

Transport for London
Winter Service Review
Weather Information Services
October 2010

Halcrow Group Limited

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Transport for London

Winter Service Review

Weather Service

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1 Executive Summary

1.1 Executive Summary

The weather services in London appear to be generally fit for purpose, with some authorities having modern weather stations and systems providing quality data for decision making and monitoring. There are other authorities who simply rely on BBC television for their forecasting details, having no access to a Road Weather Information System (RWIS) type system. Having a standard level of data from a RWIS should be a minimum aim for London to demonstrate a tactical and strategic overview regarding decision making and monitoring.

By not having access to RWIS it would appear that some London boroughs fall short in the quality of information which is best practice across the country. There also appears to be a lack of tactical and strategic verification regarding the decision making and monitoring undertaken across London which if place would drive efficiencies and bring a joined up approach to winter services.

The lack of a robust pan-London RWIS represents a missed opportunity to achieve efficiency savings and improvement in the winter service for London.

1.2 Recommendations

The recommendations are divided into those that provide a clear enough benefit to be implemented immediately and potential improvements that need further investigation before progressing. All of these recommendations will bring London more in line with other strategic agencies and authorities within England and Scotland to which Halcrow has been providing winter service policy and operational advice.

It is recommended that the following are progressed to achieve efficiencies in the short-term future:

- Begin to put in place arrangements for collaborative procurement of weather information services, as Halcrow is currently undertaking with the Highways Agency.
- Establish cross-organisational groups for exchange of information, best practice and co-ordination, as Halcrow has undertaken within their motorway and trunk road contracts in England for the Highways Agency.
- Review of the arrangements for weather station communications to ensure that they provide value for money – “filling in the gaps”.
- Ensure consistent Winter Service Plans are put in place by all London authorities, with auditing of these plans being undertaken by a lead authority.

- A peer review of the winter service decisions made in winter 2009/10 and the reasons behind these decisions.

It is recommended that work is undertaken to investigate the desirability and feasibility of the following, all of which represent best practice across England in the medium to long-term future.

- Verify the data and assumptions behind the climatic zoning for London to assess the viability of incorporating this information into winter service within London.
- Establish a London Weather Information Service.
- Upgrade and improve the existing weather station network.
- Carry out a technical review of the climatic domains with a view to potential rationalisation.
- Undertake 'snow desk' training scenarios for winter service providers.
- Reinforce and formalise existing winter service mutual aid arrangements and contingency plans.
- Audit decision making and monitoring as a performance indicator.

2 Background

2.1 Introduction

Transport for London (TfL), the 32 London boroughs and the City of London (hereafter collectively referred to as the London highway authorities) provide winter service for the roads of Greater London, consisting of snow removal and precautionary treatments using salt. To aid decision making and monitoring, the London highway authorities procure weather information services from third parties for the provision of weather forecasts and advice.

Typically, highway authorities maintain a network of weather stations linked to a central server or 'bureau.' This network, commonly called a Road Weather Information System (RWIS), provides the core of the weather information. Forecasters and winter decision makers access the information held on the bureau via a website. A typical RWIS set up is illustrated in Figure 1.1.

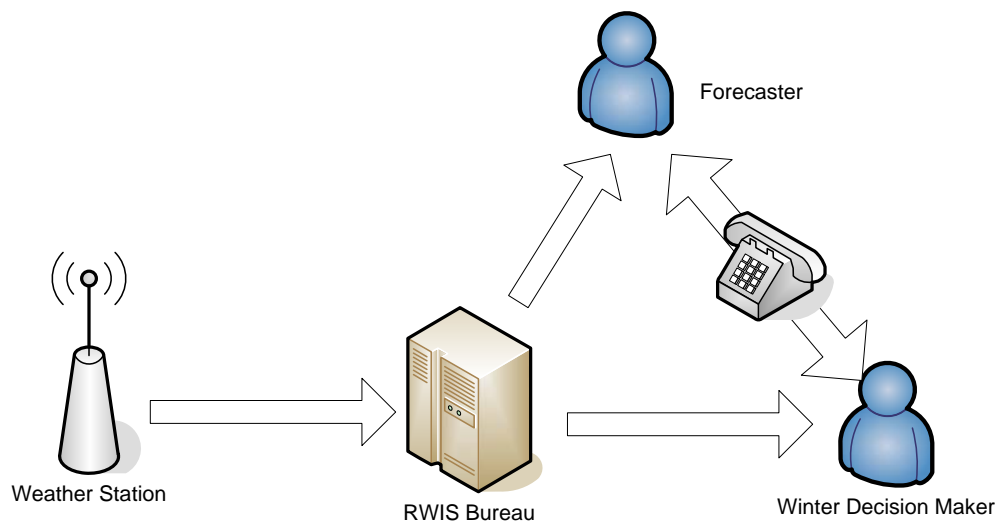


Figure 1.1: typical RWIS arrangement

As part of the LoTAG Winter Service Review, TfL has asked Halcrow to look at the current arrangements for obtaining weather information across London. This report presents the findings of that study, together with recommendations on potential improvements.

2.2 Aims and Objectives

The stated aim of the task is to 'analyse the effectiveness of the pan-London weather service and to make recommendations of [sic] improved efficiency.'

To achieve this aim, this report has attempted to meet the following objectives:

- Describe, understand and critique the current weather information services used across London.
- Identify weaknesses, areas for improvement and for potential efficiency savings.
- Outline options to correct those weaknesses; introduce improvements and make efficiencies.
- Make recommendations as to how Transport for London should proceed.

In addition to these core objectives, some discussion of wider topics concerning winter service has been necessary, regarding in particular the decision making and monitoring process. Links particularly to contingency planning should be robust, to provide a multi agency response across London. An outline addressing roles and responsibilities is key to ensure effective handling of any disruptive incident successfully. This is because winter service is an interlinked process and it is not always possible to consider one element in isolation.

2.3 Work Undertaken

This report has been produced mainly as a desktop study. Within the short timescale and resource allocation, there has been a limited opportunity to undertake stakeholder consultation. A list of questions was sent to all the London highway authorities to establish in more detail their current arrangements. Fourteen replies were received. The questions and responses received are included in Appendix A.

In addition to the engagement with London highway authorities, informal discussions were held with MeteoGroup, in order to get a view from the suppliers.

3 Current Situation

3.1 Existing Set Up

Currently winter service is provided on the strategic road network by TfL and by London boroughs and the City of London on the remainder of the treated network. From the 14 replies received back from the stakeholder engagement, the highway authorities vary greatly in the way that they independently procure weather information services. This is set out in Appendix A. Some authorities use a RWIS and a weather consultancy service, while Bromley and Bexley are known to have a joint procurement arrangement in place. Others only have a contracted weather forecasting provider (Met Office WSI etc)

Winter decision making and monitoring is also undertaken independently by each London highway authority. Each authority makes a decision for its own network based on the information available from its weather information services, a treatment matrix defining treatments for particular weather conditions, knowledge of local conditions and the decision maker's own training and experience.

For the strategic network, procedures and treatment requirements are set out in *Winter Service Plans* by the three Highway Maintenance Works Contractors (HMWCs), based on service levels set out in TfL's *Highway Asset Management Plan* and the *Winter Service Statement*. The boroughs and the City of London have their own service levels and procedures, based on the UK Road Board's *Well-maintained Highways: Code of Practice for Highway Maintenance Management* (hereafter *Well Maintained Highways*).

All London local authorities participate in the London Local Authority Gold (LLAG) arrangements, under which the London Local Authority Co-ordination Centre (LLACC) operates. Only opened at the request of and in support of the Duty LLAG, the LLACC is responsible for co-ordinating the activity of all 33 London Local Authorities, and has facilitated collection of salt stock levels and sharing of mutual aid as required during recent periods of severe weather. Although further relationships to support sharing of cross-border mutual aid exist at a local level, they remain, for the most part, informal. Work is currently being undertaken to formalise an agreed London-wide local authority mutual aid protocol, further strengthening pan-London resource-sharing arrangements.

3.2 Critique

Initial analysis shows that there are potential areas for efficiencies and improvement to be made to the weather information services used in London. These efficiencies are essential to the overall resilience of London's winter service, given the recent severe winters and consequent salt shortages. The following sections review different aspects of the current situation.

3.2.1 Road Weather Information Systems (RWIS)

Due to the timescale over which this report has been prepared it has not been possible to investigate in detail the technical aspects of the RWIS run by the London highway authorities. It is possible, however, to make some general comments on the current situation and to draw on the experiences of other organisations.

A RWIS can be divided into four parts:

- **Weather stations** – These are the stations located on the road network that measure various parameters, such as road surface temperature and wind speed. The stations provide the raw data and are usually owned by the highway authority.
- **Communication network** – This is the infrastructure or service that transmits the data from the weather stations to the bureau. It can be a private network, leased telephone lines or make use of mobile networks.
- **Bureau** – A central database and server that receives the data from weather stations, stores it and allows users to access it, usually through a log-in protected web page. This is usually purchased as a service, with highway authorities taking no ownership of the IT system.
- **Data exchange with forecasters** – The bureau and forecasting services can be provided by the same company. Where they are separate companies, an agreement to exchange data needs to be set up so that the meteorologists can access weather station data to produce a more accurate local forecast and so that the bureau can publish the forecast on the bureau site. This is usually transmitted over the internet and the main issue is usually the format and file type that is to be used.

Generally investment by highway authorities on upgrades to weather stations is commonly very low, once initial purchase has occurred, despite the opportunity to meet costs over their long life design. The density of the weather station network varies between authorities. There is a recommendation¹ for a station to be sited every 50 to 100km of road, Although this clearly is not fit for purpose in London, as it fails to provide the localised detail required by a dense, urban road network. The locations of weather stations generally are dependent on:

- location of existing weather stations;
- weather domains;
- roads affected;
- existing communication network; and
- existing power supply network.

Typically, one weather station and associated infrastructure costs in the region of £35,000.

¹ p170, *New Developments for Winter Service on European Roads – Final Report COST Action 353* (2008)

A higher density of weather stations not only provides a greater volume of data but reduces the risk of erroneous data distorting any analysis, provides contingency in the system in the event of station failures and allows a more accurate and detailed picture of the weather and climatic characteristics of an area to be built up. Thus, a higher density of weather stations can help forecasters provide more accurate localised forecasts and give winter service managers better information on which to base their decision.

An audit was undertaken to assess the procurement practice of London authorities regarding weather forecasting. Fourteen London boroughs responded to the consultation, providing an indication of practice across London. Of those respondents, only three had weather stations alongside a bureau service and can thus be considered to be operating a full road weather information system (RWIS). Given that these systems have been available since the late 1980s and that they deliver proven benefits, it is surprising that RWIS are not in wider use and represents a significant deficiency in practice compared to the rest of the country. This is most likely to be explained by the geographically small areas that London highway authorities cover and the consequently smaller budgets available in comparison to other highway authorities. Indeed one respondent stated that the cost of a weather station and bureau would have to save 10 treatments to pay for itself and that, given the short routes involved, a simple "yes/no" forecast was of more use. This was supported by the TfL and LoTAG Winter Service Workshop held on 25th May 2010, where the variance in the provision of weather information systems by London authorities was highlighted. By having a robust specification and contract, higher levels of forecasting data can be provided 24/7 with bespoke updates as the forecast changes, which will reduce variances in forecasting. Process, procedures and interpretation will need to be reviewed and training delivered with the new systems, in order to provide higher levels of efficiency.

It is recommended that a strategic review of the current locations of weather stations within London and the M25 is undertaken to gain a clear understanding of where potential gaps are for weather stations. It is not necessarily suggested that every London Borough should have a weather station, but access for highway authorities to appropriate weather stations is required, in order to enhance the forecasting capabilities of all concerned.

There are a number of problems associated with operating without an RWIS:

- Treatment will almost always take place on marginal nights, whether required or not, as there is no real time data to support the forecast.
- Thermal fingerprints, and resulting thermal maps, cannot be developed to better understand the network.
- Forecasts cannot be adapted to suit the properties of the area.

- The actual conditions on the network are unknown, unless visual inspection takes place.
- There is no evidence of the actual road conditions to potentially defend treatment decisions in court.
- The nature the road network across London, along with an incoherent nature of the authority boundaries, could lead to additional cross boundary operating issues, for example continuity of gritting routes across boundaries.

Overall, it is thought that an increased frequency of unnecessary treatments takes place in areas with no RWIS, compared to areas where RWIS is in use.

3.2.2 Forecasting Services

For the highway authorities consulted, there is a wide variation in forecasting services used, from simply making use of the Met Office Weather Advisory Service (low level), to securing a dedicated service designed specifically for winter maintenance (high level). This is reflected in the wide range of prices paid, varying from £2,500 to £8,000 per year. It should be noted, however, that there also appears to be variation between the prices paid to the same supplier for the same or similar service. With the limited information available it would appear that there is a variance of around £1,000 being paid for the same service. All forecasting service contracts for London highway authorities are for short periods, most being renewed annually with two authorities having a two year duration.

By having a robust specification of service and contract, higher levels of forecasting data can be provided 24/7 with bespoke updates as the forecast changes, which will reduce variances in forecasting.

To summarise the problems with the current forecasting services, it has been found that there is:

- Questionable value for money for those paying higher prices, given the apparent variation in cost.
- Wide variation in the quality of weather forecasts used to make decisions, where some appear to be over priced or possibly have a poor service level specification/agreement in operation. Cost is also a factor.
- Multiple procurement by highway authorities of the same or similar information e.g by the Met Office
- No mechanism to drive improvements in service.

3.2.3 Summary of Current Services

Limited information has been made available about the number and condition of weather stations across London. It is indicated that the London boroughs and TfL have a small number of stations located across their networks. There may be scope to improve coverage of London and to technically improve the weather station network, based on the information analysed. The ability of boroughs to undertake this individually is likely to be limited because of budget constraints.

The communications network is a particular area where inefficiencies can occur. The rapid development of communications technology often leaves behind weather station communications, which continue on older, less efficient networks. Work undertaken for one strategic authority looked at the connectivity of its stations and concluded that it was paying significantly more than it needed to, largely because of how this was originally procured and delivered.

This included:

- multiple forecast suppliers, specifications and contracts;
- little strategic vision or management;
- little joined up RWIS systems;
- little dissemination of forecasting lessons learnt;
- process of individual training and interpretation; and
- inconsistencies in location for weather stations

From reviews elsewhere it has been estimated that as much as 30% could be saved annually on the cost of the contract by changing how this service is delivered. Again, no detailed information is available at the time of this report but, given the evidence of potential savings elsewhere, it is an area that may reward further investigation by TfL.

The bureau and weather forecast services are proven systems with limited opportunities for technical improvement. There is, however, potential for efficiency savings. The current situation of each London highway authority having its own bureau service is unsatisfactory, as it results in duplication of procurement. This is discussed further in the next section.

The current weather information services are only used for winter service and there may be the potential to widen access to include users with other needs. This could deliver efficiencies if other weather information services are being procured separately in other parts of the same organisations, by providing more consistent locations for weather stations, uniform forecasting and common equipment etc.

In the East Midlands a number of local authorities and a Highways Agency service provider have successfully collaborated for the joint procurement of a forecasting services contract. A similar exercise was completed for the Highways Agency which indicated that reducing the number of forecasting contracts across their area network from 14 to 3 would deliver savings of approximately 15% on the contract value. A similar saving profile could be expected to be achieved for London, in addition to the savings made by sharing the costs of procurement. This would form part of the detailed business case should this be further investigated.

3.2.4 Procurement and Resources

Each of the London highway authorities procures weather information services, although to a differing extent, including a bureau, to support winter service. There are a limited number of companies that provide weather forecast and bureau services and the products available are very similar. Therefore, many of the contracts across London will be held with the same companies. The result of this is that there are many individual contracts covering an area that could quite easily be covered by a single regional contract.

This report sets out where efficiencies can be made. The duplication of effort in the procurement process and the cost of existing separate weather station contracts could be reduced by some form of collaboration. Another area for potential efficiencies is where the London highway authorities are procuring the bureau and forecasting services as separate contracts instead of a combined contract package (as evidenced in Appendix A). Both services could be supplied by a single company, which may be cheaper than separate contracts.

The small budgets available to borough councils limit the amount of work they can do in areas of innovation and research. This may mean that they are unable to take advantage of advances in meteorological sensors or other new technology that a larger organisation would be able to. Similarly, the boroughs do not have the resources to keep track of research relating to winter service and certainly have inadequate resources to commission any research themselves.

With each London highway authority responsible for carrying out the operation of winter service, it is also necessary for them to have a decision maker on duty to instruct the treatments to be carried out. Again there is no technical reason why a single decision maker cannot cover a much wider area than is currently being monitored. This is detailed in 3.2.6 within this document..

3.2.5 Administrative Areas

The current division of responsibility for winter service is based on political boundaries, resulting in 33 local authorities and three HMWCs (working on behalf of TfL) operating in

London. When compared to other parts of the country, this represents a much greater concentration of authorities for an area that is equivalent in size of one of the smaller counties. Whilst London does have a much denser network, it is questionable whether such a fine degree of division is justified on purely technical terms.

As a comparison, in the metropolitan county of the West Midlands (which has an area roughly half of that of Greater London) there are eight authorities that perform winter service². The West Midlands also has a dense highway network and if London were to be organised similarly (on a pro-rata basis) there would only be around sixteen authorities performing winter service.

Another way of disaggregating weather information services in London would be to organise by 'climatic domains.' These are used by meteorologists to categorise areas of land into divisions of similar topography, climate and thermal properties. A map of climatic domains produced for TfL, shown in Figure 3.1, divides London into eight climatic domains. Most boroughs have at least two domains within their boundaries, with ten containing three and one containing four domains.

It is possible that there are different treatment decisions made for adjacent domains on the same night. In practice this is only likely to occur on marginal nights and would not be frequent unless there are substantial differences between the domains. Organising winter service on the basis of climatic domains could be implemented. This would mean that only one treatment decision is likely to be made rather than potentially ordering different treatments across an administrative area or carrying out treatments that are unnecessary for part of that area. The reality is however, that that domains rarely coincide with administrative areas but nevertheless, there remains the possibility of changing the organisation of winter service to better reflect climatic domains.

Comparison with the rest of England suggests that there are more domains in London than in a comparable area elsewhere. The Highways Agency has maps illustrating the division of England into climatic domains. To return to the example of the West Midlands, an area half the size of London, there are only three climatic domains that cover this area's strategic routes. A comparable county in size to Greater London is Hertfordshire, which is covered by five domains.

² There are seven metropolitan boroughs and one Highways Agency Service Provider covering the West Midlands metropolitan county area.

London Boroughs – Winter Weather Service

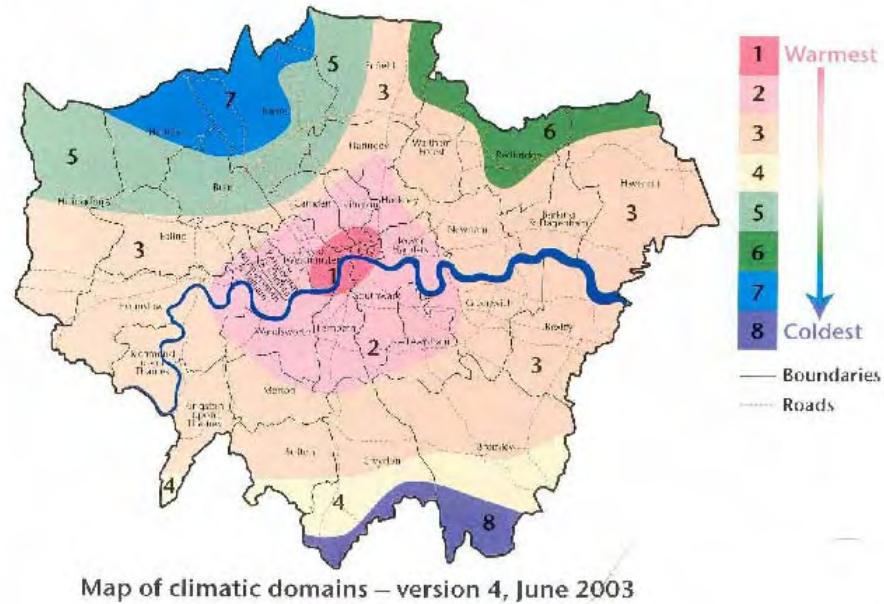


Figure 3.1: climatic domains in the Greater London area

One of the problems with the domain map shown in Figure 3.1 is that the different domains are only given a ranking and there is no information about the degree of difference between them. It could be that there is only a small variation in temperature, $\pm 0.1^{\circ}\text{C}$ for example, and that in practice there is no need to vary treatments according to domain. Certainly it would appear that the Highways Agency weather information supplier has not divided England into domains that are as finely graduated as those for London. If the variations in temperature are confirmed as small these domains could be reduced in number.

There are two strong positive aspects to having such a localised winter service. The first is the strength of local knowledge that officers have and their ability to prioritise known problem areas. The second is the local accountability and autonomy that the current arrangements provide. Individual boroughs are able to set service levels and budgets in accordance with local priorities and if the service does not meet public expectations then a local body can be held to account.

3.2.6 Consistency of Service

As previously discussed, London has a higher number of authorities undertaking winter service than comparable areas elsewhere in England. In many cases, such a comparative area would be covered by a single authority. However, the size and density of the road network within London is unique. Even in comparison with other urban authorities within Great

Britain, such as the Midlands, London authorities have specific operational undertakings, with higher stakeholder engagement. The service levels will need to be underpinned with agreed policies of sharing weather infrastructure, data and actions undertaken. This has implications on the consistency of the service provided across London, including the way in which learning lessons are learnt and issues identified.

For routine winter services and cross boundary operations, efficiencies can be achieved with strong processes and procedures. Under severe weather conditions, individual contingency plans and pan-London contingency plans should set out as should mutual aid procedures.

Each borough has its own political, policy and budgetary considerations that affect winter service. Differences in the training, experience and personal judgements also affect what treatments are carried out in different circumstances, in addition to the climatic differences faced across London. During the past two winters, problems with salt stock shortages have also had an influence on the treatments carried out.

Two examples from January 2010 serve to illustrate this variation. On the 13 January the majority of boroughs appeared to ‘over-grit’ their network, that is, undertaking precautionary treatment over and above the resilience networks then in place. Three boroughs, however, chose to undertake no treatment at all. By contrast, on the 22 January only a single borough carried out treatment when the rest of the London authorities undertook no treatment at all.

To fully understand the cost implications, section 4.4 within this document provides an estimate of cost to undertake one precautionary presalt.

- estimated cost of a precautionary presalt across London (4.4) = **£46,500;**
- estimated cost of one weather station = **£35,000.**

It can be seen that more than the cost of one weather station can be achieved by one occasion of not undertaking a precautionary salting.

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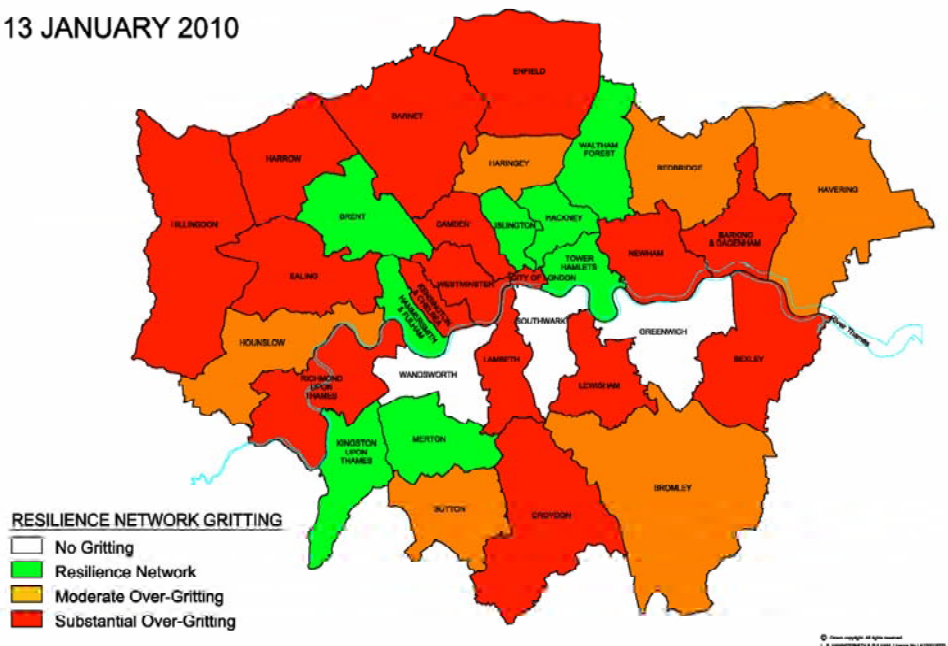


Figure 3.2: treatment by London borough on 13 January 2010

It must be stressed that there could be valid operational reasons for the discrepancies, however by not having a RWIS and robust tactical and strategic policy towards decision making and monitoring cross London, these differences cannot be fully managed effectively and therefore there could be the potential to save money.

These variations are a result of the factors noted above and the author makes no judgement over the decisions taken. What it shows is that there can be differences in how boroughs respond to particular conditions and this could result in variation in the road conditions across London. This difference can be exacerbated on marginal nights, which are nights where conditions are such that precautionary treatment may or may not be required. Any attempt at managing salt stocks on a London-wide basis will also be complicated by the variation in treatments across the boroughs.

On 22 January 2010 only one out of 33 London authorities undertook a treatment of the ‘resilience’ network. No other treatments for London have been recorded for that date. To understand why one authority situated almost within the centre of London, made a recommendation to grit, would, with formal verifying at a tactical and strategic level, become clear. This example demonstrates the need for a joined up and strategic approach to the decision making and monitoring, with formal record keeping centrally.

In order to try and understand the reasons for this variation across London and if there are any climatic factors at work, a brief subjective analysis was undertaken of treatments carried

out between 9 January 2010 and 15 March 2010. Two patterns seemed to emerge, which are illustrated in Figure 3.3. The first is that the boroughs forming lines along the south-eastern and north-western edges of Greater London, outlined in red on Figure 3.3, carried out treatments when other boroughs did not. The second pattern is that a block of boroughs from the City of London running up river along the Thames, outlined in blue on Figure 3.3, did not carry out treatments when the rest of the boroughs did.

These patterns follow known thermal characteristics, with the outer less-densely urbanised boroughs experiencing colder temperatures than the denser inner core. They also have some similarity with the climatic domains shown in Figure 3.1. It should be stressed that this was only a very cursory analysis with no statistical basis, but it illustrates the potential information that can be obtained from city-wide analysis of treatments. This can only be done through sharing of information between the London highway authorities.

This touches on another consequence of the current arrangement. Whilst each authority undertakes annual reviews of its winter service plan and post-season debriefs, there appears to be limited opportunity to share London-wide lessons learnt and discuss issues. It could be that trials and lessons are learnt separately by the London highway authorities, without being passed on.

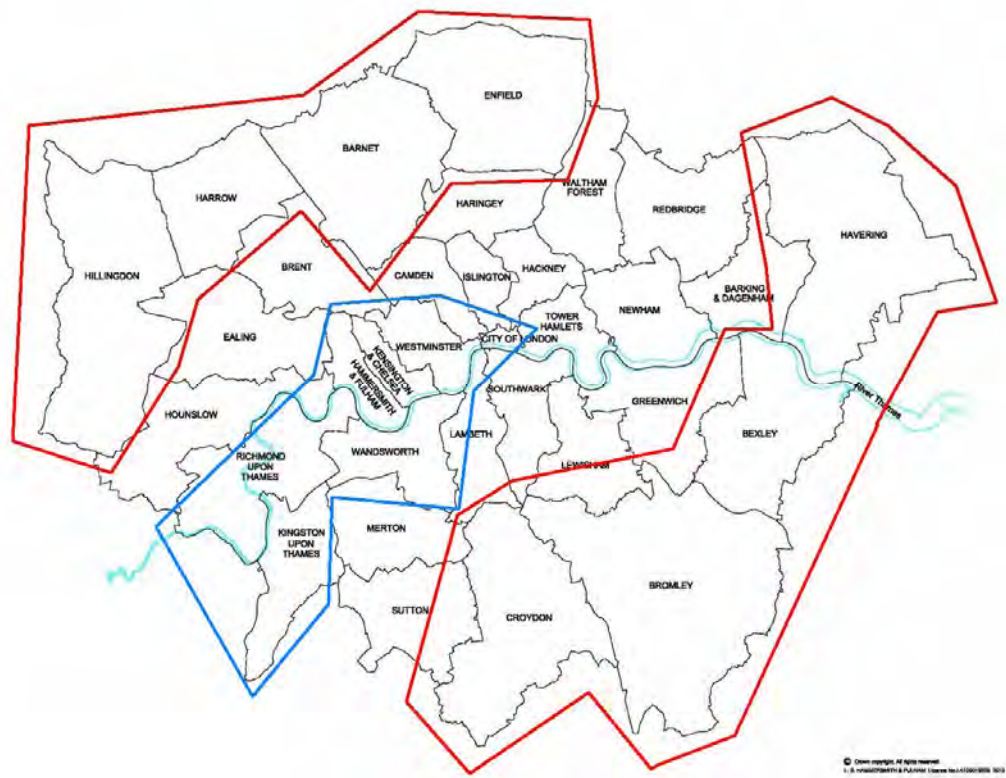


Figure 3.3: patterns of treatment across London

3.3 Areas for Improvement

From examining the current situation, four areas stand out where there are possible efficiencies and improvements to be made:

- **RWIS** – whether it is possible to improve, expand and consolidate RWIS.
- **Procurement** – find efficiencies in the procurement of RWIS (including weather stations) and forecasting services.
- **Climatic domains** – whether the current climatic domains could be modified to provide a more appropriate operational environment.
- **Cross-border collaboration** – look to pool resources and share knowledge.

In addition to these four areas directly related to weather services, there are two wider areas that may present opportunities:

- **Consistency** – how to ensure a consistent winter service across London
- **Administrative areas** – whether winter service can be re-organised to improve efficiency

4 Possible Options

4.1 Overview

With budget cuts expected, securing efficiencies will help reduce the potential impact on service levels by focussing on better value for money whilst keeping the same level of service. The following sections put forward a range of options to make weather information services more efficient. At this stage, the options are tentative suggestions rather than fully detailed proposals.

4.2 Make use of Collaborative Procurement

The individual procurement of weather services by TfL and the boroughs is a clear area where efficiencies can be made. Collaborative procurement is a recognised way of making savings and was one of the recommendations made by Sir Peter Gershon's review of the public sector, *Releasing Resources to the Frontline*. Sharing the cost of procurement in addition to the service costs would allow savings to be made. These savings may be further enhanced if the weather forecast and bureau services are included in a single contract.

The number of authorities working in collaboration can be anything from two boroughs to the whole of London. The greatest efficiencies are likely to be gained from a single contract covering all the boroughs and TfL, but it could also provide savings if London is divided into a number of procurement groups. The benefit is that this should be easy to achieve with all parties needing an identical service, and the process delivering immediate efficiencies.

4.3 London-wide Weather Information Service

A more radical change could be made by creating a London-wide weather information service that caters for not just for winter service, but for all needs. This would involve a central body, taking over ownership and responsibility for all the weather stations in London and procuring a central service. TfL could then provide access to the weather information as a service to the other London highway authorities.

A potential model for this service is the Highways Agency Weather Information Service (HAWIS), which is being undertaken by Halcrow for the Highways Agency at present. This project identified the wider need for weather information beyond winter decision makers and that the information was needed for a range of uses, including network management, the Traffic Officer Service and business intelligence. To meet the wider defined needs, HAWIS has re-defined what the bureau service does to make its services accessible for different types of user, taking ownership of this new service rather than procuring the bureau externally.

Although superficially identical to a London-wide collaborative procurement, there are some significant differences that make this option both more radical and more complex. These are:

- widening of purpose from solely winter service to all weather information needs; and
- making the weather information service, and ownership of related assets becoming the responsibility of one lead organisation.

This success of such a service would depend on economies of scale. Whether this is a viable option will depend on the wider need for weather information services within the London highway services. If a variety of weather information services are currently being obtained for purposes other than winter service, there could be potential for further savings by catering for these needs under one service. If, however, these services are used only for winter service then some form of collaborative procurement may be more appropriate.

4.4 Improving the Weather Station Network

It should be noted that the duty for highway authorities to provide winter service is set out in section 41(1A) of the Highways Act 1980; this was specifically imposed by Parliament in 2003. A legal opinion given on this duty for a previous project made the point that a key part of any s58 defence would be the operation of adequate systems and processes to provide winter service. The opinion went as far as to state that the systems should be as state of the art as possible and opportunities should be taken to make improvements.

It should be noted that this advice was aimed at for a typical organisation significantly larger in area than any of the London Boroughs, and the resources available to them must be taken into account. It does however, give an indication of how important it is to have adequate systems, processes and procedures in place. From the evidence available at this stage, it would appear that some London boroughs fall short of the quality of information which is used to make decisions by other authorities, compared to other urban councils across the country, who have made investment in weather stations (or at least paying for access to weather stations owned by other authorities), bespoke weather forecasting arrangements, some including a RWIS and robust training, data interpretation.

Weather stations provide the raw data to allow winter service managers to make decisions. The greater volume and accuracy of data available allows more accurate treatment decisions to be made. Those making decisions are naturally cautious and if there is doubt about conditions then decision makers will order pre-cautionary treatments to be carried out. This can result in unnecessary treatments with the consequent waste of salt. Improving the weather station network will give winter decision makers greater confidence in the information available and help reduce the number of unnecessary treatments.

To give an indication of the cost of unnecessary treatments, each 10mg/m² treatment of the network across the whole of London, which would be most likely on marginal nights the following assumptions have been made per occasion

Operational efficiencies (for example of not undertaking one precautionary treatment) would include the saving of salt and the cost in terms of manpower, fuel etc. Each authority will have its own purchasing and rates for plant, labour and materials. To provide a robust calculation of savings, an evidence based estimate of efficiency rates for plant, labour and materials would be required. However a coarse estimate of saving from not undertaking a precautionary treatment could be reflected as follows, for the whole of London:

Coarse assumptions:

- 50 mile route (travelling and gritting)
- 6 routes per authority
- Salt: £25/tonne
- 4 tonnes per route at 10 g/m²
- Operators cost: £20/hr (driver/loader)
- 4 hour shift
- Fuel £5.50p/gal
- Average vehicle consumption: 10 mpg

Using these figures, if the whole of London did not undertake a precautionary treatment on a marginal night, a pan London saving could be in the region of £46,500.

Avoiding unnecessary treatments, therefore, can give significant savings both individually and strategically. Following a winter as severe as 2009/10, it is also clear that any savings which can be made in salt usage will ultimately increase London's resilience with regard to salt stocking.

The weather station network can be improved in two possible ways. Firstly, the distribution of the stations can be optimised, including the establishment new sites, to provide the best coverage. Secondly, the quality and condition of the weather station equipment can be assessed and, where appropriate, replaced or upgraded. The starting point for improving the network would be to establish the current state and distribution of the weather stations in London.

4.5 Ensure Weather Station Communications are Value for Money

The responses received indicate that the Boroughs individually struggle to afford the systems that ought to be used. This strengthens the arguments in favour of some form of collaboration.

An authority of a similar geographic size London, might expect to pay between £20,000 and £40,000 per year for an RWIS and forecasting service. Using the high end figure divided by the 32 boroughs and the City of London, this would equate to a cost of approximately £1,200 per authority, approximately the cost of one precautionary treatment run set out in 4.4 above. Therefore, the London Boroughs could get a better quality service for a lower annual cost.

Without more detailed information it is not possible to make a judgement on the connectivity weather stations. However, given that the Highways Agency is expecting to save up to 30% per year on its costs simply by changing how the connectivity of its weather stations is provided, this is an area that deserves attention.

All the London highway authorities should review how weather station communications are provided and ask the following questions in particular:

- Who provides the current service and why?
- Is the current provider a telecoms company or is this provided by a sub-contractor?
- What is the current service availability and is this acceptable?
- How does the cost compare with similar services – for example telephone rental, variable message sign communications and CCTV?

4.6 Investigate the Reasons for Different Treatments

As previously described, different treatments are carried out on the same night by different boroughs. This can be a result of a whole range of factors, including variations in the quality and volume of weather information available. Investigation of the reasons why different decisions were made may reveal underlying problems or variances with the weather information used. This could point to further areas for improvement, efficiencies or sharing of best practice.

4.7 Knowledge Sharing and Cross-Border Collaboration

Learning lessons and sharing best practice is an excellent way to drive continuous improvement and look for efficiencies. It can also help to identify potential areas for research and new innovations that could be trialled. This has benefits not only for weather information but winter service generally. By pooling resources, the boroughs will be able to achieve much more than is currently possible individually.

There are three aspects to knowledge sharing that can be implemented:

- **Cross-London Winter Group(s)** – Establish a group involving representatives from all the boroughs, TfL and the three HMWCs. Given the number of organisations involved it may be better to divide London into the three TfL areas and have a smaller over-seeing steering committee.
- **Pre-season Snow Desk Exercises** – Arrange exercises between adjoining boroughs and the HMWCs to simulate snow days to identify any problems and issues before winter starts.
- **Post-season Lessons Learnt Workshops** – Arrange workshops involving the boroughs and HMWCs to share lessons learnt, discuss problems and identify areas for improvement. These workshops should not be restricted to problematic seasons.

Halcrow has assisted the Highways Agency in running similar arrangements for the last five years involving its area teams, service providers and the Traffic Officer Service. Feedback from these workshops has been positive and changes and improvements have resulted from issues identified in these forums.

4.8 Climatic Domains

There is limited information about the basis on which the current climatic domains have been devised. It may be that they are too disaggregate and complicate winter service operations. Investigation into the domains, particularly to the degree of difference between them, would give a better understanding about the climatic properties of London. This could lead to a revision of the domains that would simplify decision making and monitoring, allowing quicker and more confident decisions to be made, resulting in less unnecessary treatments.

4.9 Tangential Options

There are a number of areas that are not directly related to weather information services, but that this review has identified as possible area for further study by TfL. These are presented for further consideration and may provide confirmation for work already underway.

4.9.1 Standardisation of Policies, Guidance and the Treatment Matrix

London can, and arguably should, be treated as a single entity for winter service. To achieve a consistency of service and road and footway conditions, a cross-London winter policy and guidance document, including an agreed uniform treatment matrix, could be adopted. This would need the involvement and agreement of all the London highway authorities but should be achievable and may result in salt usage efficiencies. This would have the benefits of cost savings for de-icing materials as well as increasing London's salt stocking resilience. This standardisation of policy could be rolled out in conjunction with the development of Winter Service Plans by London highway authorities. The development of Winter Service

Plans will further apply consistency for Winter Service operations across the London road network.

The decision making and monitoring process set out within this document assumes sufficient plant, labour and materials to undertake a treatment under “normal working conditions”. Geographical factors, cold spots etc and the mechanisms to treat these locations only for example, need to be robustly embedded within the decision making and monitoring agreement/processes and procedures.

Both ‘normal working conditions’ and ‘abnormal working conditions’, along with cold spots and other geographical characteristics should be set out within each borough’s Severe Winter Plan and where necessary within the appropriate Contingency Plans as well.

4.9.2 Reduce the Number of Decision Makers

One option to reduce costs further could be for one decision maker to monitor a number of boroughs with staff pooled to provide a rota. This would reduce the staff costs for providing cover. To illustrate the potential savings, Table 4.1 shows the possible savings for a single officer monitoring a number of boroughs. This is based on each borough making their own decision, during the day, with one borough undertaking a monitoring role on marginal nights, on behalf of others. Payments made to staff monitoring weather vary from borough to borough and are therefore at present not included. The costs in table 4.1 are derived from a detailed break down set out in Appendix B.

For example, with 4 boroughs sharing resources, on marginal nights, an individual borough would undertake its role on one occasion in 4, therefore making a saving on 3 other occasions, if split equally. One borough would monitor until a ‘go/no go’ decision is made.

When a ‘go’ decision is made communications would be then made to each Borough in the ‘group’ to activate their precautionary salting operations individually. Note the shared facility considered here is only on a monitoring forecasts, decision making and monitoring, basis not an operational basis.

It would be technically possible for one borough to forecast on behalf of another, however it is considered that to retain autonomy risk ownership, this option would be politically unpopular, contractually very difficult and therefore not considered any further here.

Consequently, for monitoring on marginal nights the following saving could be achieved. The full derivation for the figures can be found in Appendix B at the back of this document.

Table 4.1: potential savings through sharing on marginal nights

Number of Boroughs Sharing monitoring marginal nights	Saving per Borough
1 in 2 occasions	£4,600
1 in 3 occasions	£9,200
1 in 4 occasions	£13,800
1 in 5 occasions	£18,400

Such an arrangement would need considerable trust between the boroughs to give them the confidence to allow someone outside of the organisation to make decisions on its behalf. There may also be some legal concerns to overcome, such as potential liabilities in the event of personal injury claims. These problems may not be insurmountable and given the potential savings it is worth further exploration. Strong protocols, processes and procedures would ensure a strong working relationship and professional ability. It is not envisaged that one authority would action another's resources, but simply make a phone call, warning for example of falling temperatures which could lead to ice forming.

4.9.3 Review and Standardisation of Training

There is currently no recognised qualification for winter decision makers, although there is some ongoing development in this regard. Qualifications for a winter decision maker are usually based on past experience and privately provided training courses, such as those provided by the Met Office. Establishing a base standard for winter decision makers and ensuring that standard is met would help provide a more consistent service across London. It would also help build the trust that would be needed for the previous option.

The incorporation of annual snow desk scenarios, to test Winter Service Plans and staff, could be open up to include other key stakeholders, again this is best practice across other highway authorities including strategic authorities within England

4.9.4 Reorganisation of Winter Service

One radical option available is for winter service to be centralised for the whole of London. This could be delivered by a lead authority through the HMWCs and would allow economies of scale particularly for routine treatments. Providing mutual aid is set out within the primary contingency documents and all authorities understand their role and responsibilities. As

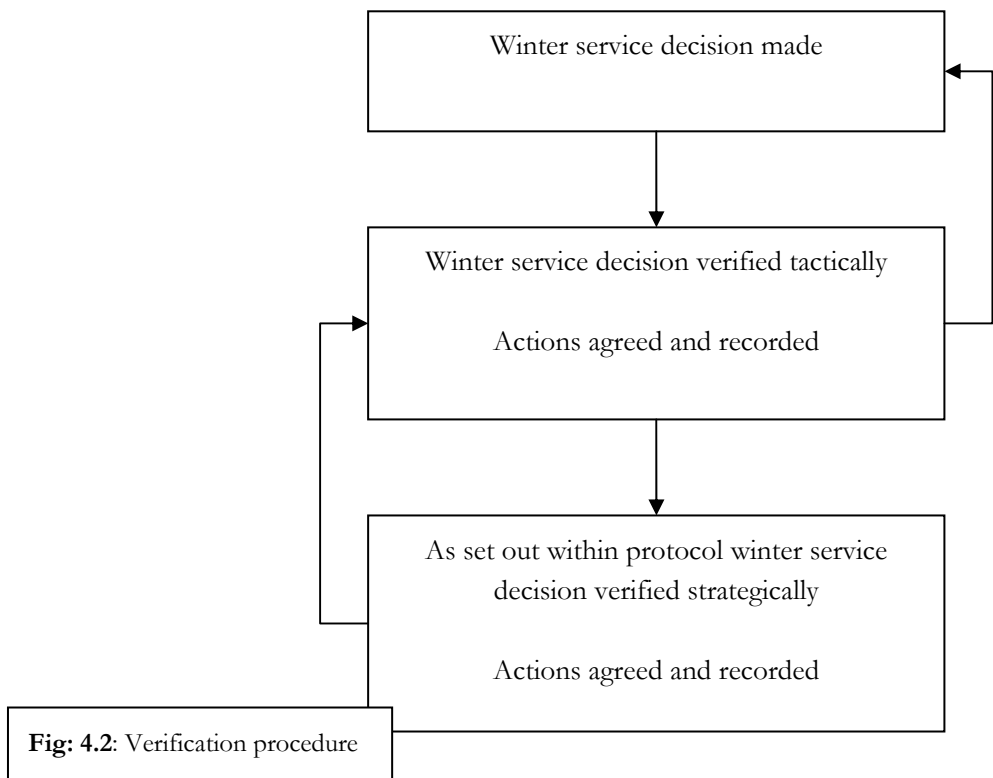
Halcrow has demonstrated with the Highways Agency, mutual aid in such conditions is achievable. There would be a number of large obstacles to overcome; these would legal, political and potentially statutory issues.

4.9.5 Decision making and monitoring Audits

Decision making and monitoring depends on

- Weather forecasting information
- Decision markers training
- Interpretation of forecast information
- Lessons learnt logs
- Operational elements; plant labour and materials

Lessons learnt from both Highways Agency and other Local Authority contracts which Halcrow has been responsible for has shown high quality of decision making and monitoring when a verification process has been put in place. On a daily basis, this involves all decisions being tactically verified by a more senior person than the decision maker. On marginal nights clearly defined within the protocols, the tactical verifier has his/her decision verified by a strategic verifier, often head of or deputy head of the particular highways department..



All actions and verifications should then be audited for technical content and for operational content, as well as financial return.

5 Next Steps

5.1 Selection of Options and Confirmation of Business Case

Should the options put forward in this report be chosen for further investigation or implementation, there are a number of steps that are recommended before there is a full commitment of resources to a project.

As the current options are in outline only and are not costed in detail, the first action should be to undertake more detailed stakeholder consultation and research to confirm the business case is valid. Of particular importance is the provision of a robust Business Case to ensure that there are good reasons to commit resources.

In summary, the next initial tasks should be:

- selection of options for progression;
- confirmation that there is a valid business case for each option taken forward;
- establishment of the aim and objectives, with expected outputs;
- target setting as to what will constitute a success;
- preparation of project briefs setting out what is expected; and
- early stakeholder engagement to secure positive commitment.

5.2 Governance Arrangements

There are a number of different bodies involved in winter service in London and most of the options need co-operation and collaboration between them. As a result, governance of any projects set up will be of particular importance.

To ensure clear lines of responsibility and communication, it is recommended that the following roles are established:

- a Project Board to oversee the project and provide a forum to represent stakeholder interests at a high level;
- a Project Manager with overall responsibility for the execution of the project; and
- lead officers are appointed for each highway authority to represent its interest.

A suggested project organisation is shown in Figure 5.1. In the event that cross-London groups are established, as described in section 4.7, these provide a group to oversee progress and provide communication channels. In addition to these roles, it will be necessary for some options to secure professional legal and procurement advice and engage with the legal departments of the London highway authorities.

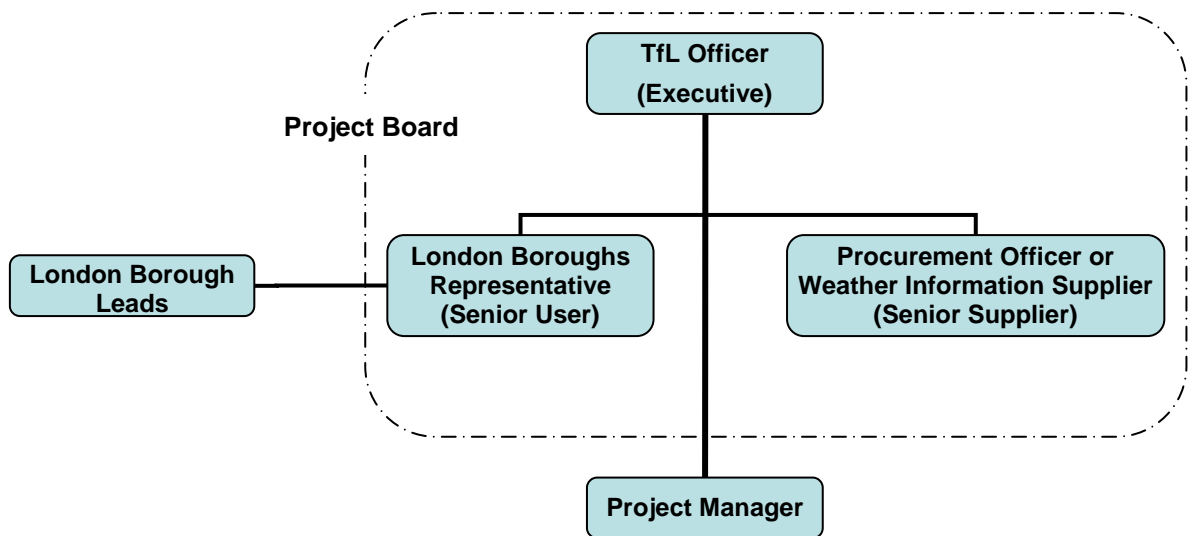


Figure 5.1: Suggested Project Governance Structure

5.3 Project Management

The options presented vary in complexity and likely duration. For any project that is set up, however, there are a number of aspects that will need particular attention. These include:

- ongoing review and validation of the business case;
- benefits identification and definition, and plans to realise and measure those benefits;
- change management within organisations;
- ongoing stakeholder consultation and engagement; and
- risk management.

As with any project, there will be a number of risks that will pose a threat. The types of risk will depend on the option in question, but a few general areas can be identified:

- Statutory – major changes to the way in which winter service is delivered may affect how the London highway authorities fulfil their statutory duties. This could even be to the extent of needing changes to parliamentary instruments. This can be mitigated by early legal advice on any option considered.
- Legal – changes to who makes the treatment decision could create liability problems in the event of personal injury claims. This can be mitigated by early legal advice and engagement with the legal departments of stakeholders.
- Organisational Complexity – many of the options involve establishing relationships between several organisations. Managing these relationships could present a difficulty

and be a burden to the organisations involved. This can be mitigated by early stakeholder engagement and setting out written protocols.

- Securing Agreement – agreement is needed between the boroughs and TfL for many of the options. Whilst some options can go ahead without all the boroughs taking part, the greatest benefits often depend on the greatest involvement.
- Budget Cuts – with cuts in budget expected the funds may not be available to make the changes desired. This cannot be mitigated but an early decision could be made whether to ring fence funds.
- Business Case – with only outline cases at this time, it may be that the benefits expected do not justify the cost and effort. This can be mitigated by following recognised project management procedures and by ongoing review and validation of the business case.

Finally, an assessment should be made as to whether any of the projects should undergo the Office for Government Commerce (OGC) Gateway Review Process; this assessment can be done by using the OGC's Risk Potential Assessment. The Gateway Review Process provides assurance to senior managers and stakeholders that the project is expected to be successful, and provides advice on how to improve the project.

6 Conclusion and Recommendations

6.1 Conclusion

As this report has shown, there are a number of areas where improvements can be made and efficiencies gained. There has not been the opportunity to fully outline the options and provide detailed costings, but it has been demonstrated that the level of savings available warrant further consideration of the options.

From the TfL and LoTAG workshop there appears to be recognition that there is a wide variant of weather services provided across the London authorities, which affects efficiencies. There was also agreement in principal across the delegates to engage with a proactive approach to weather services.

The weather services in London appear to be generally fit for purpose, with some authorities having modern weather stations and systems, but there are other authorities who simply rely on BBC television for their decision making and monitoring.

By not having access to RWIS it would appear that some London boroughs fall short in the quality of information which is best practice across the country. There also appears to be a lack of tactical and strategic verification regarding the decision making and monitoring undertaken across London, which if in place would drive efficiencies and bring a joined up approach to winter services.

The lack of a robust pan-London RWIS represents a missed opportunity to achieve efficiency savings and improvement in the winter service for London.

6.2 Recommendations

The recommendations are divided into those that provide a clear enough benefit to be implemented immediately and potential improvements that need further investigation before progressing. All of these recommendations will bring London more in line with other strategic agencies and authorities within England and Scotland to which Halcrow has been providing winter service policy and operational advice.

It is recommended that the following are progressed to achieve efficiencies in the short-term future:

- Begin to put in place arrangements for collaborative procurement of weather information services, as Halcrow is currently undertaking with the Highways Agency.

- Establish cross-organisational groups for exchange of information, best practice and co-ordination, as Halcrow has undertaken within their motorway and trunk road contracts in England for the Highways Agency.
- Review of the arrangements for weather station communications to ensure that they are value for money – “filling in the gaps”.
- Consistent Winter Service Plans to be put in place by all London authorities, with auditing of these plans being undertaken by a lead authority.
- A peer review of the decisions made in winter 2009/10 and the reasons behind these decisions

It is recommended that work is undertaken to investigate the desirability and feasibility of the following, all of which represent best practice across England in the medium to long-term future.

- Verify the data and assumptions behind the climatic zoning for London to assess the viability of incorporating this information into winter service within London
- Establish a London Weather Information Service.
- Upgrade and improve the existing weather station network.
- Carry out a technical review of the climatic domains with a view to potential rationalisation
- Undertake ‘snow desk’ training scenarios for winter service providers.
- Reinforce and formalise existing winter service mutual aid arrangements and contingency plans.
- Audit decision making and monitoring as a performance indicator.

Appendix A – Stakeholder Questions

The following questions were sent to the London boroughs:

Forecasting Services

What is your current winter service forecasting service?

Is there any more than one weather domain?

Who is the provider?

What is the current contractual period?

What is the approximate cost per year?

What are your winter service forecasting contractual arrangements? – lump sum, duty/cost reimbursable etc

Bureau Services and Weather Stations

What are the current ice station bureau arrangements?

Who is the provider?

What is the current contractual period?

What is the approximate cost per year?

What is the decision making and monitoring process grit/no grit/monitor?

How many weather stations do you operate?

Cross-Border Co-operation

What sort of co-operation do you have with other boroughs and TfL? For example: coordinating treatments, annual reviews, collaborative procurement.

The following twelve replies were received from stakeholders. These replies follow overleaf.

	London Borough of Bromley	Royal Borough of Kensington and Chelsea	London Borough of Barnet	London Borough of Merton
Forecasting Services				
What is your current winter service forecasting service?	The service we have used for the last decade + is MET OFFICE OPEN ROAD	We only use the Met Office Weather Advisory Service	Open Road weather forecast.	Met office
Is there any more than one weather domain?	Bromley borough 'contains' the three coldest MO Winter Weather service domains	No	No	Yes-Domains 3& 4
Who is the provider?	Met Office	n/a	Met Office, Exeter	Met office
What is the current contractual period?	Currently being renewed annually. We've been awaiting developments in Route based Forecasting and a Pan London contract development, an idea which has been floating around for at least 3 or 4 year	n/a	One Year	Annual
What is the approximate cost per year?	Commercially sensitive- withheld at this stage. LB Bromley has entered into a joint procurement arrangement with LB Bexley that has been running for the past three years and resulted in a significant reduction on previous cost.	n/a	£7542 + VAT	£5,000
What are your winter service forecasting contractual arrangements? – lump sum, duty/cost reimbursable etc	lump sum covering 5 month active WS period and 1 month at either end of the season.	n/a	Lump sum	Pay lump sum to met office for the service
Bureau Services and Weather Stations				
What are the current ice station bureau arrangements?	MO forecast data is interpreted and presented by a third party	N/A	Software License and Bureau Service provided by Vaisala	The Bureau service and weather stations are not applicable to us
Who is the provider?	Vaisala Who also supply and maintain our weather stations.		Vaisala	
What is the current contractual period?	Currently being renewed annually		5 year contract, Winter 2006/07 to Winter 2011/12	
What is the approximate cost per year?	Commercially sensitive – withheld at this stage (Joint procurement with LB Bexley)		£13,669	
What is the decision making process grit/no grit/monitor?	LBB Officers (7) on standby rota examine and evaluate the MO forecasts and additional data provided by Vaisala and make the go /no go decision each day. The timing of that decision is frequently altered in order to fine tune the decision making process as the weather develops.		Open Road" provides, each day, a morning summary, a 24hour forecast and a "2-5 day" forecast for the following four days. These forecasts are updated regularly if it is found that actual temperatures and conditions vary from those predicted in the original forecasts (e.g. Cloud cover dissipating before predicted time can result in colder road temperatures with ice forming on damp roads). When weather forecasts are updated by the Met. Office outside normal working hours, the Council's Emergency Control Centre is informed of the revised prediction by phone or e-mail, which is then backed up by a revised forecast. The Winter Maintenance Controller is contacted and if, after liaising with the Winter Maintenance Lead Officer, the decision is to carry out gritting, then this should commence within 60 minutes of the order being given. The Controller shall monitor the daily or updated forecasts from the Met. Office's "Open Road" weather forecast system and shall agree any necessary action with the client. This decision shall be transmitted to adjacent Boroughs / highway authorities.	
How many weather stations do you operate?	2 (Midfield Way and Main Road Biggin Hill.)		Two LBB own weather stations and have access to another weather station owned by a neighbouring authority (Enfield).	
Cross-Border Co-operation				
What sort of co-operation do you have with other boroughs and TfL? For example: coordinating treatments, annual reviews, collaborative procurement	As indicated above, Bromley has joint procurement arrangements with LB Bexley for forecasting and bureau service. Both of the account managers have expressed a wish to extend this arrangement to other adjacent South East London boroughs. Last year Bromley shared a Vaisala training course with Greenwich. In 2009 Bromley lent 160tonnes of road salt to Croydon during the shortage after the Feb snow. We share our daily go /no go decision with all our neighbouring boroughs and TfL via email (doesn't quite amount to coordination of treatments but we do consider our decisions in relation to neighbours). Data from the TfL weather station on the A21 and a station at Botley Hill Surrey is used in our forecasts and presented for duty officers consideration via the Vaisal icenet system	None	Collaborative procurement arrangement headed by Croydon for buying grit from Cleveland Pottash (ending in July 2010). Currently LBB is in the process of joining the ESPO (Eastern Shires Purchasing Organisation) framework contract for the supply of salt. Contract is valid until April 2012. Exchange of information with adjacent boroughs/TfL regarding the proposed treatment/ timing etc Taking part in LoTAG Winter Maintenance Board and Pan London Winter Service Review.	We actively participate in the Pan London mutual arrangements which includes mutual aid support. We also support cross borders and partner agencies.

	London Borough of Hounslow	London Borough of Brent	London Borough of Havering	London Borough of Waltham Forest
Forecasting Services				
What is your current winter service forecasting service?		This was a web based interactive system showing all of the Brent winter maintenance routes. Sky view data was gathered by a WSI vehicle driving all of the relevant roads and this was incorporated into their model. 24 hours; 5 days; and 10 days forecasts were offered. This gave greater forecast accuracy as this is/was a bespoke forecast. Managers could access the system at home on their PC's and text messages (with all of the relevant forecast information) was sent to managers' phones. Overall, this was far superior to the outdated met office system with inaccurate domains	The Forecasting service reports at 11.00, 1700, 2300, 0300 with 2 5 day forecasts on Monday and Thursday.	We use the Met Office- London Boroughs Winter Weather Service on an lump sum basis renewed annually I think the cost was in the region of £4500 last year
Is there any more than one weather domain?		This system did not use domains as they provide poor information especially where two or more domains cover a Borough – Brent was in two domains in the old system.	The London Borough of Havering has 2 domains 3 & 6.	The borough spans zones 3 and 6.
Who is the provider?	We enter into the agreement with the Met. office	WSI – which unfortunately pulled out of the market on the 1st May. We are currently evaluating new providers.	The provider of services is the Met Office.	
What is the current contractual period?	Yearly basis. We will enter into agreement this year in August/September 2010	1 year contract.	The current contractual period was for 2 years due for re negotiation this year.	
What is the approximate cost per year?		5,000	£7575 cost of contract	
What are your winter service forecasting contractual arrangements? – lump sum, duty/cost reimbursable etc		Lump sum	Lump sum at the start of the year.	
Bureau Services and Weather Stations				
What are the current ice station bureau arrangements?	N/A	None in place	London Borough of Havering have no weather stations or bureau services	We do not use any other bureau or other facilities to assess the weather situation other than with experienced client officers with good local knowledge.
Who is the provider?	N/A			
What is the current contractual period?	N/A			
What is the approximate cost per year?	N/A			
What is the decision making process grit/no grit/monitor?	We receive weather forecast at 11am, 5pm , 11pm and 3am. If the Condition indicator is Charlie, Snow or Delta, we carry out gritting.		The London Borough of Havering are part of the London Local Authority Gold arrangements where salt supplies and treatments are reported during crisis times through the London Local Authority Co-ordination Centre (LLACC) and supplies are considered. We have some mutual aid arrangements and are part of the Salt Union Supply Management system.	We try to liaise with our neighbouring boroughs before the season starts but to be honest decisions will always be taken based on the weather conditions expected or being experienced in Waltham Forest.
How many weather stations do you operate?	N/A			
Cross-Border Co-operation				
What sort of co-operation do you have with other boroughs and TfL? For example: coordinating treatments, annual reviews, collaborative procurement	Coordinating treatments & collaborative procurement.	We have a close relationship with Harrow, as we have a shared salt barn, and talk on the phone regularly in the winter season. As we are closer to the Northolt weather monitoring station and they are closer to the Barnet station, our forecasts tend to diverge.	The London Borough of Havering are part of the London Local Authority Gold arrangements where salt supplies and treatments are reported during crisis times through the London Local Authority Co-ordination Centre (LLACC) and supplies are considered. We have some mutual aid arrangements and are part of the Salt Union Supply Management system.	

	London Borough of Hammersmith and Fulham	London Borough of Bexley	London Borough of Lambeth	London Borough of Newham
Forecasting Services				
What is your current winter service forecasting service?	dedicated winter forecasting by WSI (although service withdrawn)	Met Office	Met Office	Met Office London Borough Service
Is there any more than one weather domain?	Not sure	No	three	No
Who is the provider?	WSI	Met Office		Met Office
What is the current contractual period?	annual so currently out of contract	Annual	Winter Months	Just completed, but we aim to renew.
What is the approximate cost per year?	£2750 per winter	£8K	£2,500	£4,000
What are your winter service forecasting contractual arrangements? – lump sum, duty/cost reimbursable etc	monthly invoiced	Split . Tendered, part of a wider street services contract (Commercially sensitive) .	one off payment	Lump sum
Bureau Services and Weather Stations				
What are the current ice station bureau arrangements?	None	Ice Cast	N/A	None
Who is the provider?		Vaisala	N/A	N/A
What is the current contractual period?		5 year contract	N/A	
What is the approximate cost per year?		£6.3K	N/A	
What is the decision making process grit/no grit/monitor?		Mid day decision with 22.00 update to confirm operations .	N/A	No forecasting time have been provided. 3 detailed decision making tables supplied.
How many weather stations do you operate?		One	N/A	n/a
Cross-Border Co-operation				
What sort of co-operation do you have with other boroughs and TfL? For example: coordinating treatments, annual reviews, collaborative procurement	We access the London (capital ambition) salt contract for the supply of salt. Taking part in the annual review this year and was part of annual review last year. No treatment coordination at present. During the past winter we had constant contact with TfL(on London salt Cell)	Collaborative procurement with Bromley . Vaisala Consortium Members Bexley, Bromley, Croydon, Greenwich, Kingston, Lewisham & Sutton.	Reviews	Daily faxes to neighbouring Boroughs. procurement - we did look into this, but "standing orders" precluded /made very difficult.

Appendix B – Potential Staff Savings

The following is the derivation for the estimated staff cost savings presented in Table 4.1 and discussed in section 4.9.2. for marginal nights

Use spinal column point 32 (grade SO1) as an appropriate level for a winter decision maker.

Annual salary for SCP 32 from April 2010, including London weighting = £27,901

Hourly rate = £27,901 / 1929.291 = £14.46 per hour (factor from Unison website)

Unknown: enhance payments to monitoring/decision makers out of hours – therefore EXCLUDED from calculation

Assumed: a decision maker monitoring marginal one night in two between October and March, so 182 days/2 = approx 90 days:

Assumed 4hrs per occasion for monitoring marginal nights

Therefore: 4hrs x 80 days = 320hrs

$$320\text{hrs} \times \text{£}14.46 = \text{approx } \text{£}4,600$$

Assumed sharing out of hours monitoring

For example with 4 boroughs sharing resources, an individual borough would undertake its role on one occasion in 4 therefore making a saving of 3 occasions

Therefore: For 2 boroughs sharing (1 in 2) = (4,600x2)-4,600 = £4,600

For 3 boroughs sharing (1 in 3) = (4,600x3)-4,600 = £9,200

For 4 boroughs sharing (1 in 4) = (4,600 x 4)-4,600 = £13,800

For 5 boroughs sharing (1 in 5) = (4,600 x 5)-4,600 = 18,400