

**HIGHWAYS AGENCY**  
**REPORT TO SECRETARY OF STATE FOR TRANSPORT**  
**IN RESPONSE TO**  
**WINTER RESILIENCE REVIEW**

Graham Dalton  
Chief Executive  
March 2011

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## 1. Executive Summary

Intense snow fall on 30 November 2010 caused disruption to all roads in south east London and North Kent. Traffic incidents caused congestion, including a number of large goods vehicles losing traction and getting stuck on local roads and on motorway junctions with steep gradients. Minor collisions in poor weather conditions then caused traffic to slow or stop

Delays continued into the night on adjoining sections of M25 at Dartford Crossing and in the Reigate area. Access to the maintenance depot at Swanley was blocked, preventing spreaders and ploughs from getting onto the M25 to treat and clear in a timely manner.

The Highways Agency's basic systems and processes, including contractual arrangements for treating the road and clearing snow are sound. But there were shortcomings in handling the particular incident, and in particular in co-ordination of clearance.

The Highways Agency took immediate action to address operational shortcomings, and the Agency and its contractors managed the network effectively throughout the very severe weather in December 2010.

There are opportunities to improve the effectiveness of communications to road users, and to make use of the rapidly developing mobile technology that gives road users access to sources for information.

There is a need for a public understanding that during periods of heavy snow fall traffic movement will be impeded, and work needs to be done with freight industry bodies and operators of large goods vehicles to reduce the number of the single incidents that have a disproportionate impact on the wider network. In addition, there is a need for messages to road users to say that HA and other road operators need time and clear access to clear snow – which simply cannot be done on heavily congested roads.

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## 2. Introduction

- 2.1 An unusually early period of severe winter weather at the end of November 2010 caused a severe impact on transport networks across England. In particular, snow fall during the day in south east England on Tuesday 30 November led to severe disruption on the M25 motorway and surrounding roads, to railway services in the south and south east, and to closure of Gatwick airport.
- 2.2 Immediately following this event, the Secretary of State for Transport asked David Quarmby CBE to undertake an urgent audit of how well the highway authorities and transport operators in England had been coping with the unexpectedly early and severe spell of winter weather. This audit was to have regard to the Review into winter resilience carried out by the panel that David Quarmby led earlier in 2010 and to the recommendations of that Review. The report of this audit was published on 21 December.
- 2.3 David Quarmby made 8 recommendations in this latest report, of which one related to the strategic road network and the responsibilities of the Highways Agency:
- “Recommendation 4: That the Highways Agency, in collaboration with other agencies as appropriate, should demonstrate the value and effectiveness of their processes of review, analysis and learning lessons after major incidents, by preparing such a report for the Transport Secretary of the major incident at the M25 Junction 3 on 30<sup>th</sup> November 2010”*
- 2.4 This document has been prepared in response to that recommendation, and sets out how the Highways Agency has responded to the weather related disruption at Junction 3 and to the wider M25 on 30 November.

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### **3. Summary of Weather Event on 30 November 2010, and the subsequent disruption to road traffic on the M25 and surrounding roads<sup>1</sup>**

- 3.1 Met Office Weather forecasts on 22 November predicted a risk of significant snow across Southern UK during the week commencing 29 November. This was followed by a specific advisory notice from the Met Office representative based in the Highways Agency National Traffic Control Centre on the morning of 29 November. This advisory notice forecast widespread snow mainly in Kent and East Sussex, and was circulated to the HA's maintenance contractors in the south and south east.
- 3.2 In addition the HA press office issued a notice to media on 29 November warning of snow forecast in the South East, East and London. This advised drivers to check the forecast and road conditions before travelling, allow extra time for their journeys and delay their journeys if the weather became severe. It also advised them to adjust their driving to suit the conditions.
- 3.3 Salt treatments were applied during the afternoon of 29 November, during the late evening, and again starting at 03:00 on 30 November in anticipation of freezing and snow conditions.
- 3.4 Light snow overnight and early on 30 November resulted in a slow but steady journey to work during the morning peak. Two traffic incidents occurred during the morning, both of which were typical events, but caused some congestion early in the day:
- At 07:34 lanes 2 and 3 of the M20 were closed eastbound at Junction 7 when a Large Goods Vehicle (LGV) and a car collided;
  - At 07:58 lanes 2 and 3 of the M25 were closed between Junctions 4 and 3 after a single Large Goods Vehicle (LGV) struck the central reservation barrier;
- 3.5 Snow became heavier in mid-morning on 30 November and persisted for most of the day and evening, affecting Essex and Kent around the Thames Estuary and the North Downs in Kent and East Surrey. At the same time snow in the Pas de Calais region affected roads and rail services in northern France, and in turn led to reduced capacity on Eurotunnel freight services from Folkestone and on cross channel ferry routes.
- 3.6 As the snow became heavier, traffic slowed on the M25 between junctions 1 and 4 and on the two major radial routes - A2/M2 and A20/M20. The snow then moved slowly westwards leading to difficult driving conditions between M25 junctions 6 and 9.
- 3.7 The snowfall was of particularly high intensity and was deposited in a short period of time over a relatively small area. A heavy fall means that passing traffic is less effective at mixing the snow with salt on the road surface, and

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<sup>1</sup> Annex A shows a map of the M25 and adjoining roads

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snow can then settle on the treated road. This in turn puts greater reliance on snow ploughs for clearance.

- 3.8 There were significant issues off the Motorways and Trunk Roads in the area. Falling snow caused severe traffic congestion, which in turn caused traffic to queue back onto the M25, A2 and A20 as it waited to exit the main routes onto local roads. This was particularly evident at junctions 2, 3 and 4 of the M25. In addition, an incident on local roads in Swanley and on the London bound A20 – part of the TfL network – caused congestion back onto the Junction 3 interchange. This junction was effectively gridlocked from about 11.00 am.
- 3.9 Local traffic volume in south east London was high from late morning as drivers attempted to return home early.
- 3.10 At some motorway junctions the significant gradients on slip roads, combined with wet road surfaces and a thin layer of settled snow, meant that some LGVs were unable to make progress and came to a halt. This in turn stopped other traffic. This was a particular issue at Junctions 2 and 3 of the M25 where direct links enable traffic to avoid the junction roundabout, but with link roads that have relatively steep gradients and lower traffic flows.
- 3.11 The congestion in the interchange at junction 3 of the M25, and the queues on all approaches to this junction, effectively prevented access to and egress from the Highways Agency Contractor's maintenance depot at Swanley after 11:00hrs. This depot is the operational base for the fleet of salt spreader / snow plough vehicles for the M25 and connected roads from just north of the Dartford Crossing to Leatherhead in Surrey. Kent County Council has an adjacent depot at this location, and their fleet of spreaders is understood to have been similarly affected.
- 3.12 The exit slips at M25 J3 were closed from approximately 15:00 to 20:00 to enable dedicated resources to salt/plough the roundabout and to move stranded vehicles.
- 3.13 Meanwhile, whilst efforts of contractors and the Agency's traffic management crews were focussed on the route from Dartford Crossing to junctions 4 and 5, heavy falling snow was causing slow moving traffic and congestion on the southerly section of the M25 – essentially between junction 5 at Sevenoaks and junction 9 at Leatherhead. The M25 here runs along the foot of the North Downs, and the section at junction 8 for Reigate has steep gradients both on the motorway, on the long exit slip roads, and on the adjacent local roads. Severe congestion here increased during the course of the evening of 30 November and a significant number of LGVs parked on the hard shoulder. In the main this is believed to be because drivers had reached the limit of their permitted driving hours, and because they were aware that they would not be able to reach their planned destinations on other local roads. It is likely that some also stopped here to avoid Operation Stack, implemented by Kent Police in response to delays on channel ferry and Eurotunnel freight movements.

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- 3.14 By late evening on 30 November traffic was moving slowly on the east section of the M25. However the very low temperatures overnight meant that the Agency's contractor, Connect Plus, closed the QE2 Bridge at the Dartford crossing in order to clear lying snow and to apply de-icing solution. Whilst planned closure of the bridge and use of the two tunnels for north and south bound traffic is a routine operation, the continuing heavy congestion meant that the contraflow arrangements took a long time to set up. The bridge then remained closed for most of the night, which combined with a series of minor road traffic collisions, severely hampered dispersal of congested traffic.
- 3.15 There were further falls of snow in the early hours of 1 December. However, by this time the fleet of spreaders and snow ploughs was effective and, helped by the lower than usual volume of traffic during the morning peak hours, the M25 and adjoining roads operated relatively well.

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## 4. Process for Review and Analysis

- 4.1 The Highways Agency works in close co-operation with police forces, fire and rescue services and with the ambulance services to undertake contingency planning and to respond to disruptive incidents. Highways Agency was identified as a Category 2 Responder in the Civil Contingencies Act 2004, and has a National Crisis Management Plan. This plan was last reviewed in July 2010 following lessons from the severe salt shortage of Winter 2009/10. After all significant incidents the Agency undertakes its own debrief discussions immediately after the event (hot debrief) and some time later (cold debrief) after a period of reflection. Cold debrief may be within the Agency, or in conjunction with other responders depending on the nature of the particular incident.
- 4.2 Review and analysis covered the initial disruption around M25 junction 3, and the wider operation of the M25 and adjacent roads. However the following sets out the review and analysis that focussed on the incident at junction 3.
- 4.3 Initial or hot debrief:
- Director level performance review meeting between HA and maintenance contractor Connect Plus – 2 December;
  - HA internal incident review – Traffic Management and Network Delivery 3 December 2010
  - HA & Kent Police review – part of the Kent Multi-Agency Gold Strategic Coordination Group debrief on 10 January.
  - Maintenance contractor ‘Severe weather desk’ review 13 December 2010 – HA and Connect Plus.
- 4.4 Follow up or cold debrief:
- Highways Agency, Maintenance Contractors, Kent County Council, TfL and Kent Police – 20 January 2011
  - Chief Executive, Highways Agency formal meetings with Connect Plus Chief Executive, and Operations Director – 25 January and with Connect Plus Chairman and Chief Executive - 21 February 2011;
  - Review of HA information services and use of media to support messages and information – 16 February 2011
- 4.5 In addition the Chief Executive of the Highways Agency was concerned to address apparent shortcomings in information flow for operational purposes and to road users, and to ensure that Agency staff had fully considered the management of traffic and performance of maintenance contractors through the early December severe weather. On 3 December he called a full review by all directors and key operational staff, culminating in a full workshop session held on 6 January 2011.
- 4.6 The Agency will hold a high level review of winter season operation and network performance at its April 2011 Board meeting. This will assess overall

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performance during the full winter period and confirm actions and any investment required to be in place before next winter.

- 4.7 The severe weather affected much of Western Europe during December 2011, with other national highway authority networks severely affected. The Highways Agency has agreed to host seminars with the Dutch, French and Belgian authorities in early summer 2011 in order to compare performance and to share lessons learned.

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## 5. Conclusions from Internal Reviews

### *Organisational Capability*

- 5.1 The Highways Agency has the systems, procedures and contracts in place that underpin the ability to offer a good level of service to road users in all weather conditions;
- The Highways Agency has an appropriate National Crisis Management Plan that meets with the requirements of the Civil Contingencies Act and supports the Agency's role as a Category 2 Responder. That plan has been maintained through regular revision, the most recent of which was in July 2010;
  - The Agency has good quality weather forecasting services available and routinely used, including the presence of a Met Office forecaster in the Agency's national traffic control centre throughout the winter months;
  - The Highways Agency has a routine and winter service code and network management manual that forms the core specification for all the Agency's maintenance contracts. These documents are technically and operationally effective, and have been updated on a regular basis to reflect technical developments and changing service level expectation. This specification applies to the M25 contract held by Connect Plus, and has been applied to older PFI contracts through contract variation in order to achieve a consistent specification across the Highways Agency's motorway and trunk road network;
  - The HA winter service fleet has been completely replaced in the last 3 years, and the new vehicles have proven to be effective in operation and efficient in use of salt. As a PFI contractor, Connect Plus owns and operates its own vehicles, though these are of a similar type and age as the Agency's owned fleet;
  - Connect Plus' operational procedures can be effective, as was evident during the subsequent snowfall days in December 2010; and
  - Through its regional and national control centres, Highways Agency is able to keep a good overview of traffic and operating conditions on the network, and to support broadcasters with actual traffic information for traffic broadcasts.
- 5.2 Nevertheless, the localised heavy snowfall on the most intensively used part of the motorway network on 30 November highlighted weaknesses in maintenance operations (snow clearance), and highlighted the need to exploit developing technology to improve communication of road conditions to users. The shortcomings identified were:

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### *Maintenance of the Highway*

- Established routine incident command structures were not initiated and escalated in time, with the consequence that there was insufficient co-ordinated or strategic action to clear individual sections or incidents in a logical order. In particular the enhanced operational management arrangements that the contractor is obliged to put into place in snow conditions – the snow desk – were not initiated in a timely manner for the M25 contract area. This contributed to a slow escalation once traffic conditions deteriorated, and to an uncoordinated response;
- There were shortcomings in the resilience of salt spreading and ploughing vehicles, with a concentration of the fleet in one depot at Swanley and a vulnerability to severe congestion on access routes between the depot and the motorway. Whilst there is no record of such problems at this depot in the past, the vulnerability introduced by total reliance on a single location had not been identified or mitigated. Both Kent County Council and HA depots were similarly affected;
- Clearance of snow and spreading routes are optimised for spreader cycle time and efficiency in use of salt for routine or precautionary treatment in frost and icy conditions, rather than prioritising locations where falling snow may settle and with greatest risk of LGVs losing traction;
- Co-ordination between different operations, and in particular between Dartford Crossing control room and the Regional and Infrastructure control centres was poor, with actions by one centre impacting on efforts by others to clear backlog traffic;
- Heavy traffic or congestion prevents free movement for spreading vehicles to treat the network. For routine spreading, treatment runs can take place outside peak traffic hours. However, when snow is falling, repeated treatment is necessary. But snow fall slows traffic which in turn exacerbates congestion, and then impedes progress of spreader vehicles – triggering a vicious circle of deteriorating conditions. The only real solution to this problem is active encouragement to road users to avoid affected areas or not to travel during and immediately after snowfall. This may be unpopular or unpalatable, with a perception amongst users that this advice may be given too freely or too often;

### *Management of Traffic and Driving Behaviour*

- Strategic electronic Variable Message Signs (VMS) were not set as early as they might have been. In part, this is because operational procedures are geared around managing immediate incidents that necessitate closure of a road, which in turn triggers a notification to the national traffic control centre that oversees strategic route sign setting. On 30 November, however, the impact of snowfall was severe congestion on a part of the network that already suffers from congestion and delay on a regular basis,

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and thus there was no immediate trigger to prompt that strategic traffic management function in a timely manner;

- Large Goods Vehicles by their nature are more likely than small vehicles to lose adhesion on a slippery road surface, and once immobile they impose a more substantial and difficult to move obstruction;
- Neither HA nor ACPO have a clear protocol for handling LGVs at times of very severe congestion. LGV drivers should know that they are permitted to exceed driving hours limits in order to reach a safe and legal stopping place. But there is no commonly understood protocol for occasions when drivers stop on the hard shoulder because authorised parking spaces are congested or they will be unable to reach their destination because of snow on local roads away from the motorway
- Coordination with adjacent operators, notably Transport for London and its traffic control centre, was poor. Liaison and escalation procedures between the adjacent highways authorities (TfL, HA and Kent CC) are not properly embedded in routine operations;
- Neither HA nor Connect Plus were effective in escalating knowledge of a rapidly deteriorating condition. In part this is because Connect Plus' snow desk was not opened sufficiently early, and in part because routine incident response procedures were followed for the junction 3 area, whereas consequential congestion and weather related incidents over a wider area meant that a series of routine incidents actually combined into one major event. It is questionable whether earlier escalation would have made much difference on road during the day, but it would certainly have facilitated much earlier co-ordinated action to disperse affected traffic, and would have enabled greater use of strategic signs and traffic broadcasting to deter new traffic from entering the already congested areas.

#### *Communication with Road Users*

- Variable message signs were used to give information on traffic conditions and incidents. Whilst these were used with good effect in places, such as directing traffic from the channel ports to avoid the Dartford Crossing, a policy that constrains messages to a specific predetermined list meant that information was not actually as clear as it should have been. To reduce the number of cars and freight vehicles getting caught in the congestion, and thus to ease the process of clearance, "Long Delays" is simply not sufficient to prompt drivers to divert to avoid the area altogether;
- The use of handheld mobile telephones is illegal whilst driving, and current policy presumes against use of personal mobile telephone for communication. Moreover, traffic information systems and polices do not reflect the very recent and widespread adoption of smart phone technology and social networking systems for accessing information.

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## 6. Application of Lessons Learned

6.1 After 30 November and the hot debrief sessions, HA took a number of immediate actions:

- Connect Plus and the Highways Agency's contract management staff reviewed detailed arrangements for severe weather maintenance operations during snow, and instigated more rigorous management and supervision arrangements through the mandatory snow desk process. This operated better during snow fall in later parts of that week, and on 18/19 December when there was further heavy snow fall.
- A fully revised reporting format was developed giving a summary of conditions and incidents across the HA network using a strict reporting template. Prepared and issued from the HA's National Traffic Control Centre, this Network Stress Report is prepared and circulated at 2 to 3 hour intervals, and presents a clear and up to date commentary on current incidents on the network. This reporting system was used during the severe weather from 17 December onwards, and provided HA staff, contractors' staff, DfT staff and ministerial advisors with a clear and concise accurate summary – a single version of the truth. To improve co-ordination between transport authorities, there is merit in making this report routinely available to other operators' centres, including TfL and possibly principal airports and other transport hubs;
- The messages for media reports were reinforced, with an emphasis on checking conditions prior to travel, and urging drivers to adapt their driving to reflect the adverse weather conditions. As the severe low temperatures continued, this advice was extended to warn of the reduced efficacy of salt in preventing icing in extremely low temperatures.
- The Agency's Interactive Voice Response (IVR) telephone service (0870 660 115) has seen declining usage as customers switched to 'smartphone' technology such as the HA and RAC iPhone Apps and mobile websites. As a result this service was due to terminate on 4 January 2011. However, usage increased during the severe weather periods and the termination was postponed until 31 March 2011. After that date calls to the 0870 number will be directed to the Agency's HA Information Line contact centre.

6.2 Further actions have been identified and will be implemented over the course of summer 2011 in readiness for the next winter season:

- Review salting routes in falling snow to ensure that vulnerable sections or junctions are prioritised. Each contractor will undertake its own review, and will consider the need for prior deployment of spreaders, ploughs or other resources to critical locations in anticipation of snow fall;
- Review diversionary route arrangements, to reflect that diversion routes planned for closure of a motorway or trunk road following a normal traffic

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incident are probably not effective during periods of severe weather when the diversionary route is likely to be at least as badly affected;

- Mitigation plans to be assessed for all maintenance depots to identify measures to be taken in the event of severe congestion impeding access between depot and HA controlled network. This might lead plans for traffic officers to prioritise clearing gridlocked traffic, or prior placing of winter fleet vehicles at strategic out stations;
- Severe weather escalation procedures to be reviewed and both contractor and HA staff familiarisation undertaken on a regular basis;
- Processes for setting strategic traffic information signs and traffic bulletins should be reviewed to ensure that slowly developing or rising tide type incidents are identified promptly, and that messages to road users are clear enough to inform and to lead to drivers then taking appropriate action;
- HA Regional Directors and Regional Operations Managers should refresh links with other highway authorities and with Police forces in their areas, and should consider whether documented protocols for collaborative working will improve the consistency of service to road users delivered through the respective public bodies;
- Work with freight operator industry bodies to address vehicle preparation and driver skills in unusual severe weather, to tackle poor driver behaviour and identify effective channels for information and guidance;

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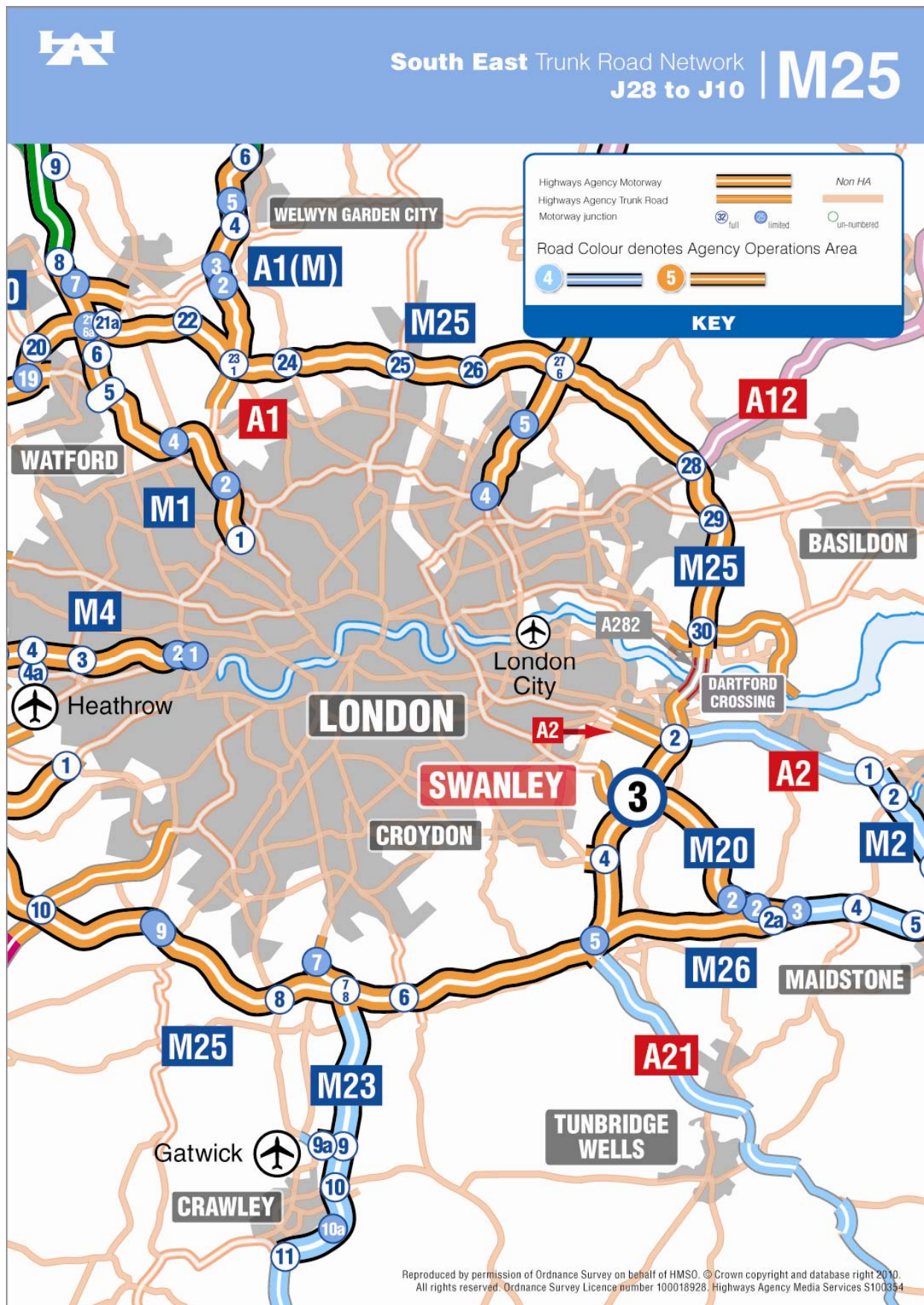
## 7. Recommendations for Further Action

7.1 From the lessons learned during the severe weather in Kent on 30 November, and across England throughout December, we have identified some additional aspects for HA to follow up in conjunction with Department for Transport and with other industry bodies:

- A wider awareness programme to create a public expectation that falling snow will cause some disruption to travel, and that highway maintenance operators need space to clear the road and treat surfaces. This change in public expectation would be valuable for all transport modes;
- Consideration is needed of how best to reduce the numbers of LGVs travelling during and immediately after heavy snow falls, and whether to bar such vehicles from the most severe gradients on slip and access roads and impose mandatory diversions. Any such measures might be developed on the established systems of high wind warnings, where the economic impact of restrictions is balanced against the consequences to all road users of incidents and associated congestion;
- Consideration should be given by HA and ACPO to developing and publishing guidelines on management of LGV traffic during severe disruption, including advice on application of drivers hours legislation and use of hard shoulder where that is present;
- HA with other operators should assess how to work with radio broadcasters to ensure accurate and timely traffic information is broadcast regularly, and road users are directed towards those broadcasts for information; and
- Policy on disseminating traffic information should be updated to reflect the rapid and widespread adoption of smart phone technology and social networking systems. This policy review should continue to balance the aim of widespread dissemination of information against compliance with legal restrictions on use of mobile telephones whilst driving and support of wider road safety objectives

Graham Dalton  
March 2011

## Annex A – Location Map



## Annex B – Traffic Management and Maintenance Operations Capability

Summary of Operations and Maintenance control centres, depots and vehicles for winter service maintenance and traffic management in South East area

