amounted to the cost savings achieved by implementing variable crewing.

- 3.19 The number of on-road staff currently employed in the TOS is 1142, covering 242 shifts per day. Whilst the shift requirements currently mean only 484 staff are actually out on the road during a 24 hour period, the additional staff allow for cover shifts, days off, annual leave and sick leave. Pay, allowance and overtime costs were adjusted pro-rata, translating an 11% reduction in staff numbers to an equal reduction in costs.

#### Additional Vehicles and Fuel

- 3.20 During each 'early' or 'late' shift there are currently 92 patrols. Under the proposed variable crewing scenario this is estimated to increase to 123 (as shown in Table 3.3). This represents a 33.7% increase in the number of patrols. It is assumed vehicle and fuel costs will increase by the same proportion.
- 3.21 Table 3.6 uses the budget costs from the 'HA Traffic Operations Performance Report 07/08', published by the Highways Agency in 2007, to estimate the potential cost saving facilitated by variable crewing.

Table 3.6 – Potential Cost Savings Under Variable Crewing (2007 prices)

| Item                                  | Budget Cost (£)   | Affected by SC? | % change with Variable Crewing | New Cost (£)      |
|---------------------------------------|-------------------|-----------------|--------------------------------|-------------------|
| Pay and Allowances                    | 47,010,747        | Yes             | - 11%                          | 41,839,565        |
| Overtime                              | 2,449,700         | Yes             | - 11%                          | 2,180,233         |
| Travel Time                           | 187,000           | Neutral         |                                | 187,000           |
| Travel and Subsistence                | 1,142,553         | Neutral         |                                | 1,142,553         |
| Fuel                                  | 2,868,000         | Yes             | + 33.7%                        | 3,834,516         |
| Vehicle Consumables                   | 288,000           | Yes             | + 33.7%                        | 385,056           |
| Payroll for Traffic Learning Centre   | 724,271           | Neutral         |                                | 724,271           |
| Accommodation                         | 3,690,007         | Neutral         |                                | 3,690,007         |
| Equipment (Technology and Uniforms)   | 8,458,921         | Neutral         |                                | 8,458,921         |
| Vehicles (Lease, repair, preparation) | 4,601,559         | Yes             | + 33.7%                        | 6,152,284         |
| Recruitment and Training*             | 2,000,000         | Neutral         |                                | 2,000,000         |
| Support (FM Contract, HRS etc)        | 3,875,729         | Neutral         |                                | 3,875,729         |
| Total                                 | 7,703,513         | Neutral         |                                | 7,703,513         |
| <b>Sum Cost</b>                       | <b>85,000,000</b> |                 | <b>New Sum Cost</b>            | <b>82,173,648</b> |
|                                       |                   |                 | <b>Estimated Net Saving</b>    | <b>-2,826,352</b> |

\* Training costs will be assessed separately

- 3.22 Based on these costs, the staff cost savings amount to £5.4m per year, once variable crewing is fully up and running.

- 3.23 The additional costs associated with the extra vehicles amounts to £2.6m a year when variable crewing is fully operational.

#### Cost of Staff Training

- 3.24 The primary cost involved with implementing variable crewing is assumed to be the training of staff. This will require staff to undertake four weeks of training, in preparation for dealing with incidents when working alone. Using figures taken from the 'HA Traffic Operations Performance Report 07/08', the cost of this staff training is summarised in Table 3.7.

Table 3.7 – Cost of Staff Training for Variable Crewing

|  |                        |                  |
|--|------------------------|------------------|
| Staff, allowance and overtime annual budget                | (a)                    | 49,460,447       |
| Total number of Traffic Officer Staff                      | (b)                    | 1,614            |
| Average cost per Traffic Officer                           | (c) = (a) / (b)        | 30,645           |
| Cost for 4 weeks of 1 member of staff                      | (d) = (c) / 52 x 4     | 2,357            |
| Number of staff to be trained                              | (e)                    | 1,017            |
| <b>Cost for 4 weeks of training for all relevant staff</b> | <b>(f) = (d) x (e)</b> | <b>2,397,354</b> |

- 3.25 Figures (a) and (b) were used to estimate the average cost for each Traffic Officer, including off road staff, as these staff are included in the total budget figure. Figure (d) calculated the cost of four weeks of one staff member's time, based on the annual cost of one Traffic Officer. Figure (e) represents the number of staff required for single crewing, which is 11% lower than the original number of on-road Traffic Officers.
- 3.26 The total cost for staff training to enable variable crewing is estimated to be approximately £2.4 million.

## 4. Business Case

### Cost Benefit Summary

- 4.1 Using the costs outlined in the previous section, a cost-benefit analysis for variable crewing in the Traffic Officer Service was undertaken. All outputs should be considered in light of the assumptions stated in paragraph 3.5.
- 4.2 The main costs used in this analysis are as follows;
- Training costs: The staff time required to train for variable crewing;
  - Vehicle costs: Additional vehicles required for extra patrols; and
  - Staff time: The 'benefits' realised through the freeing up of Traffic Officers for other work.
- 4.3 As staff training is assumed to take 18 months, the training costs were split, with two-thirds occurring in the first year and one-third in the second.
- 4.4 Similarly, vehicle costs and staff time savings were calculated to represent the gradual implementation of variable crewing over the first 18 months. This assumed a linear cost increase, such that in year one costs/ benefits accumulated on a month by month basis from month two to twelve. In year two, the increments continued until month six. At this point it was assumed variable crewing was fully operational, with the costs/ benefits for month seven to twelve calculated at 50% of the 'typical' year under variable crewing. These profiles are summarised in Annex A21 and B2.
- 4.5 All costs and benefits were calculated in 2007 prices, and as per WebTAG guidance, inflation was applied at a rate of 2.5% per annum to the respective year that the money was assumed to be invested/ saved.
- 4.6 The costs and benefits were discounted to 2002, using a discount rate of 3.5% and the Retail Price Index, where available.
- 4.7 Table 4.1 shows a summary of costs and benefits.

Table 4.1 – Cost Benefit Analysis for Variable Crewing: 2002 prices

| Year         | Training cost (£) | Vehicle cost (£) | Total cost (£)    | Staff time benefit (£) | Cumulative BCR |
|--------------|-------------------|------------------|-------------------|------------------------|----------------|
| 2010/11      | 1,317,839         | 697,413          | 2,015,252         | 1,451,396              | 0.72           |
| 2011/12      | 652,553           | 1,977,841        | 2,630,394         | 4,116,113              | 1.20           |
| 2012/13      | -                 | 2,114,187        | 2,114,187         | 4,399,863              | 1.47           |
| 2013/14      | -                 | 2,093,760        | 2,093,760         | 4,357,353              | 1.62           |
| 2014/15      | -                 | 2,073,531        | 2,073,531         | 4,315,253              | 1.71           |
| <b>Total</b> |                   |                  | <b>10,927,125</b> | <b>18,639,978</b>      |                |
| <b>NPV</b>   |                   |                  | <b>7,712,853</b>  |                        |                |

- 4.8 As shown above, variable crewing has the potential to generate over £7.7 million of benefit. This translates to a benefit to cost ratio of 1.71 in the fifth year of operation.

# Annex A1

## Network Plans



# Annex A2

## Cost/ Benefit Profiles

## Annex A2a: Assumed Additional Vehicular Cost Profile for the Initial 18 months of Variable Crewing (2007 prices)

|  | Existing Costs | Costs under Variable Crewing | Additional Cost under Variable Crewing |
|--|----------------|------------------------------|--|
| Fuel   | 2,868,000      | 3,834,516                    | <b>966,516</b>                         |
| Vehicle Consumables  | 288,000        | 385,056                      | <b>97,056</b>                          |
| Vehicles lease, repair etc                                 | 4,601,559      | 6,152,284                    | <b>1,550,725</b>                       |
| Additional vehicular costs per year under Variable Crewing |                |                              | <b>2,614,297</b>                       |

|                                     |        |
|-------------------------------------|--------|
| No of existing cars                 | 92     |
| No of cars under variable crewing   | 123    |
| No of new cars needed               | 31     |
| Cost per additional car             | 84,332 |
| Cost per month per additional car   | 7,028  |
| No of additional vehicles per month | 1.82   |

| Month | New (Cumulative) Costs |
|-------|------------------------|
| 1     |                        |
| 2     | 12,815                 |
| 3     | 25,630                 |
| 4     | 38,446                 |
| 5     | 51,261                 |
| 6     | 64,076                 |
| 7     | 76,891                 |
| 8     | 89,706                 |
| 9     | 102,521                |
| 10    | 115,337                |
| 11    | 128,152                |
| 12    | 140,967                |
| 13    | 153,782                |
| 14    | 166,597                |
| 15    | 179,413                |
| 16    | 192,228                |
| 17    | 205,043                |
| 18    | 217,858                |

**845,802** Total cost in 2010

**1,114,921** Cost for first 6mths of 2011

**1,307,149** Cost for second 6 mths of 2011

**2,422,069** Total cost for 2011

## Annex A2b: Assumed Staff Cost Saving Profile for the Initial 18 months of Variable Crewing (2007 prices)

|                      | Existing Costs | Costs under Variable Crewing | Cost Savings     |
|----------------------|----------------|------------------------------|------------------|
| Pay & Allowances     | 47,010,747     | 41,839,565                   | <b>5,171,182</b> |
| Overtime             | 2,449,700      | 2,180,233                    | <b>269,467</b>   |
| <b>Total Savings</b> |                |                              | <b>5,440,649</b> |

|                                    |        |
|------------------------------------|--------|
| No of existing staff               | 1,142  |
| No of staff under variable crewing | 1,016  |
| Staff saving                       | 126    |
| Saving per staff member            | 43,310 |
| Staff cost saving per month        | 3,609  |
| No of staff saved per month        | 7.39   |

| Month | New (Cumulative) Costs |
|-------|------------------------|
| 1     |                        |
| 2     | 26,670                 |
| 3     | 53,340                 |
| 4     | 80,010                 |
| 5     | 106,679                |
| 6     | 133,349                |
| 7     | 160,019                |
| 8     | 186,689                |
| 9     | 213,359                |
| 10    | 240,029                |
| 11    | 266,698                |
| 12    | 293,368                |
| 13    | 320,038                |
| 14    | 346,708                |
| 15    | 373,378                |
| 16    | 400,048                |
| 17    | 426,718                |
| 18    | 453,387                |

**1,760,210** Total saving in 2010

**2,320,277** Saving for first 6 mths of 2011

**2,720,325** Saving for second 6 mths of 2011

**5,040,601** Total saving for 2011