Network Services Incident Management Policy

Test Design for Single Crew Traffic Officers
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Introduction

Since the inception of the Traffic Officer Service in 2004, procedures have required two traffic officers to crew each vehicle when operating on the Network.

This project will assist efficient delivery of the Traffic Officer Service on the All Purpose Trunk Road (APTR) and motorway network.

The Incident Management Policy Team and their Network Operations client aim to build upon the findings of recent reports, studies and papers such as;

- Extending the Traffic Officer Service onto the All Purpose Trunk Road (APTR) Network – PA Consulting Group – 31st March 2007

Next steps from the above studies recommend that a limited area rollout of a single crew traffic officer service be completed. Prior to this limited area rollout a test (or series of tests) will be required to determine whether single crews can operate effectively and safely.

The test design was undertaken by staff from the HA and Atkins and the check will be undertaken by staff from the HA who are independent from the design team and JCB Consulting Ltd.

The test design and check programme is as follows:

- Design iteration 1 complete by 13 March 09
- Check iteration 1 complete by 27 March 09
- Design team assess check team comments and refine the design by 10 April 09
- Check iteration 2 complete by 24 April 09

The role of the check team is to determine whether the test design will obtain the test results required, in a way that will not expose those undertaking the test to unacceptable risks.

It is not the role of the check team to comment on the test design document formatting, spelling or grammar.
**Aim of Single Crewing**
To allow the TOS to patrol their existing Dual 3 lane Motorway routes using an appropriate mixture of double, lone or other crewed vehicles and utilising all other available resources.

**Purpose**
To create efficiency savings which free resources allowing TOS to be re-distributed to meet HA commitment to patrol the APTR

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**Aim of Single Crewing Test**
To inform a report which considers the overall feasibility of Singly and Variably crewing the Traffic Officer Service vehicles which patrol the existing motorway network.

**Purpose**
To provide sufficient evidence to fully and robustly inform Director level signature, or otherwise, of the Pilots and Trials PT1 form for Variable Crewing. This signature signifying approval to progress to a live network pilot/trial of variable crewing

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**Single Crew – End State**

**Single Crew – Test Methodology**

**Simulated Technology**

**Safety**

**Safety**

- What is the condition that we want to replicate in our test?
- How do we replicate that condition safely?

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**Mental Capability**

- Staff Retention
- Remuneration / Reward
- Workforce Bonding
- Driving / Other Activity conflict
- Competent Person to single crew?
- Correct level of Training & Experience & knowledge
- Trained by whom?

**Environment**

- Prevailing Traffic Conditions
- Lighting - Night Parade?
- Prevailing (Adverse) Weather Conditions
- Deployment Flexibility (Even no of staff not required)
- Core Duties? TOS Scope Creep?
- TOE ROLE?

**Communications/Technology**

- RACE On Road Comms
- Satellite Navigation To Deploy/Direct
- Vehicle Fleet Management
- Staff Security
- In Vehicle Cameras
- Technology (at time of rollout, in vehicles on road in RACE)

- Hot Debrief
- Legislation – The road vehicle (construction & use) regulations 1986 amendment no 4 2003

- On the Spot Advice
- Panic Button
- Existing Procedure tie-in ET Adapted

- Dynamic risk assessment – requires skill

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**Test Results**

- Who to collect test results
- How Many People in test vehicle
- Public Perception at incident scene (Carlsson)
- Test Validity with observers present?

**Test Location/Environment**

- Test within RACE
- Track Test
- Prevailing Traffic Conditions
- Prevailing (Adverse) Weather Conditions

**Test Duration / Timetable**

- 1-2 Weeks? All shifts? 24/7?

**Test Attestation Rules?**

- Call Mechanism?
- Back-up availability?
- Approval to proceed with the test? What level of signoff is required? Ginny Clarke?

**Test Staff Experience/Skills/Background**

- Competent Person Test Designer

**Intelligent Deployment**

- Driving Duration data +
- Safety of Test monitors
- How to collect test results

**Test Crew – Methodology**

- Test Vehicle

**Safety**

- How do we replicate the condition safely?
- What technology will exist at time of rollout?
- ROCO communication

**Environment**

- Public Safety
- Over shoulder conscience
- In Vehicle Safety
- Out of vehicle safety
- Safety of Lone TOS

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**Environment**

**Communications/Technology**

**Mental Capability**

**Single Crew – End State**

**Safety**

- All persons present whilst in position of safety can alert of impending danger
- What technology is required to make this feasible?

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**Procedure**

1. Can working area/worksplace be made safe? If no request more resource
2. Can safe site be maintained during activity? If no request more resource
3. Can activity be completed safely? If no request more resource

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**Safety**

- Public Safety
- Over shoulder conscience
- In Vehicle Safety
- Out of vehicle safety
- Safety of Lone TOS

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**Mental Capability**

- Staff Retention
- Remuneration / Reward
- Workforce Bonding
- Driving / Other Activity conflict
- Competent Person to single crew?
- Correct level of Training & Experience & knowledge
- Trained by whom?

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**Environment**

- Prevailing Traffic Conditions
- Lighting - Night Parade?
- Prevailing (Adverse) Weather Conditions
- Deployment Flexibility (Even no of staff not required)
- Core Duties? TOS Scope Creep?
- TOE ROLE?
Single Crew Test Results Required

The success criteria is to determine whether single crewing is feasible (or not) and informs the variable crew feasibility report.

Is single crewing safe?

<table>
<thead>
<tr>
<th>Safe pre-shift process</th>
<th>Can a single TO adequately check the safety of a vehicle pre-shift? If not could issues be overcome by partnering up?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Safe driving</td>
<td>Can TO travel safely whilst single crewed? Can TO travel safely and observe hazards/debris/customers whilst single crewed? How could issues be overcome?</td>
</tr>
<tr>
<td>Safe Communication</td>
<td>Can RCC &amp; TO communicate safely? Can TO and public communicate safely? Can TO, RCC and other stakeholders communicate safely? How could issues be overcome?</td>
</tr>
<tr>
<td>Safe attendance</td>
<td>Can RCC safely deploy a single crew resource? Differences between double/single crew procedures to be noted. Can TO safely exit the vehicle? How could issues be overcome?</td>
</tr>
<tr>
<td>Dynamic Risk Assessment</td>
<td>Is the dynamic risk assessment of ‘create safe workplace, maintain safe workplace, carry out activity safely’ within the skill/ability of a lone TO? Does the above DRA conflict with existing TO procedures?</td>
</tr>
<tr>
<td>Creating a Safe workplace</td>
<td>Can the workplace (out of vehicle) be made safe with single crew resources? Has the pre-training adequately ensured the TO has the required skills/ability to determine when the workplace is safe? What action can be taken safely whilst waiting for additional resource arrival? How could issues be overcome?</td>
</tr>
<tr>
<td>Maintaining a safe workplace</td>
<td>Can a safe workplace be maintained with single crew resources, whilst carrying out an activity? Has the pre-training adequately ensured the TO knows for which activities an additional resource is required to maintain a safe workplace? What action can be taken safely whilst waiting for additional resource arrival? How could issues be overcome?</td>
</tr>
<tr>
<td>Carrying out an activity safely</td>
<td>Has pre-training effectively identified which activities can be carried out safely by a single crewed patrol (strictly observing manual handling restrictions etc)?</td>
</tr>
<tr>
<td>Opening the road</td>
<td>Can the road be opened or handed over safely?</td>
</tr>
</tbody>
</table>
### Is single crewing practically achievable?

| Practical pre-shift process | Can a single TO adequately check the serviceability and practical running aspects of a vehicle pre-shift?  
If not could issues be overcome by partnering up for pre-patrol checks? |
| --- | --- |
| Practical driving | Can TO practically travel whilst single crewed?  
Can TO practically travel and observe hazards/debris/customers whilst single crewed?  
Is TO able ergonomically able to use necessary equipment in vehicle?  
Which (of the remaining) equipment is it unnecessary/unadvisable to use whilst driving?  
How could issues be overcome? |
| Practical Communication | Can RCC & TO communicate practically?  
Can TO and public communicate practically?  
Can TO, RCC and other stakeholders communicate practically?  
Can TO communicate sensitive subjects effectively to necessary parties?  
How could issues be overcome? |
| Practical attendance | Can RCC practically deploy a single crew resource (to appropriate tasks or are double crews always used) - To be checked in vehicle and in RCC?  
If not could issues be overcome? |
| Dynamic Risk Assessment | Is the dynamic risk assessment of ‘create safe workplace, maintain safe workplace, carry out activity safely’ practical for use by a lone TO?  
Is the dynamic risk assessment process for single crew dispatch effective?  
Does the above DRA conflict with existing TO procedures?  
How could issues be overcome? |
| Creating a Safe workplace | Is it practical to create a safe workplace (out of vehicle) with single crew resources?  
For what activities are an additional resource required to practically maintain a safe workplace?  
How could issues be overcome? |
| Maintaining a safe workplace | Can a safe workplace be practically maintained with single crew resources, whilst carrying out an activity?  
For what activities are an additional resource required to practically maintain a safe workplace?  
How could issues be overcome? |
| Carrying out an activity safely | Can TO confirm they have received manual handling training?  
What activities can be carried out practically by a single crewed patrol (strictly observing manual handling restrictions etc)? |
| Opening the carriageway | Can the carriageway be opened practically? |
| De-brief | Can an effective de-brief be held concerning practicalities? |
Data Collection

On-Road

Did the crew complete a checklist before leaving the outstation?
Did the crew satisfy the driving criteria below at all times?
**Control:** The driver should have good control of the clutch, gears, accelerator, brakes and steering.
**Use of Mirrors:** During normal driving, there should be frequent checks on the mirrors. The driver should also use mirrors when making a turn, changing speed or performing manoeuvres.
**Signals:** The driver should use the indicators to inform other road users of their intentions. Always signal in good time, and ensure that the signal has been cancelled after performing the manoeuvre, to avoid confusing other road users.
**Use of Speed:** The driver should make safe progress, without travelling too slowly, or exceeding the speed limit.
**Following Distance:** The “2 Second Rule” should be followed at all times. The driver should not tailgate vehicles in front.
**Road Positioning:** The vehicle should be positioned in a sensible position at all times. Where multiple lanes exist, the driver should drive in the centre of the lane, and should not straddle the lane markings.
**Awareness/Planning:** The driver must display awareness of other road users at all times. The driver should be thinking ahead, and planning ahead so that they can judge what other road users are going to do, make plans to avoid them, and act in good time. Changes in traffic conditions should also be planned for.
**Ancillary Controls:** The driver should be able to use controls in the car as and when required. The driver should be able to operate the controls without looking down.

Is there any significant loss of awareness of the driver whilst communicating?
Where there any issues concerning the use of radio to acknowledge the call?
Did the crew check that incident assigned to is an agreed task and confirm cancellation or redeploying if necessary?
Did the test subjects follow the single crew procedures?
Check crew called in status code 6 (at scene) on arrival at deployment scene.
Where there any issues concerning the use of the vehicle light bar or VMP?
Did the crew cancel rear reds if stationary on the hard shoulder?
On arrival did the crew protect the vehicle by the use of ETM?
Was ETM necessary at the incident?
Did the crew fend in or off as appropriate?
If ETM was necessary did the crew put out correct deployment of signs?
Were there any issues concerning the delay of approach to the incident while deploying signs?
Did the crew maintain safety views while deploying ETM?
Ask at debrief why was a support crew requested?
Was the crew effective in dealing with the incident or completing set task?

Off Road

Check that incident assigned is an agreed task and confirm cancellation or redeployment if necessary
Is the incident confirmed or on CCTV?
Was any additional information passed to the crew?
Was the deployment appropriate having regard to weather and time of day?
Was there a support vehicle to offer assistance if required?
Did any incidents require a double crewed vehicle due to severity or complexity?
Could the single crew vehicle be deployed to assist a double crewed vehicle?
Has the crew sent a status 5 message?
Has the crew reported a status 6 message?
Was there effective and clear feedback from the crew?

Test Location(s)

2 test locations were initially considered, M5 J4-8 and M6 J10a – 14.

To start with we will commence on a relatively straightforward section of motorway, M5 J4-8, and state that the test will only assess the feasibility of single crewing under the test conditions, i.e. daytime, dual 3 lanes with continuous hardshoulder etc.

There could be several further tests with increasing levels of complexity of network and conditions such as roadworks, discontinuous hardshoulder, ATM, dark unlit sections, adverse weather etc.

Test Duration

The test duration will be 4 early shifts and 4 late shifts over a fortnight period.

Selection Criteria for Test Subjects and Monitors

To be completed

Briefing for on and off-road Supervisors

To be completed

What Incidents will be Attended During the Single Crewing Test

Halcrow and TRL have undertaken a review of single crewing. An extract from their report is included below:
The objectives and findings for this task were to:

1. Review the current range of Traffic Officer functions with regard to incident types and identify which might best be managed by use of a single crew, which require a double crew and any that may require more than a two crew members

- Single crew: Attending a hard shoulder breakdown
  - Carrying out welfare checks
  - ‘Baby-sitting’ abandoned vehicles
  - Acting as a back-up / advance warning at incident scene

- Double crew: Anything requiring live lane work, particularly road traffic collisions
  - Emergency lane closures
  - Carriageway debris removal
  - Rolling road blocks (possible single crewed if procedures adapted)
  - Towing

For the single crew test we do not propose to significantly change the single crew incident types listed above.

There will be occasions where the RCC will dispatch the single crew patrol to incidents where they have sufficient information to identify that the incident may be suitable for a single crew to attend. For the test these will be:

- Attending a hard shoulder breakdown
- Carrying out welfare checks for vulnerable or disabled people
- Abandoned vehicles

It is acknowledged that once at the scene, the incident may be different or have escalated from that initially reported. The on-road TO in liaison with the dispatcher may then need to determine what other appropriate resources are dispatched to the incident. Test procedures will be prepared for these 3 incidents.

There may also be occasions where a single crew patrol during the test identifies an incident of which the staff at the RCC is not aware. As incidents are random events, it is not possible to predict what type of incident this will be, and there is a possibility that it will not be one of the 3 incident types identified above. During the test it is anticipated that the test subject will ‘do something’ at such an incident. For the test we will call this incident:

- An incident attended whilst on patrol

A test procedure will be prepared for this incident type. The on-road TO in liaison with the dispatcher may need to determine what other appropriate resources are dispatched to the incident.
Vehicles and Equipment

A brief vehicle review has taken place to understand the implications of single crewing and what will need to be achieved to support the trial. Figure 1 shows a typical layout of a standard specification.

Figure 1

Figure 2 highlights the some of problems faced with current vehicles which generally are not necessarily issues with double crews. There are also variances with different vehicle models as to where the equipment is fitted.

Issues for single crewing

Figure 2
The high level ergonomic review has shown that a number of the TO functions are not easily visible or accessible to the driver for single crew operations e.g. lightbar switch panel. The current vehicle specifications don’t provision for fixed locations for how and where the equipment is mounted within the vehicles. There are also variances between the different vehicle platforms used as well based on ease of installation and minimal obscuration of existing vehicle controls and functions.

In order to support the trial in the most effective way a Land Rover Discovery should be utilised (without navigation or multimedia pack) as that has the optimum space to re-site the light switch panel for the single crewing trial which should also have the least amount of preparation for the trial. During or post the trial other vehicle platforms will need to be reviewed to understand how single crewing requirements can be met.

The only other additional equipment that should be used in the trial is a vehicle fitted Dictaphone. This would remove a lot of the paper clutter and the requirements for notes whilst in the vehicle e.g. audible notes can be recorded and transcribed as required after dealing with any incident.
**Single Crew Test Procedures**

**Procedure Title: Daily pre-patrol vehicle and equipment check**

**Key Warnings:**

When preparing for single crewed patrol, enlist the assistance of a colleague for physical check of brake lights, safety lock and reversing lights.

If in doubt about a vehicle defect, or weather to take a vehicle out of service consult with a supervisor. Any vehicle subsequently taken out of service must not be returned until it has been inspected and declared fit for service.

<table>
<thead>
<tr>
<th>Tyres:</th>
<th>Carry out physical check of tyres, for obvious signs of defect / wear that compromises the legality of its use. Check the pressures by use of a tyre pressure gauge. Where a tyre is under inflated, re inflate to required pressure and monitor throughout the patrol period. If the tyre continues to deflate, take the vehicle out of service, notify the supervisor, and relevant tyre contractor.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wheels:</td>
<td>Check the wheel rims for damage, carry out a visual check in relation to the security and integrity of the wheel nuts.</td>
</tr>
<tr>
<td>Oil and Water Levels:</td>
<td>To be checked and filled when required. Check for obvious signs of leaks, if found take vehicle out of service.</td>
</tr>
<tr>
<td>Brake / Power steering fluid:</td>
<td>Check fluid levels and where a drop in the levels are detected, take the vehicle out of service for checking</td>
</tr>
<tr>
<td>Screen Wash:</td>
<td>Level checked and topped up accordingly</td>
</tr>
<tr>
<td>Horn:</td>
<td>Check operating correctly</td>
</tr>
<tr>
<td>Vehicle Lighting:</td>
<td>Make a physical check of all the vehicle lighting, from outside the vehicle, to both obligatory and emergency lights. Do not rely on internal warning lights to diagnose faults. Where a fault is found take the vehicle out of service until rectified.</td>
</tr>
<tr>
<td>Drivers electronic door safety lock:</td>
<td>Check for correct operation of switch and that all relevant doors lock and unlock when activated.</td>
</tr>
<tr>
<td>Seat Belts:</td>
<td>Checked to ensure they are not frayed and run freely when operated. Check they will lock when pulled hard. Prior to leaving the outstation complete a moving brake test to ensure the locking mechanism works. The check does include the passenger seatbelt.</td>
</tr>
<tr>
<td>Head Restraints:</td>
<td>Should be positioned so as the centre of the restraint is in line with the drivers ears in order to restrain the head in a collision.</td>
</tr>
<tr>
<td>SRS (Air Bags):</td>
<td>If the vehicle is fitted with a supplementary restraint system, dashboard warning lights must be checked to identify any malfunction. Where a malfunction is identified, then refer to the manufacturers hand book and follow the advice given.</td>
</tr>
<tr>
<td>Damage:</td>
<td>Vehicle should be checked and all damage found MUST be reported to a supervisor.</td>
</tr>
<tr>
<td>Vehicle Livery:</td>
<td>This is a fundamental safety feature of the vehicle, so it must be kept clean to ensure it stays conspicuous. Vehicles should be cleaned at least once a day, or following any incident that compromises the effectiveness of the</td>
</tr>
</tbody>
</table>
livery.

**TO Equipment:** Ensure that all equipment carried in the vehicle is present and in good working order

**Storage Cage:** Check the rear storage is serviceable and is securely fitted to the vehicle.

Great care should be taken at all times when checking vehicles and their equipment, to ensure personal safety and the safety of others at all times. Protective gloves should be worn, and spilt fluids must be cleaned up immediately. If corrosive or other harmful fluids come into contact with the body, the instructions issued by the manufacturers of such fluid must be followed.
## Procedure Title: Patrolling the HA Network

### Key Warnings:

When patrolling as single crewed, please be aware that there is a possibility that you could suffer from fatigue far more that when patrolling double crewed. If you feel fatigued then stop and take a rest period. You should not drive continuous for more than 2hrs at any one given time before taking a rest period.

Follow ABC of communications, Accuracy, Brevity, Clarity.

### Whilst patrolling as single TO consideration should be given to the following:

- Patrol area, urban / rural
- Size of area to be patrolled
- Patrol times, should not drive for prolonged periods as single crewed, should always look to take breaks from driving on a regular basis.
- Take break stops in motorway service areas, or outstations, or observation platforms, to give a high visible presence on the network, that will influence the driver behaviours of the travelling public.
- When stopping for breaks, inform the RCC of your location
- When on a rest period / break from driving, remain available for deployment
- Should set a good driving example, to other road users, should be courteous at all times. Choose a comfortable patrol speed, round 50mph, this will allow you to see and respond to incidents quicker.
- As part of your patrol, stop and check all previously unattended stationary vehicles on the hard shoulder, and report to RCC where necessary
- Ensure that all communications are kept to a minimum when driving, only use the supplied hands free facility when using the in-car communications system
- When exiting the hard shoulder having dealt with the incident, you should build up your speed to that of vehicles travelling in lane one, indicate prior o moving into suitable gap in the traffic.
- TO will turn off mobile phone whilst in the vehicle.

### RCC Responsibilities

- Ensure that single crewed TO despatched to appropriate incidents
- Keep all communications to the vehicle concise and to the point
- Monitor AVL of single crewed TO vehicle and if TO vehicle remains at rest for an extended period, conduct welfare check on the driver
Procedure Title: Dealing with unplanned incidents whilst on patrol as a single crewed resource

Key Warnings:

When on patrol as a single crewed Traffic Officer, and happen upon an incident that you have not been directed to attend, always make a dynamic risk assessment of the scene before beginning to deal with the incident. Yours safety and that of paramount importance. Safety of the travelling public is of utmost importance.

Points to consider

- Location of the incident, is it in the carriageway or on the hard shoulder

If the incident is on the carriageway

- Position the TO vehicle on the hard shoulder, adjacent to the incident, having illuminated the emergency lighting to warn other road users of the incident
- Contact the RCC and give the location, and brief details of the incident, including what incident is, how many vehicles / person(s) / debris involved
- How many lanes are affected.
- If you require the attendance of the emergency services
- Is there a likelihood of further collisions
- Take into account the road / weather conditions
- Requirement of vehicle recovery
- Deal with people if the DRA allows it.

RCC Operatives

- On receipt of notification of the incident create a command and control log
- Confirm the location and where possible monitor on CCTV
- Where required, set the appropriate signals / VMS legends
- Despatch a double crewed vehicle to the incident to assist
- Notify supervisor
- Where required emergency services attendance
- Organise vehicle recovery

If the incident is on the hard shoulder (broken down vehicle)

- Position the TO vehicle in the appropriate fend position, activating the emergency lighting
- Inform the RCC of your location, and the nature of the incident.
- Ensure you have a good view of the oncoming traffic when exiting the vehicle from the offside
• Get [people out of the vehicle if appropriate and safe.
• When speaking to the occupants of the vehicle, position yourself so that you have a view of the oncoming traffic
• Identify a suitable escape route for both yourself and the occupants of the vehicle should vehicles look to encroach onto the hard shoulder.
• Never stand between your vehicle and the broken down vehicle
• Having obtained all the details required pass them to the RCC to arrange recovery, either a motoring club or through the national vehicle recovery scheme.
• If the occupants of the vehicle are not vulnerable / disabled then give appropriate safety advice and leave the scene.
• If approaching during hours of darkness, be aware that the occupants of the vehicle could be walking along the hard shoulder.
• If during hours of darkness, leave appropriate cones and lamps behind the vehicle

(abandoned vehicle)
• Position the TO vehicle in the appropriate fend position, activating the emergency lighting
• Inform the RCC of your location, and the nature of the incident
• Ensure you have a good view of the oncoming traffic when exiting the vehicle from the offside
• Check the vehicle to ensure there are no occupants, and inform the RCC of the registration number
• If approaching during the hours of darkness, be aware that the occupants of the vehicle may be walking on the hard shoulder.
• If during the hours of darkness leave appropriate cones and lighting behind the vehicle.
• When exiting the hard shoulder having dealt with the incident, you should build up your speed to that of vehicles travelling in lane one, indicate prior to moving into suitable gap in the traffic.

RCC Operatives
• On receipt of the information create a command and control log, with all details
• Check the registration number of the vehicle via PNC
• If result of PNC shows other authority interest, pass onto the appropriate authority
• If no interest, vehicle recovered under the national vehicle recovery scheme.
Procedure Title: Vulnerable People

Key Warnings:

Under no circumstances should a single crewed TO carry a vulnerable person in the TO vehicle.

Note: This procedure is only applicable for vulnerable persons who are occupants of vehicles.

A vulnerable person is a person who is considered by themselves or others to be subject to enhanced or additional risks in the circumstances they find themselves in.

Both on road and RCC TO’s will give responding to vulnerable people a high priority and will do their best to meet their particular needs so as to remove or reduce the risks.

Personal characteristics such as age / gender do not necessarily make a person vulnerable – every case must be judged on the circumstances at hand.

In respect of a person or persons whose vehicle has broken down or finds themselves in some other form of difficulty on the HA network or in a service area,

Circumstances that may make them vulnerable include:

- Illness (including anxiety and disorientation)
- Actual or potential fear of personal attack (for any reason)
- Restricted personal mobility e.g. a wheel chair user
- Multiple passengers, particularly if children (ie from a public service vehicle)
- Stranded in adverse weather conditions
- Inability to understand advice and guidance from RCC staff (e.g deaf, or English not spoken)
- It is dark and their location is unlit
- It is daylight and CCTV does not cover their location
- Their location is particularly isolated or dangerous (e.g reduced hard shoulder width or within a wind tunnel)
On road single crewed TO

- On arrival at the incident position the TO vehicle in an appropriate fend position on the hard shoulder, and illuminate the emergency lighting, and inform the RCC
- Take extra care when exiting the TO vehicle from the offside
- Approach the stricken vehicle and its occupants from the nearside
- On speaking to the occupant(s) and it becomes that they are vulnerable give them safety advice and attempt to reassure them
- Update the RCC with further information, including what the vulnerability is
- If the vulnerable person appears unwell / suffering from the effects of alcohol / drugs request the attendance of the relative emergency services via the RCC (tips / warnings A traffic officer is not empowered to detain a person whilst awaiting the arrival of the police)
- Consider requesting the attendance of a double crewed TO vehicle dependent on the circumstances
- Where the emergency services are not in attendance, work with the RCC to resolve the situation by contacting the vulnerable person(s) relatives / friends.
- If the vulnerable person is to be removed from the network to a place of safety to await the arrival of friends / relatives, ensure that they remove valuable belongings from the vehicle, and then make arrangements for it to be removed.
- If the broken down vehicle is a public service vehicle liaise with the driver / company to arrange the attendance of a replacement vehicle to remove the occupants from the scene.
- If the transfer of passengers is to take place on the hardshoulder, ensure this is done in a controlled and safe manor.

RCC Operator

- On receiving information from on road TO that they have found a vulnerable person(s) create incident log with all relevant information
- If available monitor the situation on CCTV
- Consider deploying doubled crew TO vehicle to the scene should their assistance be required.
- Where requested contact the relevant emergency services
- If no CCTV view present, then conduct regular welfare checks on the scene TO
- Attempt to resolve the situation by working with the on road TO, contact any relatives / friends that have been nominated, keep the on road TO informed of the results
- If it is decided to remove the vulnerable person from the network, facilitate the safe removal of their vehicle either by the attending relatives / friends, or through the national vehicle recovery scheme.
• If the decision to remove the vulnerable person from the network, this should only be completed by a double crewed vehicle, and the appropriate ‘FLAG’ be entered on the command and control, and continue to make regular welfare checks.
Procedure Title: Disabled drivers

KEY Warnings:

Different disabilities create differing needs, on an individual basis, and in some case the disability may not be visually obvious.

Disabled drivers, travel the network on a daily basis, and may due to their disability encounter difficulties alighting from their vehicles to summons assistance. In such cases the highway code suggests the following:

- Stay in their vehicle
- Switch on their hazard warning lights
- Display a ‘Help’ pennant, or if they have a mobile telephone, contact the emergency services, and be prepared to advise them of their location

RCC Operatives

- On receiving a call reporting a disabled driver, open a command and control log.
- If the call is from the person themselves, ascertain as much information you can in respect of their disability, their location etc, and give them appropriate safety advice
- Where possible confirm their location by CCTV, and confirm they are safely on the Hard shoulder
- If the call is received via the emergency services control room, and a contact number is provided call the person back, asking the relevant questions, re their disability, family contacts, recovery arrangements
- Despatch a TO patrol, updating them with the information you have received. When dealing with a disabled person, you should be polite, understanding, sympathetic to their plight, but not condescending
- Continue to monitor on CCTV

On Road TO Patrol

- Where directed to by the RCC attend the scene of the incident
- On arrival, position the TO vehicle in the appropriate place on the hard shoulder, illuminating the emergency lighting
- Take care exiting the TO vehicle from the offside
- Approach the disabled person(s) vehicle from the nearside, and make contact with the occupants.
- If the control room operator has had difficulty communicating with the disabled person, then obtain whatever details you are able to. If that person has a difficulty hearing / speaking then attempt to converse with them on paper.
- When dealing with a disabled person, you should be polite, understanding, sympathetic to their plight, but not condescending.
Where necessary, where required, be firm to ensure both their safety and that of your own.

- Once you have the information, pass it back to the RCC
- Decide on what form of protection you are going to give to the vehicle whilst awaiting recovery.
- At all times reassure the disabled person that help is on its way

*If a disabled person is found in a broken down vehicle
*Whilst in the course of their normal patrol, the above rules
*Will apply.*
## Abandonment Rules

<table>
<thead>
<tr>
<th>Category</th>
<th>Detail</th>
<th>Person Responsible for calling test abandonment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Weather</td>
<td>Inclement weather which has a Met Office weather warning which could include: Snow/Ice, Fog, Heavy Rain, below 0°C daytime temperature</td>
<td>Test TO, RRC Controller/Supervisor/Monitor, Test TO Monitor</td>
</tr>
<tr>
<td>Road Conditions</td>
<td>Flooding, Snow covered Roads, Icy Roads, Major Spillage of hazardous substance/s</td>
<td>Test TO, RRC Controller/Supervisor/Monitor, Test TO Monitor</td>
</tr>
<tr>
<td>Test Vehicle Failure</td>
<td>Vehicle Breakdown before or during test, Failure of essential vehicle equipment before or during test, Failure to pass Pre-Shift Vehicle Check</td>
<td>Test TO, Test TO Monitor</td>
</tr>
<tr>
<td>Sickness</td>
<td>Absence of anyone actively involved in the test</td>
<td>Test TO, RRC Controller/Supervisor/Monitor, Test TO Monitor</td>
</tr>
<tr>
<td>Overtime excess</td>
<td>Test TO’s work period reaches their limit of overtime</td>
<td></td>
</tr>
<tr>
<td>Stress on the Test TO</td>
<td>The Test TO shows signs of being adversely affected by the test conditions</td>
<td>Test TO Monitor</td>
</tr>
<tr>
<td>Risk Assessment Changes</td>
<td>The dynamic risk assessment at the incident site changes such that risks are no longer acceptable.</td>
<td></td>
</tr>
<tr>
<td>Any other Reason</td>
<td>Any reason that dictates the test cannot be</td>
<td>Test TO, RRC</td>
</tr>
<tr>
<td>undertaken for reasons of health and safety, or compromises the validity of test and test results</td>
<td>Controller/Supervisor/Monitor, Test TO Monitor, HA, Atkins</td>
<td></td>
</tr>
</tbody>
</table>
Welfare Monitoring refers to the basic provision of suitable rest facilities either at the depot or remote points to allow eating, drinking, toilet and washing during the shift. It also includes the monitoring of the identified personnel to check the stress levels and capability to deal with the incidents as they arise before, during and after the test.

<table>
<thead>
<tr>
<th>Welfare of Who?</th>
<th>When</th>
<th>How</th>
<th>By Who</th>
</tr>
</thead>
<tbody>
<tr>
<td>Test TO</td>
<td>Prior to involvement in Test</td>
<td>Selection of suitable test subjects by volunteer and interview, particularly to assess and ensure their mental capability to work as a single crew under test conditions</td>
<td>Test Monitor, TO Supervisor</td>
</tr>
<tr>
<td>Test TO</td>
<td>Following selection but prior to involvement in Test</td>
<td>Training, to include full understanding of revised or bespoke test procedures, and details of the occupational welfare and support available during the test, Pre-briefing at start of shift</td>
<td>Test Monitor, TO Supervisor</td>
</tr>
<tr>
<td>Test TO</td>
<td>During Test</td>
<td>Monitoring the reaction of the Test TO to events and situations when: making decisions, using 2 way airwave/phone communications, reacting to “Over-shoulder Conscience”</td>
<td>Test Monitor, TO Supervisor, RRC Controller</td>
</tr>
<tr>
<td>Test TO</td>
<td>After Test</td>
<td>Communication de-briefing immediately following closure of incident, including report and collation of test data, De-briefing room for major incidents</td>
<td>Test Monitor, TO Supervisor</td>
</tr>
<tr>
<td>Test TO</td>
<td>After Test</td>
<td>De-briefing in a confidential environment for sensitivity reasons, if considered necessary</td>
<td>Test Monitor, TO Supervisor, HR Representative</td>
</tr>
<tr>
<td>RRC Controller</td>
<td>Prior to involvement in</td>
<td>General briefing to raise awareness of intended test</td>
<td>Test Monitor, RRC Manager</td>
</tr>
<tr>
<td>RRC Controller</td>
<td>Test</td>
<td>Prior to involvement in Test</td>
<td>Training, to include full understanding of revised or bespoke test procedures, Pre-briefing at start of shift</td>
</tr>
<tr>
<td>----------------------</td>
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<td>------------------------------</td>
<td>-------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>RRC Controller</td>
<td>Test</td>
<td>During Test</td>
<td>Monitoring the reaction of RRC Controller to events and situations when: making decisions, using 2 way airwave/phone communications</td>
</tr>
<tr>
<td>RRC Controller</td>
<td>Test</td>
<td>After Test</td>
<td>Communication de-briefing immediately following closure of incident, including report and collation of test data, De-briefing room for major incidents</td>
</tr>
<tr>
<td>RRC Controller</td>
<td>Test</td>
<td>After Test</td>
<td>De-briefing in a confidential environment for sensitivity reasons, if considered necessary</td>
</tr>
<tr>
<td>TO Supervisors / Test Monitors</td>
<td>Test</td>
<td>Prior to involvement in Test</td>
<td>General briefing to raise awareness of intended test</td>
</tr>
<tr>
<td>TO Supervisors / Test Monitors</td>
<td>Test</td>
<td>Prior to involvement in Test</td>
<td>Training, to include understanding of revised or bespoke test procedures, Pre-briefing at start of shift</td>
</tr>
<tr>
<td>TO Supervisors / Test Monitors</td>
<td>Test</td>
<td>During Test</td>
<td>Monitoring the reaction of Test TO’s / RRC Controller to events and situations when: making decisions, using 2 way airwave/phone communications, acting as “Over-shoulder Conscience”</td>
</tr>
<tr>
<td>TO Supervisors / Test Monitors</td>
<td>Test</td>
<td>After Test</td>
<td>Communication de-briefing immediately following closure of incident, including report and collation of test data, De-briefing room for major incidents</td>
</tr>
<tr>
<td>TO Supervisors / Test Monitors</td>
<td>Test</td>
<td>After Test</td>
<td>De-briefing in a confidential environment for sensitivity reasons, if considered</td>
</tr>
</tbody>
</table>
Monitors necessary Representative

| *VCTDWG | This is a member of the Variable Crewing Test Design Working Group who may be asked to provide relevant information, procedures or monitoring |  |
EXPLANATORY NOTE ON RISK CLASSIFICATION

Risk is the likelihood of potential harm from a hazard being realised. The extent of risk will depend on:

- The likelihood/probability of that harm occurring
- The potential severity of that harm, i.e. of any resultant injury or adverse health effect
- The population which might be affected by the hazard, i.e. the number of people who might be exposed.

The risk assessments should be reviewed if there is reason to suspect that they are no longer valid or there has been a significant change in the matters to which they relate.

<table>
<thead>
<tr>
<th>Probability (P) *</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Minor harm</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>Moderate harm</td>
<td></td>
<td></td>
<td>6</td>
<td>8</td>
<td>10</td>
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<tr>
<td>Serious harm</td>
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<td></td>
<td>9</td>
<td>12</td>
<td>15</td>
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<tr>
<td>Major harm</td>
<td></td>
<td></td>
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<td>16</td>
<td>20</td>
</tr>
<tr>
<td>Catastrophic harm</td>
<td></td>
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<td>25</td>
</tr>
</tbody>
</table>

Risk rating/classification

( R )

1 – 2 = Low
No action required

1 – 2 = Low
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No action requested

No action required
3 – 6 = Low
Ensure control measures are maintained and reviewed as necessary to ensure so far as is reasonably practicable the appropriate control of residual risk

8 – 16 = /Medium
Control measures to reduce risk rating to a level which is as low as is reasonably practicable

20 – 25 = High
Activity not permitted
– hazard to be avoided or risk to be considerably reduced

* Probability that harm will occur:

<table>
<thead>
<tr>
<th></th>
<th>Extremely unlikely</th>
<th>Highly improbable, never known to occur</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Unlikely</td>
<td>Improbable, remote chance</td>
</tr>
<tr>
<td>3</td>
<td>Likely</td>
<td>Possible, has happened occasionally</td>
</tr>
<tr>
<td>4</td>
<td>Extremely likely</td>
<td>Probable, commonly occurs</td>
</tr>
<tr>
<td>5</td>
<td>Almost certain</td>
<td>Inevitable, definite, continually occurs</td>
</tr>
</tbody>
</table>

* Potential severity of harm: e.g.

<table>
<thead>
<tr>
<th></th>
<th>Minor harm</th>
<th>Minor injury with short term effect, minor damage or loss</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Moderate harm</td>
<td>Lost time injury or illness, moderate damage or loss</td>
</tr>
<tr>
<td>3</td>
<td>Serious harm</td>
<td>Over 3 day injury or illness, substantial damage or loss</td>
</tr>
<tr>
<td>4</td>
<td>Major harm</td>
<td>Major injury, major damage or loss</td>
</tr>
<tr>
<td>5</td>
<td>Catastrophic harm</td>
<td>Fatality (inc. to the public) or disabling illness, catastrophic damage or loss</td>
</tr>
</tbody>
</table>
**Comments:**

This document only takes account of those identified activities and risks over and above the standard Operating Procedures for dual crewing.

### HEALTH AND SAFETY RISK - HAZARD IDENTIFICATION AND RISK ASSESSMENT

<table>
<thead>
<tr>
<th>Ref</th>
<th>Activity</th>
<th>Hazards</th>
<th>P</th>
<th>S</th>
<th>R</th>
<th>Response/Control Measure</th>
<th>P</th>
<th>S</th>
<th>R</th>
<th>Output*</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Monitoring Weather conditions around network</td>
<td>Inclement weather, e.g. Snow/Ice, Fog/Heavy Mist, Heavy Rain, below 0ºC daytime temperature</td>
<td>4</td>
<td>4</td>
<td>16</td>
<td>Dynamic risk assessment is required prior to, and during, all single crewing tests to determine suitability of weather conditions. If conditions dictate test is to be abandoned and revert to standard Operating Procedures</td>
<td>4</td>
<td>3</td>
<td>12</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Monitoring Road conditions around network</td>
<td>Unsuitable road conditions: Flooding, Snow covered Roads, Icy Roads, Major Spillage of hazardous substance/s</td>
<td>4</td>
<td>4</td>
<td>16</td>
<td>Dynamic risk assessment is required prior to, and during, all single crewing tests to determine suitability of road conditions. If conditions dictate test is to be abandoned and revert to standard Operating Procedures</td>
<td>4</td>
<td>3</td>
<td>12</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Test Monitoring</td>
<td>Sickness - of RCC Monitor, of Test TO, or Test TO Monitor</td>
<td>2</td>
<td>3</td>
<td>6</td>
<td>Single Crewing Procedure to call for abandonment of test and revert to standard Operating Procedures, including any first aid actions required</td>
<td>2</td>
<td>2</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td></td>
<td>RCC Controller or RCC Monitor suffers an adverse reaction during or following an incident</td>
<td>Stress, Loss of Concentration, logical decision making affected</td>
<td>3 3 9</td>
<td>Single Crewing Procedure to call for assistance as necessary, revert to standard Operating Procedures, and attend personal de-briefing at the earliest opportunity</td>
<td>3</td>
<td>2</td>
<td>6</td>
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<tr>
<td></td>
<td>Test encounters an incident which can only be mitigated by the use of additional resources</td>
<td>Stress, loss of concentration, fatigue</td>
<td>3 4 12</td>
<td>RCC to monitor incident and consider whether to and when to call for assistance as necessary and if there is a need to revert to standard Operating Procedures</td>
<td>3</td>
<td>3</td>
<td>9</td>
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</tr>
<tr>
<td></td>
<td>RCC Controller or RCC Monitor exceeding normal shift working patterns through overtime or emergency working</td>
<td>May affect logical decision making process</td>
<td>3 2 6</td>
<td>Additional cover to be provided or Single Crewing Procedure to call for abandonment of test and revert to standard Operating Procedures</td>
<td>3</td>
<td>1</td>
<td>3</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Operating communication equipment to TO while they are Driving</td>
<td>Loss of concentration, Stress</td>
<td>4 4 16</td>
<td>Short term inability - RCC to only transmit /receive communications when safe to do so. Long term inability - Single Crewing Procedure to call for abandonment</td>
<td>3</td>
<td>2</td>
<td>6</td>
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<tr>
<td></td>
<td>Communication to TO and others involved in the incident via communications equipment</td>
<td>Failure of equipment may lead to misheard or incorrect orders/decisions</td>
<td>3</td>
<td>3</td>
<td>9</td>
<td>Single Crewing Procedure to call for abandonment of test and revert to standard Operating Procedures</td>
<td>3</td>
<td>2</td>
<td>6</td>
<td></td>
</tr>
</tbody>
</table>

**Verification:**

Prepared by: David Bone

Date: 11th March 2009

Checked by:

Date:
**Comments:** This document only takes account of those identified activities and risks over and above the standard Operating Procedures for dual crewing.

### HEALTH AND SAFETY RISK - HAZARD IDENTIFICATION AND RISK ASSESSMENT

<table>
<thead>
<tr>
<th>Ref:</th>
<th>Activity</th>
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<th>P</th>
<th>S</th>
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<th>Response/Control Measure</th>
<th>P</th>
<th>S</th>
<th>R</th>
<th>Output*</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Driving around network with other traffic</td>
<td>Collision</td>
<td>5</td>
<td>3</td>
<td>15</td>
<td>TO must be fully qualified and competent to drive in accordance with current road safety laws and company standards</td>
<td>5</td>
<td>2</td>
<td>10</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Driving around network with other traffic</td>
<td>Inclement weather, e.g. Snow/Ice, Fog/Heavy Mist, Heavy Rain, below O°C daytime temperature</td>
<td>4</td>
<td>4</td>
<td>16</td>
<td>Dynamic risk assessment is required prior to, and during, all single crewing tests to determine suitability of weather conditions. If conditions dictate test is to be abandoned and revert to standard Operating Procedures, providing support if required.</td>
<td>4</td>
<td>3</td>
<td>12</td>
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</tr>
<tr>
<td>3</td>
<td>Driving around network with other traffic</td>
<td>Unsuitable road conditions: Flooding, Snow covered Roads, Icy Roads, Major Spillage of hazardous substance/s</td>
<td>4</td>
<td>4</td>
<td>16</td>
<td>Dynamic risk assessment is required prior to, and during, all single crewing tests to determine suitability of road conditions. If conditions dictate test is to be abandoned and revert to standard Operating Procedures, providing support if required.</td>
<td>4</td>
<td>3</td>
<td>12</td>
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</tr>
<tr>
<td>4</td>
<td>Driving around network with other traffic</td>
<td>Sickness - of TO or Test Monitor</td>
<td>2</td>
<td>3</td>
<td>6</td>
<td>Single Crewing Procedure to call for abandonment of test and revert to standard Operating Procedures, including any first aid</td>
<td>2</td>
<td>2</td>
<td>4</td>
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<tr>
<td></td>
<td>actions required</td>
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<tr>
<td>5</td>
<td>Driving around network with other traffic over a long duration&lt;br&gt;Stress, loss of concentration, boredom, fatigue</td>
<td>4 3 12 Single Crewing Procedure to ensure that sufficient rest periods are built into the shift</td>
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<tr>
<td>6</td>
<td>Test Monitor travelling in vehicle with little control over events&lt;br&gt;Frustration, stress</td>
<td>5 3 15 Test Monitor must be fully qualified and competent to drive in accordance with current road safety laws and company standards, be able to observe the environment and advise on incidents which the TO may not see</td>
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<tr>
<td>7</td>
<td>Single TO operating with a Test Monitor in rear of vehicle&lt;br&gt;loss of concentration, Stress</td>
<td>4 2 8 Interview and careful selection of suitable TO. Training and briefing in the reasons for the test. Regular monitoring at briefings and de-briefings</td>
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<tr>
<td>8</td>
<td>TO experiences undue stress caused by Test Conditions&lt;br&gt;Stress, loss of concentration, fatigue</td>
<td>3 2 6 Interview and careful selection of suitable TO. Training and briefing in the reasons for the test. Regular monitoring at briefings and de-briefings</td>
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<td>9</td>
<td>TO or Test Monitor suffer an adverse reaction during or following an incident&lt;br&gt;Stress, Loss of Concentration, logical decision making affected</td>
<td>3 3 9 Single Crewing Procedure to call for assistance as necessary, revert to standard Operating Procedures, and attend personal de-briefing at the earliest opportunity</td>
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<tr>
<td>10</td>
<td>Test encounters an incident which can only be mitigated by the use of additional resources&lt;br&gt;May affect logical decision making process</td>
<td>3 4 12 Single Crewing Procedure to call for assistance as necessary and revert to standard Operating Procedures, providing support if required</td>
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<tr>
<td>11</td>
<td>Test Vehicle Failure&lt;br&gt;Mechanical Breakdown, e.g. Vehicle Breakdown before or during test, Failure of essential</td>
<td>3 3 9 Single Crewing Procedure to call for abandonment of test and revert to standard Operating Procedures</td>
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<tr>
<td>No.</td>
<td>Situation</td>
<td>Impact on Logical Decision Making</td>
<td>Risk Assessment</td>
<td>Response</td>
<td>Impact Rating</td>
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<tr>
<td>12</td>
<td>TO or Test Monitor exceeding normal shift working patterns through overtime or emergency working</td>
<td>May affect logical decision making process</td>
<td>3</td>
<td>Single Crewing Procedure to call for abandonment of test and revert to standard Operating Procedures</td>
<td>3</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>13</td>
<td>Attending an incident that is not covered by the Single Working Procedure</td>
<td>May affect logical decision making process</td>
<td>3</td>
<td>Dynamic Risk assessment is required to determine ability for single crew to manage the incident in conjunction with RCC. Otherwise Single Crewing Procedure to call for abandonment of test and revert to standard Operating Procedures</td>
<td>2</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>14</td>
<td>Operating communication equipment to RCC and others while driving</td>
<td>Loss of concentration, Stress</td>
<td>4</td>
<td>Short term inability - TO to only transmit/receive communications when safe to do so. Long term inability - Single Crewing Procedure to call for abandonment of test and revert to standard Operating Procedures</td>
<td>3</td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>15</td>
<td>Communication to RCC and others involved in the incident via communications equipment</td>
<td>Failure of equipment may lead to misheard or incorrect orders/decisions</td>
<td>3</td>
<td>Single Crewing Procedure to call for abandonment of test and revert to standard Operating Procedures</td>
<td>3</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>16</td>
<td>Lone Working</td>
<td>Stress, loss of concentration, boredom, assault</td>
<td>3</td>
<td>During the test the TO will always have a Test Monitor present. The Test Monitor will not get involved unless required to do so for operational or personal safety</td>
<td>3</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>17</td>
<td>Out of Vehicle Safety for TO and Test Monitor</td>
<td>Traffic Noise, Collision, pressure from Public</td>
<td>4</td>
<td>TO and Test Monitor to follow standard Operating Procedures regarding out of vehicle safety during an incident</td>
<td>4</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Lack of peer interaction for TO during test</td>
<td>Boredom, fatigue</td>
<td>3</td>
<td>2</td>
<td>6</td>
<td>Single Crewing Procedure to ensure that sufficient rest and briefing periods are built into the shift to provide variety, interaction with other staff</td>
<td>2</td>
<td>1</td>
<td>2</td>
<td></td>
</tr>
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<td></td>
</tr>
<tr>
<td>19</td>
<td>Dealing with a test incident where the TO is alone and the Customer is aggressive/abusive or otherwise unpleasant</td>
<td>Assault, verbal or actual</td>
<td>3</td>
<td>3</td>
<td>9</td>
<td>During the test the TO will always have a Test Monitor present. The Test Monitor will not get involved unless required to do so for operational or personal safety. TO should ensure standard operating procedure is implemented to deal with Customer, including calling for appropriate assistance. (Note: in real situation Single Crewing Procedure and training for such must include how to use communication method to call for back up and continue to calm Customer down)</td>
<td>2</td>
<td>1</td>
<td>2</td>
<td></td>
</tr>
</tbody>
</table>

**Verification:**

*Output (TBA)*

Prepared by: David Bone

Date: 11th March 2009

Checked by:

Date:
## APPENDIX A – design test parameters

### Test design criteria: Customer Service

<table>
<thead>
<tr>
<th>Category: Customer Service</th>
<th>Before</th>
<th>During</th>
<th>After</th>
</tr>
</thead>
<tbody>
<tr>
<td>Who will do it? Atkins</td>
<td>TO test subject in vehicle. 1 control room test monitor. Control room test subject.</td>
<td>Test subjects, the monitor and Atkins.</td>
<td></td>
</tr>
</tbody>
</table>

| What will they do? Review how the test could impact on other road users. | TO test subject will provide service as they would in a dual-crew. Control room test subject will deploy the right patrols to meet customer needs. | During the de-brief they will explore if the test patrol attended the correct types of incident. |

The test will not aim to capture the effect of single crewing on KPIs.

| How will they do it? Understand what incidents will be attended by the test patrol. | TO test subject will attempt to follow existing procedures and communicate attendance decisions. More information is required to understand how the control room monitor will undertake this. | By reviewing on what information did both test subjects make his/her deployment/attendance decisions. |

| Where will it take place? Desk-top exercise | In-vehicle for TO test subject. In the control room for the control room test subject and the control room monitor. | RCC |

| When will it take place? During the design period. | During the entirety of test period. | During 2 hours at the end of shift. |

| Why will it take place? To limit the impact of the test on other road users. | To limit the impact of the test on road users. | To learn what incidents a single crew should be deployed to. |

<p>| Risks | Public perception Road user dissatisfaction |</p>
<table>
<thead>
<tr>
<th>Road user affected by the test</th>
</tr>
</thead>
<tbody>
<tr>
<td>Overload of the test driver</td>
</tr>
<tr>
<td>Overload of monitor</td>
</tr>
<tr>
<td>Test design criteria: Measurement</td>
</tr>
<tr>
<td>----------------------------------</td>
</tr>
<tr>
<td>Category: Test Results</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>Before</th>
<th>During</th>
<th>After</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Who will do it?</strong></td>
<td>Atkins &amp; Design Team</td>
<td>2 Test Monitors</td>
<td>Atkins</td>
</tr>
<tr>
<td><strong>What will they do?</strong></td>
<td>Atkins to define results required to support feasibility report. Design Team to refine requirements to ensure pragmatism</td>
<td>Collect pre-defined raw data using designed collection techniques.</td>
<td>Atkins to process raw data into meaningful results which will inform the feasibility report</td>
</tr>
<tr>
<td><strong>How will they do it?</strong></td>
<td>Review feasibility report excluding test element to determine what additional information would bolster feasibility. Review data requirement against practicality of data collection and prioritise to ensure targeted data collection. Also minimised post test data processing requirement at this stage.</td>
<td>Collection of raw data for the on-road service requires simple collection techniques able to withstand weather (assuming monitor leaves vehicle) and potentially stressful situations (assuming monitor is not a TO) Take lessons from traffic counts</td>
<td>All raw data should be safely stored in it's original format before analysis. Processing of data should be limited to avoid distortion of facts noted in the field. Determine results and evaluate to ensure test gained data required for feasibility</td>
</tr>
</tbody>
</table>

| Where will it take place? | Office Based | RCC and On-road | Office Based |

| When will it take place? | Test Design Period. Finalised before Test | Briefing pre-Test and During Test Period | Post Test pre signature of PT1 |

| Why will it take place? | It is essential to limit the test scope to what is beneficial to the feasibility report. Scope creep may desire that we test many other things. Scope creep is to be avoided to keep this test 'clean' | The measurement and collection of data is the reason for this test. The test is taking place to ensure a robust, objective and considered analysis of single crewing to inform feasibility | The correct processing of field data is essential. Taking field data and feeding it through a statistical 'masher' will not assist our goals. Minimal post test processing must be an aim. |

<p>| Risks | H&amp;S risks - To test result collector in vehicle, out of vehicle, in RCC | | |</p>
<table>
<thead>
<tr>
<th>Consider additional risk to TO due to presence of test monitor</th>
</tr>
</thead>
<tbody>
<tr>
<td>Project Risks – Data is corrupted, lost, Data does not inform feasibility, Test is aborted mid-way, is data still valid?</td>
</tr>
<tr>
<td>Publicity/Public perception of numerous people in test vehicle.</td>
</tr>
<tr>
<td><strong>Test design criteria: Measurement</strong></td>
</tr>
<tr>
<td>-------------------------------------</td>
</tr>
<tr>
<td><strong>Category:</strong> KPI simulation</td>
</tr>
<tr>
<td><strong>Before</strong></td>
</tr>
<tr>
<td>Who will do it?</td>
</tr>
<tr>
<td>What will they do?</td>
</tr>
<tr>
<td>How will they do it?</td>
</tr>
<tr>
<td>Where will it take place?</td>
</tr>
<tr>
<td>When will it take place?</td>
</tr>
<tr>
<td>Why will it take place?</td>
</tr>
<tr>
<td>Risks</td>
</tr>
</tbody>
</table>
## Test design criteria: Measurement

| Category: Control Room Observer/In vehicle Test Monitor |
|-----------------|-----------------|------------------|
| **Who will do it?** | **Before** Alan Apps/TLC | **During** 2 In vehicle test monitors = 1 Traffic Officer Trainer, 1 Data collector. Control Room Monitor = Control Room Supervisor | **After** Test Result collectors and test participants Atkins |
| **What will they do?** | Discuss who are the best internal staff to use as Observers in the control room and Test vehicle. Assume internal staff are appropriate thereby avoiding lengthy procurement process. NO may have other internal resource they could use. | The in vehicle monitors will perform 2 functions. 1 (the Data Collector) will be responsible for recording all test data whilst the other (The TO trainer) acts as the driver’s conscience and assures the health and safety of the test staff and members of the public. The TO trainer is empowered to abandon the test at any point. | A hot de-brief will take place to inform other future tests. The Data Collector will also pass across all field data collected to the Data analysts. Following this, the test monitors will not have an ongoing involvement so it is important to capture their information effectively |
| **How will they do it?** | Alan will talk to Trixy Alberga and Jenny Moten to discuss participation | The data collector will be provided with tried and tested data collection tools. The TO trainer will be required to remember test process as observing road and operative behaviour a key safety role. | There will need to be a structured be-brief process in place to ensure information capture. |
| **Where?** | Office Based | In test vehicle and RCC | RCC |
| **When will it take place?** | Following the first design and check iteration cycle. To Inform design iteration 2 | During test | Immediately following test |
| **Why will it take place?** | To ensure resources can be made available to monitor the test and collect results. | To ensure data is collected during the test and to ensure staff and public health and safety. | To ensure data collected during the test is captured and safety stored. To inform other tests. |
| **Risks** | H&S Risk – If the in vehicle monitor does not ensure H&S of the test staff who will? Can the in vehicle monitor ensure public H&S? What | | |
are the risks to the public? What qualification would make the in-vehicle (TO Trainer) competent to carry out this role?

Project Risk – Internal HA resource to monitor the test is unavailable necessitating an NO procurement exercise prior to commencing the test making implementation by NO less attractive and prolonged.
<table>
<thead>
<tr>
<th><strong>Test design criteria: Test Spec</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Category:</strong> Test Location/Environment</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Who?</strong></th>
<th><strong>Before</strong></th>
<th><strong>During</strong></th>
<th><strong>After</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Who?</strong></td>
<td>Design Team – Alan Apps</td>
<td>Test Crew &amp; RCC operator</td>
<td>Atkins</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>What will they do?</strong></th>
<th><strong>Before</strong></th>
<th><strong>During</strong></th>
<th><strong>After</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>The Design Team will choose a test location(s) and environment(s) to meet the needs of the feasibility report. The choice of weather and other conditions appropriate for running the test in will be considered</td>
<td></td>
<td>The test crew will operate within the chosen test environment unless required to abort the test.</td>
<td>Atkins will review the test location and environment used to ensure they were adequate for the test and provide correct results to inform the feasibility report. If they do not consideration will be given to a repeat test in a differing environment/location</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>How will they do it?</strong></th>
<th><strong>Before</strong></th>
<th><strong>During</strong></th>
<th><strong>After</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>The M60 ring or the Birmingham box are suggested locations, but a test track is not ruled out. The design team will review these against the requirements of the feasibility report. The weather and other conditions will attempt to match the end state in which single crewing will be appropriate.</td>
<td>A dynamic risk assessment procedure is to be written by the test designers to allow test abortion should conditions become inappropriate for single crewing</td>
<td>During the de-brief Atkins will interview the test crew to determine the on-road conditions encountered and the test crew ability to perform safely as a single crew under those conditions. A record will be kept of all conditions tested. For those remaining untested single crewing will be assumed unfeasible until evidence can prove otherwise</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Where?</strong></th>
<th><strong>Before</strong></th>
<th><strong>During</strong></th>
<th><strong>After</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Office Based decision making process. Site visits with TOS may be required to explore likely test locations</td>
<td>Suggest Birmingham Box with varied patrol routes, varied road and weather conditions</td>
<td>RCC</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>When?</strong></th>
<th><strong>Before</strong></th>
<th><strong>During</strong></th>
<th><strong>After</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Before test implementation</td>
<td>Summer/Winter?</td>
<td>Immediately following the test and analysis following.</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Why will it take place?</strong></th>
<th><strong>Before</strong></th>
<th><strong>During</strong></th>
<th><strong>After</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>A test should attempt to replicate the end condition of single crewing as far as possible. Making the right location and</td>
<td>During the test useful information will be gained about the road and weather conditions in which it is</td>
<td>The test implementation phase is programmed to start following 1st May. Reviewing the conditions encountered is essential to determine if a winter test is required for</td>
<td></td>
</tr>
<tr>
<td>Risks</td>
<td>Project Risk – Time of year of the test is not representative.</td>
<td></td>
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<td>---------------</td>
<td>-----------------------------------------------------------------</td>
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<tr>
<td></td>
<td>H&amp;S Risk – Test encounters conditions which are a hazard which</td>
<td></td>
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</tr>
<tr>
<td></td>
<td>cannot be mitigated in the single crewed condition.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>condition choice will ensure this realism</td>
<td>practical/advisable to single crew</td>
<td>representative results.</td>
<td></td>
</tr>
</tbody>
</table>
### Test design criteria: Test Spec

**Category: Test Duration/Timescale**

<table>
<thead>
<tr>
<th>Who?</th>
<th>Before</th>
<th>During</th>
<th>After</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alan Apps/Design Team</td>
<td>Traffic Officer Test Subject and Test Monitors</td>
<td>Atkins/Alan Apps</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>What will they do?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Determine appropriate duration of test with ROM and NO Client. The requirements of the feasibility report are to be defined these may give an indication of the test duration desirable to gain results. The test timescale will be dependant on NO resources and will require discussion.</td>
</tr>
<tr>
<td>There is a restriction on driving duration to 4 hours for a single crew. An 8 hour on-road test will not allow de-brief. Suggest 6 hour test with 1 hour de-brief following. Need to consider what to do during 2 hours non-drive time.. Also suggest 2 -4 test weeks: 2 spring, 2 winter. 2 Urban, 2 Rural. Initially use May 09 Urban test.</td>
</tr>
<tr>
<td>Following first and subsequent tests determine if further test weeks are required to inform feasibility based on results obtained. Discuss with NO client need for additional test weeks. Discuss with NO ops appetite for further test weeks.</td>
</tr>
</tbody>
</table>

Night shift testing of single crewing is not anticipated as it does not replicate the end state. All other shifts should be considered.

<table>
<thead>
<tr>
<th>How will they do it?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alan Apps and John Jones to discuss practicalities of 1 week of overtime for test crew.</td>
</tr>
<tr>
<td>Test week 1 May 09 Urban</td>
</tr>
<tr>
<td>Test week 2 Aug 09 Rural</td>
</tr>
<tr>
<td>Test week 3 Nov 09 Urban</td>
</tr>
<tr>
<td>Test week 4 Jan 10 Rural</td>
</tr>
<tr>
<td>Design team to assess ‘time of year’ and ‘Rural/Urban’ relevance to feasibility study based on results obtained and conditions replicated.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Where?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Office based/Network visits to determine suitability</td>
</tr>
<tr>
<td>Urban – Birmingham Box</td>
</tr>
<tr>
<td>Rural – North West, perhaps M6?</td>
</tr>
<tr>
<td>Office/RCC based assessments.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>When?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Important to resolve initial test timescales/duration soon in design process.</td>
</tr>
<tr>
<td>As above in how</td>
</tr>
<tr>
<td>Discussion of further tests to take place following test results incorporation into feasibility report</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Why will it take place?</th>
</tr>
</thead>
<tbody>
<tr>
<td>The initial test will reveal considerable information concerning single crewing. This first</td>
</tr>
<tr>
<td>A May test to start should be aimed to capture single crewing practicalities in good weather. This can then be developed onto</td>
</tr>
<tr>
<td>There may be an appetite to move to a single crewing trial prior to later poor weather/conditions testing. This</td>
</tr>
<tr>
<td>Risks</td>
</tr>
<tr>
<td><strong>Test design criteria: Simulated technology, Vehicles and Equipment</strong></td>
</tr>
<tr>
<td>-------------------------------------------------</td>
</tr>
<tr>
<td>Category: Simulated technology, Vehicles and Equipment</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Who will do it?</th>
<th>Before</th>
<th>During</th>
<th>After</th>
</tr>
</thead>
<tbody>
<tr>
<td>Atkins</td>
<td>Atkins</td>
<td>Atkins</td>
<td>Atkins</td>
</tr>
</tbody>
</table>

| What will they do? | | | |
|--------------------| Current vehicles and equipment review | Review how changes to vehicles and equipment assist/hinder actual operations | Review outcomes and where necessary determine specification changes to vehicles and equipment for either additional review and/or implementation |
|                     | For identified single crewing scenarios understand key equipment and vehicle usage in double crew situation Recommend and carry out changes to both vehicles and equipment to support the trial vehicles | Monitor actual usage and gather feedback from trial. Ongoing review during trial period with a view to making adjustments to both vehicles and equipment based on monitoring. | Review data collected during trial period and determine the final vehicle and equipment specification going forward. |
|                     | Desktop mainly with some discussion with on-road resources. Look to prep trial vehicle with a pre-trial review by means of utilising a test track following the vehicle revisions | In-vehicle throughout various phases of trial followed up with feedback from on-road and off road resources. RCC - Monitoring will also take place. | Desktop mainly with some possible in-vehicle review |
|                     | During design period | During trial period | Post trial once data has been reviewed |
|                     | To help mitigate activity risks as well as improve effectiveness of single man crewing option for the | This will help determine any safety or effectiveness issues during the trial that will need | To review and implement lessons learnt to form part of final recommendations and should the |
identified scenarios. Also will allow staff to familiarise themselves with vehicle and equipment changes prior to trial commencing.

<table>
<thead>
<tr>
<th>Risks</th>
<th>Operational requirements not fully understood – leading to safety issues</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Vehicles and equipment do not meet the needs of the trial – inability to carry out the tasks</td>
</tr>
<tr>
<td></td>
<td>Modifications of vehicles and equipment may be prohibitive during trial period requiring further trial</td>
</tr>
<tr>
<td></td>
<td>Timescales to implement revisions</td>
</tr>
<tr>
<td></td>
<td>Current vehicles can not meet revised specification requirements</td>
</tr>
</tbody>
</table>

**Test design criteria: People**

<table>
<thead>
<tr>
<th>Category: Safety</th>
</tr>
</thead>
<tbody>
<tr>
<td>Before</td>
</tr>
<tr>
<td>Who will do it?</td>
</tr>
<tr>
<td>What will they do?</td>
</tr>
<tr>
<td>How will they do it?</td>
</tr>
</tbody>
</table>
| Where will it take place? | The Generic Risk Assessment and reviews may be office based | Control Room for generic risk assessment  
On site for dynamic risk assessment | Office based |
|--------------------------|----------------------------------------------------------|-------------------------------------------------|
| When will it take place? | The Generic Risk Assessment will be prepared before any tests, then specific assessment up to 2 weeks prior to each test  
Dynamic risk Assessment immediately prior to and during test conditions | Test Monitor to refer to revised Risk Assessments | During the de-brief and full review of test |
| Why will it take place?  | To ensure that all foreseeable generic and test specific risks are identified and evaluated prior to, and during, the test | To monitor the effectiveness in practice and cease the trial if risks not adequately managed | To provide further improvement to the management of safety |
| Risks                    | Hazards not identified  
Failure to evaluate risks sufficiently  
Failure to monitor management of risk | | |
## Test design criteria: People

**Category: Welfare**

<table>
<thead>
<tr>
<th></th>
<th>Before</th>
<th>During</th>
<th>After</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Who will do it?</strong></td>
<td>Test Subjects, Supervisors and Managers Test Monitors</td>
<td>Test Monitor, Test Subjects Supervisors and Managers</td>
<td>Test Monitor, Test Subjects Supervisors and Managers</td>
</tr>
<tr>
<td><strong>What will they do?</strong></td>
<td>Provide full information on the test in regard to occupational welfare and support</td>
<td>Monitor the welfare of the test subjects</td>
<td>Monitor the welfare of the test subjects</td>
</tr>
<tr>
<td><strong>How will they do it?</strong></td>
<td>Pre-briefing, Training, careful selection of test subjects (on-road and off-road)</td>
<td>2-way communication, “Over shoulder Conscience”, monitoring of test subjects during live test</td>
<td>De-briefing</td>
</tr>
<tr>
<td><strong>Where will it take place?</strong></td>
<td>Briefing/Training Room</td>
<td>Within vehicle (through comms) with support from the RCC</td>
<td>In the de-briefing room and, if required for confidentiality purposes, in a private room</td>
</tr>
<tr>
<td><strong>When will it take place?</strong></td>
<td>This will be part of the process during the selection of suitable test subjects and then during training</td>
<td>During the live test conditions</td>
<td>During de-briefing and at other times as deemed necessary</td>
</tr>
<tr>
<td><strong>Why will it take place?</strong></td>
<td>To ensure that Test subjects fully understand and accept the situations they are to deal with</td>
<td>To ensure that test subjects are coping with the tasks being undertaken</td>
<td>to ensure that test subjects are not adversely affected by the conditions of the test or the situations that arise</td>
</tr>
<tr>
<td><strong>Risks</strong></td>
<td>Undue stress caused by pre-test nerves and anxiousness</td>
<td>Undue stress affecting logical decision making at safety critical periods of the test</td>
<td>Post traumatic stress disorder</td>
</tr>
<tr>
<td><strong>Test design criteria: People</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
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<tr>
<td>Supervisors and Managers of the test subjects</td>
<td>Control room Monitors</td>
<td>Supervisors and Managers of the test subjects</td>
<td></td>
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<tr>
<td>Selectors of the test subjects</td>
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<tr>
<td><strong>What will they do?</strong></td>
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<tr>
<td>Assess and ensure the mental capability to work as a single crew under test conditions</td>
<td>Monitor their ability to make controlled decisions in line with existing and test procedures</td>
<td>Assess the after effects of the test and their capability to continue similar test conditions</td>
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<tr>
<td><strong>How will they do it?</strong></td>
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<tr>
<td>Selection of the test subjects will be through psychometric testing, interviews and continuous monitoring</td>
<td>Assess each decision dynamically to ascertain their control</td>
<td>Further individual interviews to determine the test subjects feelings during the test</td>
<td></td>
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<tr>
<td><strong>Where will it take place?</strong></td>
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<td>During the live test and in the Control Room</td>
<td>Interview/Training rooms</td>
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<tr>
<td><strong>When will it take place?</strong></td>
<td>Prior to formal selection of the test subjects Preparation of test subjects</td>
<td>Ongoing throughout the live test</td>
<td>Within 2 weeks of the completion of the test or earlier if specific circumstances identified</td>
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<tr>
<td><strong>Why will it take place?</strong></td>
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<tr>
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<td>Interview and selection techniques fail to identify vulnerable test subject</td>
<td>Test Subject fails to perform as expected under test conditions</td>
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<td><strong>Test design criteria: People</strong></td>
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<td><strong>Who will do it?</strong></td>
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<tr>
<td>Atkins/Control Room Operators/Test Monitors</td>
<td>Atkins/Control Room Operators/Test Monitors</td>
<td>Atkins/Control Room Operators/Test Monitors</td>
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<tr>
<td><strong>What will they do?</strong></td>
<td>Provide a range of interview/selection and procedures to enable the test</td>
<td>Manage and monitor the application of specific test procedures</td>
<td>Review the on-road and off-road application of the test procedures</td>
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<tr>
<td><strong>How will they do it?</strong></td>
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<td>Off-line through the Test Design Working Groups and Terms of Reference During the preparation of test conditions</td>
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<td>During the various de-briefings and Test Design Working Groups</td>
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<td><strong>Why will it take place?</strong></td>
<td>Competence of the off road support is vital to ensure that on-road Test Subjects have the necessary support</td>
<td>To activate normal working procedure or withdraw test if competence is compromised</td>
<td>To ensure the processes and procedures have covered all the necessary competences to allow successful completion of the tests</td>
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<tr>
<td><strong>Risks</strong></td>
<td>Competency of off road staff is not fully determined Processes and procedures fail to provide sufficient competencies to test subjects</td>
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<tr>
<td><strong>Test design criteria: People</strong></td>
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<td>Existing TOs and support teams</td>
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<td>Provide support under normal operating procedures to override test conditions when required</td>
<td>Provide support under normal operating procedures to override test conditions when required</td>
<td>Provide de-brief to Test Monitors to identify why the test condition required additional support</td>
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<td><strong>How will they do it?</strong></td>
<td>Normal Operating Procedure, possibly with resources working overtime to provide cover</td>
<td>Normal Operating Procedure, possibly with resources working overtime to provide cover</td>
<td>Participate in de-brief and other review points as required</td>
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<td><strong>Where will it take place?</strong></td>
<td>Overtime Crews operate from designated depot or holding area</td>
<td>Control room</td>
<td>De-briefing rooms</td>
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<td>To coincide with the test</td>
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<td><strong>Why will it take place?</strong></td>
<td>To ensure that full support is available to any incident within the test area thus not compromising the PSA or existing KPI’s</td>
<td>To ensure that full support is available to any incident within the test area thus not compromising the PSA or existing KPI’s</td>
<td>To ensure that full support is available to any incident within the test area thus not compromising the PSA or existing KPI’s</td>
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<td><strong>Risks</strong></td>
<td>Existing shift patterns mean that insufficient resource is available to provide cover</td>
<td>Delay in Dual Crew attending situation affecting the PSA/KPI</td>
<td>Unwillingness of existing TOs and support staff to provide resources due to political opposition to the tests</td>
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<td><strong>Who will do it?</strong></td>
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<td></td>
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<tr>
<td>Atkins</td>
<td>Single crewed traffic officer in vehicle together with safety person and test monitor</td>
<td>Atkins</td>
<td></td>
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<td><strong>What will they do?</strong></td>
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<td></td>
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<tr>
<td>Review how the test will impact on other road users</td>
<td>Single crewed traffic officer will patrol, attend and deal with incidents as appropriate</td>
<td>Through de brief with the traffic officer</td>
<td></td>
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<td><strong>How will they do it?</strong></td>
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<td></td>
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<tr>
<td>Gaining an understanding of current on road and control room procedures</td>
<td>On road traffic officer will deal with incidents they are directed to or find as part of their routine patrol, having communicated with the control room and undertaken risk assessment</td>
<td>Reviewing the decision making process of both the control room and on road personnel</td>
<td></td>
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<td><strong>Where will it take place?</strong></td>
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<td>During the design period</td>
<td>During the entirety of the test period</td>
<td>During the two hours after the shift</td>
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<td><strong>Why will it take place?</strong></td>
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<tr>
<td>To review the current TO procedures with a view to introducing single crewed patrols</td>
<td>To test the impact of single crewing on the traffic officer service</td>
<td>Discuss the feelings / thoughts of the traffic officer in respect of single crewing</td>
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Traffic Officer Service - Variable Crewing Trial

Feasibility Report

March 2009

Notice
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Appendix A – Business Case
Appendix B – PT1 Form
Appendix C – Test Health and Safety Assessments
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Executive Summary

The Incident Management Performance Team (IMP) is one of three teams making up the Network Policy Group within the Highways Agency’s Network Service (NetServ) Directorate. The Group’s mission is “to research, develop and deliver first class policy, advice and techniques to improve the operational performance of the Strategic Road Network”.

Atkins have been commissioned by the IMP Team to provide a report into the feasibility of variable crewing within the Traffic Officer Service (TOS) and to make a recommendation as to whether a Network Trial of variable crewing should be undertaken.

The Highways Agency intends to deliver greater benefits through the TOS. There is unlikely to be any further funding available for additional staff, therefore this will have to be achieved through improvements in efficiency of the service. Variable crewing is being considered as one means of making these efficiency improvements.

For the purposes of this study, variable crewing includes the deployment of variable numbers of Traffic Officers (TO) within a patrol vehicle based on an assessment of need and prevailing conditions. Nevertheless, a pre-requisite for the feasibility of variable crewing is that it is possible to operate single-crew patrols safely on the Network. At the time of writing, a test to determine whether a single-crew can operate safely is being designed.

This work has been carried out following the principles and methodology set out in the “Guide for the Design, Management and Delivery of Pilots and Trials on the Highways Agency Network”.

This report considers the concerns associated with the application of variable crewing to the TOS. Related to these concerns, the possible impacts, both positive and negative, of implementing (or not) variable crewing are identified.

The interaction between response and clearance times using variable crews is a complex issue which will not be fully understood without conducting a trial. The effect on response and clearance times will depend on whether the number of vehicles or the number of TOs on a particular patch remains constant.

In the Netherlands, the Rijkswaterstaat Weginspecteurs, with whom the Highways Agency enjoys an established relationship, routinely use single crews to good effect. Their experience demonstrates that there is a case for variable crewing within the TOS.

It is recommended that, subject to a successful outcome of a single crewing test, a Network Trial of variable crewing be implemented. This Trial would aim to determine whether it is practicable for the TOS to adopt variable crewing, and also to consider which incident types may be suitable for lone TOs to deal with.

It is recommended that this Network Trial be implemented in the West Midlands or the North West, as these regions are likely to have a high proportion of incidents which can be
responded to by a single TO. Therefore the increased flexibility of variable crewing will be likely to have the greatest benefits there.

If approval to proceed with a Network Trial of variable crewing was to be given on the 1st of August 2009, it is anticipated that the test of single crewing would proceed until winter 2009, with the Trial itself commencing April 2010.

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

1.1 Participants

The Incident Management Performance Team (IMP) is one of three teams making up the Network Policy Group within the Highways Agency’s Network Service (NetServ) Directorate. The Group’s mission is “to research, develop and deliver first class policy, advice and techniques to improve the operational performance of the Strategic Road Network”. The IMP Team is tasked with delivering projects within a People Organisation & Powers Task in support of that objective.

Atkins have been commissioned by the IMP Team to provide a report into the feasibility of variable crewing within the Traffic Officer Service (TOS) and to make a recommendation as to whether a Network Trial of variable crewing should be undertaken.

1.2 Objective

In its 2007-08 business plan, the Highways Agency outlined its intent to review the effectiveness of the TOS and develop a plan for making improvements in efficiency of service delivery. With the TOS now firmly established the time is right to consider whether a more flexible approach may be taken which extends capability without detracting from the safety or wellbeing of Traffic Officers (TO), members of the public, or other incident responders.

This report addresses the issue of variable crewing and in particular the feasibility of variable crewing.

This work has been carried out following the principles and methodology set out in the “Guide for the Design, Management and Delivery of Pilots and Trials on the Highways Agency Network”. This methodology is explained in greater detail in Section 2 of this report.

1.3 Definition of variable crewing

The term “variable crewing” can have many interpretations. For the purposes of this study, variable crewing includes the deployment of variable numbers of TOs within a patrol vehicle based on an assessment of need and prevailing conditions. Variable crewing implies that the numbers of TOs deployed in each vehicle are determined in a strategic way. The essence of the initiative is that the number can be varied in order to deliver the best possible service and may therefore change for example:

- from one time of day to another
- between patrol routes or RCC regions
- dependent on the weather.
There is likely to be a mix of single and dual crewed vehicles on the road at any one time, rather than a blanket switch to single crewing.

Nevertheless, a pre-requisite for the feasibility of variable crewing is that it is possible to operate single-crew patrols safely on the Network. At the time of writing, a test to determine whether a single-crew can operate safely is being designed.

In this report, variability of vehicle types or equipment are not considered, nor are combined TO/Incident Support Unit patrols.

### 1.4 Location and programme

This report also makes recommendations for possible locations for a Network Trial and the timing of any such trial.

### 2. Methodology

#### 2.1 “The Guide”


This report is the feasibility report for Stage 0 (The Guide, Section 3) in the development of a Network Trial for variable crewing of TO patrols.

Following Section 3 of The Guide, this report reviews relevant previous work on the subject (Section 3.1 – Literature review). The various aspects of the feasibility are then discussed under the following headings:

- Problem and concerns (Section 3.2)
- Previous experience (Section 3.3)
- Alternatives (Section 3.4)
- Impact Assessment (Section 3.5) – This section explores the likely effects on the current TOS and on the Highways Agency Network, including favourable effects
- Potential cost and benefits (Section 3.6)
- Potential pilot sites (Section 3.7)
- Preliminary programme (Section 3.8)
3. Discussion and Analysis

3.1 Literature review

This feasibility study intends to make best use of existing reports and studies. In particular, it acknowledges the following reports:

- Extending the TOS onto the APTR Network – PA Consulting Group (PAC), March 2007
- Review of Crewing Levels – Halcrow Report, April 2008
- Draft Single Crewed Traffic Officer Team Manager procedures – Highways Agency TOS Procedures Group 2008
- Traffic Officer Variable Crewing – Live Lane Framework Methodology Version 1 – User Perspective Ltd 2008
- Traffic Officer Variable Crewing – Live Lane Framework Methodology Version 2 – User Perspective Ltd 2009

3.1.1 Review of Crewing Levels

Since the introduction of the Highways Agency TOS in 2004, all patrol vehicles have been "double crewed". Reasons for this include:

- To enhance the safety of TOs whilst they went through their initial stages of on road familiarisation and accreditation
- In 2004, the majority of police motorway patrols were double crewed. Although the police have a different role to TOs as they also deal with criminality, it was reasonable to draw comparisons with the personal safety of their officers when managing traffic incidents
- During the early stages of TOS operation, experience was heavily weighted in favour of police. It was determined that double crewing TOS patrols would mitigate against any concerns the police might have that their attendance at incidents would in any way lessen standards of safety

Consequently, TOS procedures have been written on the basis that a minimum of one double crewed patrol should deal with each incident.

The Review of Crewing Levels (Halcrow and TRL, August 2008) was commissioned by the Highways Agency with the stated purpose:

"to review, assess and challenge the position that two Traffic Officers are required in each vehicle."
This work identified a number of issues (mostly related to health and safety and procedures) that would need to be resolved if single crews were to be used, however, the report’s conclusion states that:

“The key conclusion of this task is that single crewing of Traffic Officer Service vehicles is possible.”

3.1.2 User Perspective research

User Perspective is a specialist human factors consultancy being formally part of the School of Cognitive and Computing Sciences at the University of Sussex (1999-2005) where Dr. Martin Langham established the Human Factors group. After the school closed Dr. Langham established User Perspective Ltd.

User Perspective were commissioned to define a testing methodology in order to establish whether the risks to a single crew TO could be mitigated to the same extent as they can be for a dual crew (User Perspective, January 2009)

Their report dealt with various aspects of the scientific approach and the difficulties of devising an experiment to test risk as it relates to TOs. The final report (see Appendix D) concluded:

“Because it is unknown which particular combination of variables will arise at any particular time and place, any testing undertaken will be unlikely to deliver meaningful, reliable data which can be generalised across the HA”

and:

“Consequently, based on previous research and using our understanding and knowledge, User Perspective Ltd are recommending that there is not a viable and realistic way of studying lone or dual TO working on live lanes in order to provide valid, reliable and meaningful data for the test question”.

3.2 Problem and concerns

3.2.1 The ‘problem’

The Highways Agency intends to deliver greater benefits through the TOS. There is unlikely to be any further funding available for additional staff, therefore this will have to be achieved through improvements in efficiency of the service.

3.2.2 Proposed solution

There is anecdotal, rather than hard evidence from TOs and others that the TOS could better meet its objectives if a number of changes were made to the current ways of working. One solution that has been proposed to address this problem is the implementation of variable crewing practices.

Therefore, the aim of a Network Trial of variable crewing would be to determine whether or not this change could make a worthwhile improvement in efficiency of the service.
The way in which variable crewing is (or is not) introduced should be so as to enhance the TOS capability to meet its objectives. So a secondary objective of a Network Trial would be to provide knowledge and experience that would inform the planning of any full scale roll-out of variable crewing.

### Concerns

There are several concerns associated with the practice of variable crewing, as discussed below. These will need to be addressed as part of the planning process, before implementation of any Network Trial.

#### Personnel

Introducing variable crewing would be a significant change. The Highways Agency has already recognised the importance of engaging with all concerned, including staff unions at the earliest opportunity.

TOs involved in any test or Network Trial would need to be carefully selected to ensure that they have the necessary abilities, aptitude and willingness to be involved in them. This process itself would need to be carried out with sensitivity to ensure that staff are not alienated and to avoid creating a two-tier system where some TOs are perceived to have a higher status.

If these ‘soft’ personnel issues are not considered and dealt with carefully there may be a negative impact on staff morale, whatever the outcome of the test or Trial. Conversely, however, the opportunity to positively engage with staff in the development of the TOS has the potential to increase morale and staff ownership. In order to achieve this, any Trial must be genuinely a trial with the real possibility that the outcome is to maintain the status quo.

#### Collection and evaluation of data

User Perspective’s work highlighted some of the difficulties associated with gathering useful data from a test of single crewing. On the other hand, the Halcrow/TRL work shows that a successful interview methodology can be developed. It is expected that a combination of observation and interview would be used to gather data from a Network Trial. This process also provides an opportunity to positively engage with staff and increase morale if managed well.

#### Health & safety and procedural implications

These concerns are considered specifically in the report following the methodology of Work Instruction 2 which is included in Appendix C. A 5x5 risk matrix has been produced for the single crew test.

#### Physical resources

Whilst no additional TOs will be required in order to trial variable crewing, there will be a need for some physical resources to be procured.

- More vehicles will be needed in order to operate variable crews, because one of the aims is to be able to deploy more patrols at some times.
**Previous work has demonstrated that the equipment within the current TO vehicles may not be suitable for use by a single TO on patrol. Therefore, any vehicles that would be single-crewed as part of the trial would need to be modified.**

**Initially, the Trial would only be implemented on areas of the network that are already patrolled, therefore no additional outstations would be required. However, it is possible that in some locations the availability of space at outstations for storage and maintenance of additional vehicles may be an issue.**

### 3.3 Previous experience

#### 3.3.1 Sources of previous experience

The Highways Agency itself has no previous experience of variable crewing (other than Team Managers), however, a number of incident responders operate on the Highways Agency network or on similar roads both in the UK and abroad. These include the emergency services, vehicle recovery or breakdown operators, highways contractors and variants of the TOS from overseas. It will be important for the Highways Agency to draw upon and learn from others’ experience. However, with such diversity, it is important that the differences in the environment in which the various responders operate are also considered, as they may not be directly comparable. For example, the fire and ambulance services mostly respond to incidents on the Highways Agency network as part of a double or multiple crew and are protected at the scene by the TOS or police. Recovery operators on the other hand tend to work alone – issues such as how they handle communications while driving and work safely while away from their vehicle may help inform this study.

Researching too many other responders can take valuable time and potentially lead to a confused outcome. For the purposes of this feasibility study research has been limited to:

- TOS incident history study – build on Halcrow report incident history data
- TOS Procedures Team - procedures are currently being drafted to give guidance to Team Managers who already routinely patrol alone. These may be used as the basis for producing single TO procedures
- Highways Agency Health & Safety Team – they currently comment on new or revised procedures.
- Police – source a force which routinely adopts variable crewing on the Highways Agency network and seek their rationale and risk assessments for doing so - eg Greater Manchester Police routinely patrol motorways when single crewed but double crews too when appropriate
- Fleet managers – take advantage of their equipment and communication ergonomics experience for single crewed patrol vehicles
• Overseas experience – the Highways Agency enjoys an established relationship with the equivalent Dutch “TO” service. Their attitude towards deployment and patrol duties and the perceived reaction from the public are equally important as the actual mechanics of how appropriate crewing is determined.

3.3.2 The Dutch experience

The Dutch equivalent to the TOS, Rijkswaterstaat Weginspecteurs, routinely operate single-crewed vehicles. Dual crewing is rare and, in fact, in places is not officially permitted in order to maintain a greater number of patrols.

In the urban areas the density of patrol and incidents are similar to that around the ‘Birmingham Box’. There are no specific incidents that a single crew is not permitted to tackle alone. There is anecdotal evidence that the Weginspecteurs themselves would like to be able to use dual crews in certain circumstances.

There are some safety concerns associated with single crewing but safety records are awaited from Rijkswaterstaat Weginspecteurs. Anecdotal evidence suggests that the major issue is that of personal safety of Weginspecteurs. However, the Dutch situation is complicated by the fact contractors can also call their staff ‘Weginspecteurs’, and they have the same livery on their vehicles, and consequently the public do not understand the difference. This is not the case in the UK. It seems that most of the safety threat from the public is directed at contractors’ Weginspecteurs.

The Rijkswaterstaat Weginspecteurs in-vehicle technology is significantly different from that used by the TOS, but there are no specific problems related to the use of technology by a single crew.

3.4 Alternatives

3.4.1 Alternatives to variable crewing

A number of possible alternative means of increasing efficiency of the TOS without an increase in resources have been proposed. The main initiatives that have been introduced or are being considered to achieve this objective in a safe, orderly and managed way, include:

• Adopting an “RCC centric” approach so that all communications or requests from the emergency services, other responders or members of the public for services on any Highways Agency road come to one of its Regional Control Centres (RCCs)

• A review of the number, size and location of TOS outstations

• Co-locating Service Providers in RCCs

• Extending the Highways Agency’s use of the “Airwave” radio network to its MAC Incident Support Unit (ISU) operatives to enhance communications and their effectiveness when supporting the TOS to manage incidents
- A review of the potential for ISU operatives to take on additional responsibilities and a more proactive role in incident management
- Combined TO/Incident Support Unit crews, representing an integrated HA response to incidents, rather than solely a TOS response
- Reviews of intelligent deployment of Traffic Officers (although the precise content of these reviews are currently not known).

3.4.2 Alternative objectives of a Network Trial

If variable crewing is to be implemented, a Network Trial would necessarily be part of the implementation process, the principles and practice of which are defined by “The Guide”. A Network Trial of variable crewing could take one of three different approaches representing increasing levels of detail:

- Is it practicable for the TOS to adopt variable crewing?
- In addition, verify the conclusions of the Halcrow/TRL report
- In addition, consider how variable crewing can meet future TOS needs.

The first level is the fundamental question that a Network Trial would be required to answer. The answer to this question would have to be demonstrated to be “yes” before proceeding to meet the subsequent objectives.

1) Is it practicable for the TOS to adopt variable crewing?

In light of other experience, subject to meeting existing Highways Agency and TOS safety criteria the answer is likely to be “yes”. This presumption is based on the many other responders who already practice variable, or in some cases solely single crewed patrols.

An advantage of tackling this question alone is that the study should be completed in a relatively short time. It can then be held in abeyance until TOS strategy including future expansion onto more of its network is in place and other enablers such as changes to shift patterns to meet them have been determined.

2) Verify the conclusions of the Halcrow/TRL report

Subject to the answer to the first question being yes, the study could go on to consider only those incident types which Halcrow identified as being suitable for lone TOs to deal with. They are:

- Attending a hard shoulder breakdown
- Carrying out welfare checks
- “Baby sitting” abandoned vehicles
- Acting as back up / advance warning at incident scene

This work could reasonably be expected to be completed in the medium term as it will look at a small number of possible scenarios and reflects a very risk averse
approach to incident management, with which the Highways Agency is likely to be comfortable.

If this is the preferred option it may be helpful to first review the basis on which the scenarios were selected. For example, since publishing the report the Highways Agency has been given statutory powers to recover or remove abandoned vehicles from its network. Therefore, there is now a persuasive argument that “baby-sitting” abandoned vehicles should not be standard practice: if an abandoned vehicle is in a dangerous position, rather than “baby-sit” it removal should be arranged immediately; conversely, if it is not in a dangerous position it may be difficult to justify putting TOs at risk to care for the empty vehicle.

3) Consider how variable crewing can meet future TOS needs

Again, the first question has to be answered first. Beyond that however, subject to the Highways Agency being satisfied that its safety criteria can be met there are potentially many ways to get more from variable crewing. Options for research include:

- Daytime only, peak demand, special events or 24x7 patrols – National and Regional Intelligence Unit data can help inform this work
- Identifying appropriate patrol areas - for example, only where there is CCTV coverage or where historically there is greatest demand
- Patrolling or responding to incidents on Managed Motorway sections only
- Relieving or assisting crews who are already at incidents
- Benefits and disadvantages of adopting a fire or ambulance “respond only when called” approach for single crewed vehicles
- Adopting a more proactive asset management approach to network patrolling such as that used in the Netherlands by Rijkswaterstaat Weginspecteurs
- Using motorcycles for early access to scene and initial assessment of incident
- How to make the most of all Highways Agency resources, including potentially enhanced ISUs
- The interaction between response and clearance times using variable crews is a complex issue which will not be fully understood without conducting a trial. The effect on response and clearance times will depend on whether the number of vehicles or the number of TOs on a particular patch remains constant.

Some of these variables go beyond the scope of what is proposed for the purposes of this feasibility report (refer to Section 1.3), however if a Network Trial proved to be successful it may be possible to extend its scope to research some of the other possible variables identified above.
Of the options this would take the longest time to complete and would be likely to be the most challenging too. However the potential benefits are greater and may enable the TOS to expand onto more of its network sooner than may otherwise be possible.

This option would also need a more comprehensive review and revision of on-road procedures than would the other options.

3.5 Impact Assessment

Table 3.1 below compares the possible impacts of implementing variable crewing.

<table>
<thead>
<tr>
<th>Aspect</th>
<th>Possible benefits of variable crewing</th>
<th>Possible disadvantages of variable crewing</th>
</tr>
</thead>
</table>
| Finance                       | • If the number of patrols can be increased then more incidents will be responded to more quickly and therefore there will potentially be less delay. | • Increased costs for more vehicles, ergonomic equipment changes to fleet, additional fuel, servicing and other life time costs. This may be an issue as there is little scope for additional funding.  
  • Incident clearance times may be extended with a single person crew. |
| Health and safety of single crews | • Opportunity to review and update operating procedures.  
  • TOs on single-crew patrols would need to develop their skills in dynamic risk assessment and independent decision making. | • Need to ensure that single crews are not exposed to hazards and risk that they would not be able to safely manage as a single crew. This is a pre-requisite to implementing a Trial (Section 1.3)  
  • Single crew TOs may be exposed to unfamiliar situations. |
| Personnel issues              | • Greater job satisfaction for some TOs  
  • Opportunity to positively engage with staff to develop the Service. | • Trade Union Side (TUS) and individual TO disaffection  
  • Potential loss of some TOs from the service (this might be minimised by adopting an initial or permanent volunteer only approach)  
  • Division into two classes of TO – those who “single crew” and those who can’t (or won’t) |
<table>
<thead>
<tr>
<th>Aspect</th>
<th>Possible benefits of variable crewing</th>
<th>Possible disadvantages of variable crewing</th>
</tr>
</thead>
<tbody>
<tr>
<td>Public perception</td>
<td>• Enhanced perception of TOS with the public, partners and stakeholders due to improvements in the level of service.</td>
<td>• Public perception could be damaged if TOs are seen to be unable to deal with some incidents as a single crew. This issue would need to be carefully considered in any revision of procedures.</td>
</tr>
<tr>
<td>Level of service delivery</td>
<td>• Greater operational flexibility to meet existing and new TOS objectives</td>
<td>• Risks that variable crewing will be adopted in isolation from other enablers such as shift reviews and ultimately fail to meet strategic objectives/KPI.</td>
</tr>
<tr>
<td></td>
<td>• Speedier expansion of TOS onto more of the Highways Agency strategic road network</td>
<td>• Delay to other procedures due to diverting TOS Procedures Team from producing them to meet the demands of variable crew responses to incidents</td>
</tr>
<tr>
<td></td>
<td>• Improved incident response times (but not necessarily clearance times, see note 1)</td>
<td>• Abstraction of staff for training</td>
</tr>
<tr>
<td></td>
<td>• More proactive “Weginspecteur” patrol strategy</td>
<td>• Delay to other training programmes by finding time to train for variable crewing</td>
</tr>
<tr>
<td></td>
<td>• More resources available at times of peak demand (together with shift pattern changes)</td>
<td></td>
</tr>
<tr>
<td>Physical resources</td>
<td></td>
<td>• Greater numbers of patrols may lead to greater or unacceptable demands on control room operators and use of “Airwave” communications</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• In the longer term, if there were to be a national roll-out of variable crewing, new, extended or replacement outstations may be needed.</td>
</tr>
<tr>
<td>Environment</td>
<td>• Reduced congestion and therefore reduced environmental impacts of congestion.</td>
<td>• Increase in the direct carbon footprint of the TO Service due to increased fuel consumption.</td>
</tr>
<tr>
<td></td>
<td>• Through better management of the existing network, reduction in the need for new construction.</td>
<td></td>
</tr>
<tr>
<td>Aspect</td>
<td>Possible benefits of variable crewing</td>
<td>Possible disadvantages of variable crewing</td>
</tr>
<tr>
<td>-------------------------------</td>
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<td>--------------------------------------------</td>
</tr>
</tbody>
</table>

Notes:
1) The interaction between response and clearance times using variable crews is a complex issue which will not be fully understood without conducting a trial. The effect on response and clearance times will depend on whether the number of vehicles or the number of TOs on a particular patch remains constant.

Table 3.1 – Comparison of possible benefits and disadvantages

Table 3.2 compares the possible impacts of retaining the status quo.

<table>
<thead>
<tr>
<th>Aspect</th>
<th>Possible benefits of retaining the status quo</th>
<th>Possible disadvantages of retaining the status quo</th>
</tr>
</thead>
<tbody>
<tr>
<td>Finance</td>
<td>• No additional money required for additional vehicles, running costs or outstations</td>
<td></td>
</tr>
</tbody>
</table>
| Personnel issues             | • Stability of working practices for TOs  
• No need to address working practice issues (especially TO safety) with TUS  
• Less change management issues to address | • The longer that double crewing only practices continue, the more challenging it will be to change them in the future |
| Level of service delivery    | • Procedures Team can concentrate on their current programme | • Shift pattern and other changes alone might not provide sufficient efficiency gains to allow expansion onto more of the network  
• Standing with Government and key strategic partners such as Ministers and police may be damaged in that expansion onto more of the network may be delayed in the short term |

Table 3.2 – Comparison of possible benefits and disadvantages of retaining the status quo
3.6 Potential cost and benefits

The proposed impact to both TO patrol numbers and to actual TO staff numbers under variable crewing are shown in Figure 3.1 and Figure 3.2 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 3.1 – Traffic Officer Patrols, Existing Situation and with Variable Crews](image1)

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).

The cost benefit analysis has been considered in detail in Atkins’ variable Crewing Study Business Case included in Appendix D.
3.7 Potential pilot sites

A Network Trial would be implemented over an entire RCC region and would be managed by the Regional Operations Manager (ROM) for that region.

A Network Trial should be carried out in the region in which it is likely to deliver the greatest benefits, as this will demonstrate that variable crewing is (or is not) worth implementing in at least one region. If successful, there could then be a phased roll-out to the whole Network on a region by region basis, leaving the regions where the benefits would be less until last.

This methodology contrasts with that for the single crewing test (see Section 1.3), which will need to be carried out in a range of conditions in order to give confidence that its findings are applicable to the whole Network.

The greatest benefit will be derived in the region where the increased flexibility of variable crewing will enable the most incidents to be responded to and cleared more quickly (thus improving safety and reducing congestion). This is likely to be a region which has a high proportion of incidents which can be responded to by a single TO. Based on Figure 3.3 (Figure 2 of the Halcrow/TRL report, reproduced below), the region with the greatest proportion of incidents that could be attended by a single TO is likely to be either the North West or West Midlands.

Notwithstanding this, it will be important that a Trial is carried out in a region which is prepared to take ownership of it. Therefore, the first stage in determining the region for a Trial should be to investigate which ROMs would be most able (or willing) to support it.

There would be a benefit of choosing the West Midlands for a Network Trial, which is that Active Traffic Management (ATM) is also in operation. There would therefore be the possibility of investigating how variable crewing and ATM could interact with each other. In the North West, the implementation of variable crewing would have the benefit of releasing staff to give potentially high coverage of patrols on APTR in this region.

It is therefore recommended that the Network Trial be implemented in the West Midlands or the North West.
3.8 Preliminary programme

If approval to proceed with a Network Trial of variable crewing was to be given on the 1st of August 2009, it is anticipated that the test of single crewing would not proceed until winter ’09, with the Trial itself commencing April ’10. An indicative programme for the implementation of the Trial would be as shown in Figure 3.4. This programme would also be subject to agreement by the ROM in the region where the Trial would be carried out. This agreement would be part of the mobilisation phase.

Figure 3.4 – Indicative programme for a Network Trial

The mobilisation phase would include the following actions:

- Define the scope of the trial including success criteria
- Task analysis to either determine which incidents can or cannot be dealt with by single/double crew or propose generic guidance to consider in dynamic risk assessment for dealing with any incident
- Consultation with staff associations
• Research as detailed in the section of previous experience commensurate with the scope of the task
• Production of trial procedures and assessment/review methodology
• Independent review of proposed trial methodology
• Ethical review of trial methodology
• Health & Safety review of trial methodology
• Procedure Team and User Group to assess need for provisional procedures
• TO participant selection criteria
• Selection of trial site(s)
• Early trials to be conducted in sterile environment if possible eg: Fire College
• Review findings before sanctioning live trial
• Consider psychological effects of lone working in a safety critical role
• Define vehicle ergonomics to suit double and single crew operation
• Communication guidance for single crew – routine and emergency
• Procedures to be reviewed and amended before variable crewing is adopted
• Once the role of a single TO is known, a complete role specification and selection procedure to be produced.

4. Conclusions and Recommendations

The two main pieces of research reviewed in Section 3.1 clearly have opposing conclusions.

The Halcrow/TRL work concludes that single crewing would be possible whereas the view of User Perspective is that any test of single crewing would be unlikely to be meaningful but that research would be likely to show that it cannot be operated safely.

Having considered both views, it seems somewhat premature to discount any sort of testing of single (and hence variable) crewing on the basis that it cannot be precisely measured in an experiment. In any case, it is questionable whether risk can be measured; risk can certainly be assessed, but it is always a subjective judgement. A trial is different from an experiment – it would provide knowledge and experience which will not be available to the Highways Agency if no trial is carried out.

Of course, the risks involved in undertaking such a trial will need to be assessed, and those involved in any trial would need to be skilful in dynamic risk assessment too. However, the knowledge and experience gained through a trial will enable a more useful and meaningful risk assessment for single/variable crewing to be carried out.
The experience of other incident responders, most notably the Rijkswaterstaat Weginspecteurs in the Netherlands supports the Halcrow/TRL view that single crewing is likely to be possible.

The impact assessment shows that the implementation of a Network Trial could have both positive and negative effects. However, it is possible to mitigate all of the potential negative effects through good management of the Trial.

As stated above, a pre-requisite for the feasibility of variable crewing is that it is possible to operate single-crew patrols safely on the Network. At the time of writing, a test to determine whether a single-crew can operate safely is being designed. It is recommended that this test be undertaken by Network Operations.

Subject to a positive outcome from this test, it is recommended that approval is given for a Network Trial of variable crewing to go ahead, by completion and signature of the PT1 form provided in Appendix B. It is recommended that this Network Trial should be carried out in the West Midlands or North West region. The scope of the trial would be finalised during the mobilisation phase. However, it is recommended that initially the study would aim to determine if it is practicable for the TOS to operate variable crewing, and also to verify the findings of the Halcrow/TRL report (as discussed in Section 3.4.2).
Appendix A

Business Case
Appendix B
PT1 Form
Appendix C
Test Health and Safety Assessment
Appendix D
User Perspective Reports