Report on the investigation into the Mid-Kent Water supply interruptions in the Kemsing-Plaxtol area

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THE DIRECTOR'S CONCLUSIONS

Starting on Friday 30 July, up to 3,000 customers of Mid Kent Water suffered supply interruptions, some for as long as four days. On 3 August I told the Company that I would be carrying out an inquiry into the incident.

The inquiry team's findings, set out in this report, have been agreed by the Company.

The distribution system in this part of the Company's area is difficult, and requires skilful management. The combination of events meant it was possible, despite best endeavours that some customers would have experienced some interruptions to supply. However, the extent and duration of the incident, and the handling of the consequent customer issues, were within management control, and the report identifies significant failings in these. In particular I consider that:

- There is no evidence that this failure of water supplies was primarily attributable to unprecedented demand, or to lack of water resources, or to inadequate infrastructure.

- The scale and duration of the failure of piped water supplies was primarily attributable to the failure on Thursday 29 July, at Director level, to recognise and act on the potential consequences of the accumulated operational problems. This meant that remedial measures that could have been initiated on Thursday 29 July were not initiated until Saturday 31 July and Monday 2 August.

- The failure was exacerbated by poor communication between Ashford and Snodland, no preparation of weekend emergency arrangements, poor telephone arrangements and inadequate plans for customer communication. This resulted in a failure to make adequate provision of emergency supplies where they were needed.

- As regards the management of the incident, it is clear that non-operational staff should have been mobilised earlier, ie on Saturday 31 July, and that too much reliance was placed on high-level public relations rather than communication with the customers directly concerned. However, it is clear that all of the staff involved over the weekend worked long hours and devoted considerable effort and ingenuity to restoring water supplies.

- The company management has expressed concern that it could become inadequately resourced to deal with unexpected emergencies. This is not borne out by the company's accounts, but may suggest the need for a sharper focus by the Directors on the operational management of the company's core functions.

I have told the Company that it needs to address the following issues:

- Why were senior management not sufficiently engaged by 29 July to anticipate the risk of a major incident and therefore to take appropriate action? This is an issue of internal management and communications.

- The need to review arrangements for communicating with customers in incidents of this kind, including both manning the company's telephones as well as taking active steps to deliver sound information and advice to customers.

- The need to review generally, the adequacy of the company's contingency and emergency plans for major incidents. This includes the availability of appropriate staff resources, arrangements with adjoining companies, and arrangements for emergency supplies.

The Company has already taken a number of actions and others are planned. These are set out at the end of the report. I will require the company to report their progress on these actions so that I can be satisfied that these are appropriate to address the issues identified above.

The Company responded quickly to the incident by a payment of £50 to be credited to customers' accounts. This included some customers not affected by the incident. Having regard to the difficulties customers encountered, I have asked the Company to extend the payment to £100 for those customers who were directly affected. The Company has agreed to this.

During the Inquiry, the Company raised more general issues about the future maintenance and strengthening of the Company's rural distribution network. These are being considered as part of my review of the Company's price limits for the period 2000 – 2005. Final decisions on these will be announced on 25 November.

I C R BYATT
Director General of Water Services

1. INTRODUCTION

1.1. Starting on Friday 30 July up to 3000 customers of Mid Kent Water suffered supply interruptions, some for as long as four days. This report details the findings of an investigation by the Director General of Water Services into the incident.

2. PURPOSE OF THE INQUIRY

2.1. The purpose of the investigation was to establish whether the company has been properly carrying out its functions in respect to its supply duties under the Water Industry Act 1991. The issues covered included:

- What caused the supply failures?
- Did the company do everything in its power to prevent the failures in the first place, and then to provide alternative supplies and restore the service as quickly as possible?
- Were customers kept properly informed about the situation?

2.2. This investigation is not concerned with any water quality issues which, if appropriate, will be considered by the Drinking Water Inspectorate.

3. THE INVESTIGATION

3.1. The investigation team comprised Ofwat's Head of Water Resource Economics and a Senior Performance Analyst. The team made two visits to Mid Kent Water to gather evidence and to interview key company personnel. The area affected by the incident was visited. In total the team spent 5 days in the area.

3.2. Ofwat placed advertisements in local papers asking for customers affected by the incident to pass on their views. A total of 16 written submissions have been received and studied. In addition the Ofwat Customer Service Committee with responsibility for Mid Kent Water received 35 letters and more than 200 telephone calls, which have been taken into account.

3.3. Mid Kent Water's Director of Customer Services and Regulation was the key point of contact for the inquiry. The Managing Director, along with the Incident Director (the Director of Commercial Development) briefed the investigating team for three hours on the first day of the investigation.

During the investigation the team interviewed the Operations Director, the Director of Strategic Planning, the Resources Manager, Customer Services Manager, Customer Services Account Manager, Key Commercial Customer Manager, Works Manager, Control Manager, Distribution Network Supervisor, Operations Controller, the company's PR consultant and the IS Consultant.

3.4. Written evidence was provided by the Managing Director, Incident Director, Director of Customer Service and Regulation, Customer Services Manager, Production Manager, Works Manager, Maintenance Manager, Control Manager, Customer Services Accounts Manager, Distribution Network Supervisors, Supply Network Supervisor, Special Projects and Leakage Team, a Customer Service Representative, and the PR consultant.

3.5. The company co-operated fully throughout the investigation.

4. REPORT STRUCTURE

4.1. This report gives a brief description of the company and the area affected by the incident. This is followed by a chronological analysis of the incident, and a discussion of the key issues.

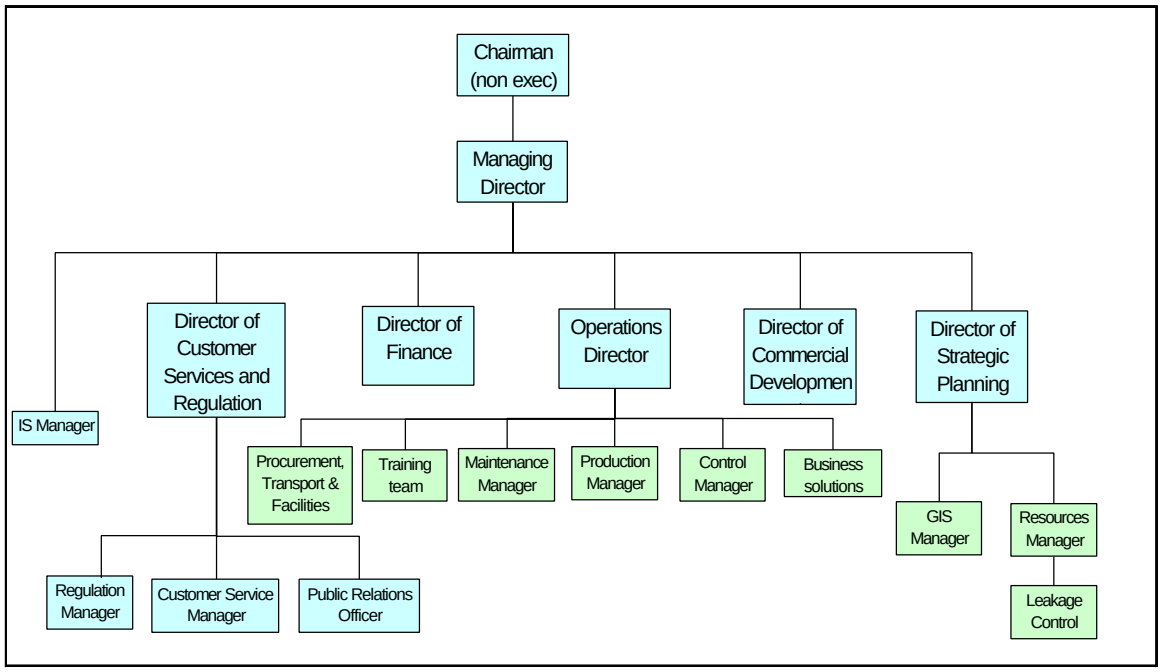
5. MID KENT WATER PLC

5.1. Mid Kent Water PLC is the wholly owned subsidiary of Mid Kent Holdings PLC and is the appointed water undertaker supplying a population of 560,000 (202,000 domestic customers, 21,300 commercial customers) in the largely rural area (2050km^2) of central Kent and parts of East Sussex. The area includes the larger centres of population of Ashford, Maidstone and Canterbury. There are a significant number of agricultural and horticultural customers.

5.2. The company has its headquarters at Snodland in the north west of its area but has a major subsidiary office at Ashford some 30km to the south east.

6. ORGANISATION

6.1. Mid Kent Water PLC is headed by a non-executive Chairman, with the Managing Director exercising day-to-day control. The company is organised functionally with control of functional areas exercised by five Directors, though only one of these – the Operations Director, is a board member of Mid Kent Water PLC. The organisation diagram below sets out the company management structure that has bearing on the incident.



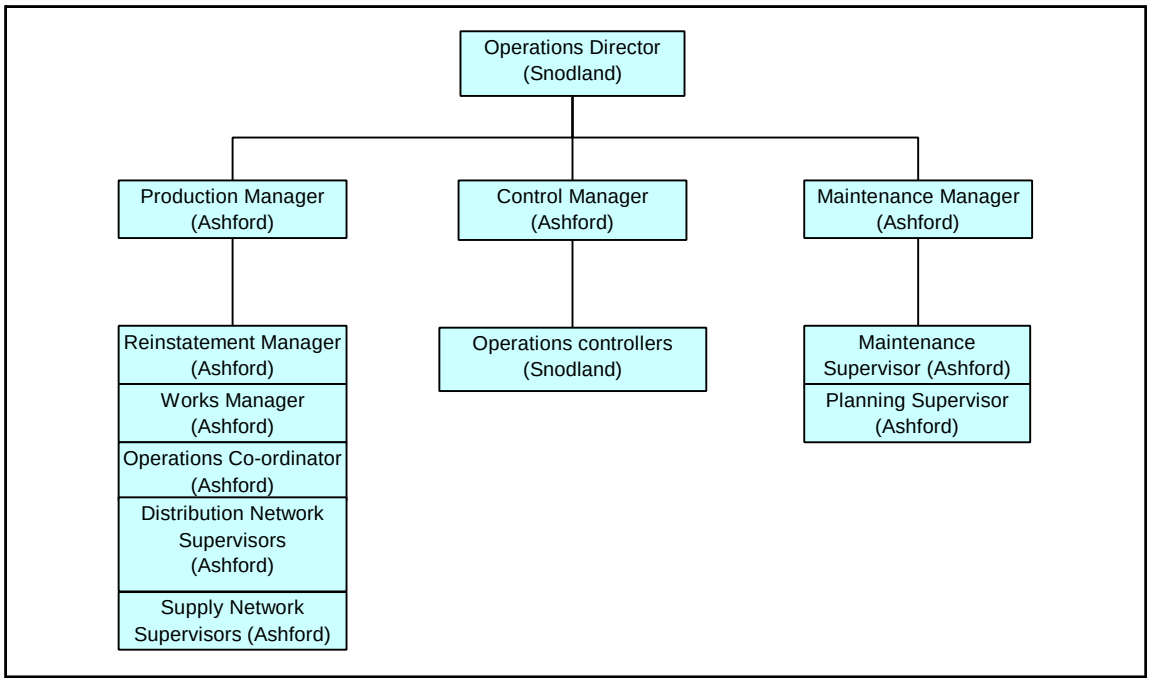
6.2. All of the Directors are based at the company headquarters in Snodland while the management posts in the operations and planning teams are

located at Ashford some 30km away. However, the operations control room and the customer services team are at Snodland. The company is building new operations accommodation at Snodland to allow the managers now based in Ashford to be relocated.

6.3. The operational functions of the company are the responsibility of the Operations Director. In practice, however, operations managers at Ashford carry out the function with direction from Snodland as described below. Formal communication between the operations managers and the Operations Director is by the Production Manager's feedback from the weekly operations review meeting.

7. OPERATIONS MANAGEMENT

7.1. The company is organised by function for management of operations; an organisation chart is shown below:



7.2. The three managers reporting to the Operations Director meet at least weekly, usually on a Tuesday, to review system performance over the previous weekend and to make plans for meeting demands over the week ahead. The Production Manager, as the Operations Director's deputy, chairs the meetings and provides feedback to him after meetings. The operations managers have authority to make changes to the operational configuration of the system within the guidelines of set procedures. This means, for example, that they cannot, without the authorisation of a

Director, alter District Meter Area (DMA) boundaries fundamental to leakage control in order to import water from another zone.

7.3. The operations control room at Snodland controls the operation of the water supply and distribution system. Normal manning there is one controller except at weekends when two controllers are on duty during the day. A member of the operations management team is appointed to be out of hours duty manager. Similarly, a member of the executive team is appointed as standby Duty Director for the quiet hours.

7.4. As regards operational matters, the formal communication channel between the Operations Director and his key managers is the Production Manager's feedback from the weekly operational review meeting. The company says that the Operations Director is briefed by the Controller in the Control Room at Snodland at the start of each day. This details any over night problems, the status of any ongoing work and details of any major job to be carried out during the day. He is briefed by the Controller in the Control Room before leaving site on Friday evenings.

7.5. The Operations Director, in addition to the weekly review with the Production Manager, visits Ashford for a Departmental meeting each month, mid month and at the beginning of each month has a formal one-to-one meeting with each manager at Ashford. A monthly customer liaison meeting chaired by the Operations Director is also held to review customer related issues at which senior managers from Ashford, Customer Service and Commercial Development are present.

7.6. The Managing Director usually visits the Control Room in the course of informing the Controller he is leaving the building.

7.7. The company says staff are not expected to deal with every operational eventuality. They are, however, experienced and knowledgeable and so can reasonably be expected to handle day to day operational problems. The efficiency improvements required of the Company have been made by reducing staff numbers which means that staff at all levels carry more responsibility and have to make more judgements on operational issues than would have been the case in previous years.

7.8. It is appropriate here to stress that it is evident from the operational logbooks that certain operational managers and supervisors were working long hours over the period under report, some at night and some on a voluntary basis.

8. COMMUNICATING WITH CUSTOMERS

8.1. Mid Kent Water operates a telephone call centre at its Snodland office during the normal working day from Monday to Friday. The call centre is the responsibility of the Director of Customer Services and Regulation and it deals with account queries and telephone complaints during weekday office hours. There is a facility to indicate to the customer service team the number of calls waiting to be answered. Customers with water supply and other operational emergencies are directed by Mid Kent's entry in the telephone book to two numbers that terminate at the Snodland switchboard during normal working hours. These are passed to the control room at other times. There are 12 lines into the operations control room and there is a facility for the operations controllers to place recorded explanatory messages that will be activated when a line rings unanswered. However, there is no facility to indicate how many calls there are waiting to be answered. During the incident it appears that, although the recorded message facility itself was functioning correctly, the company switchboard was malfunctioning and misdirecting calls. As a result, although the recorded messages were updated regularly most calls received an engaged tone instead of the message.

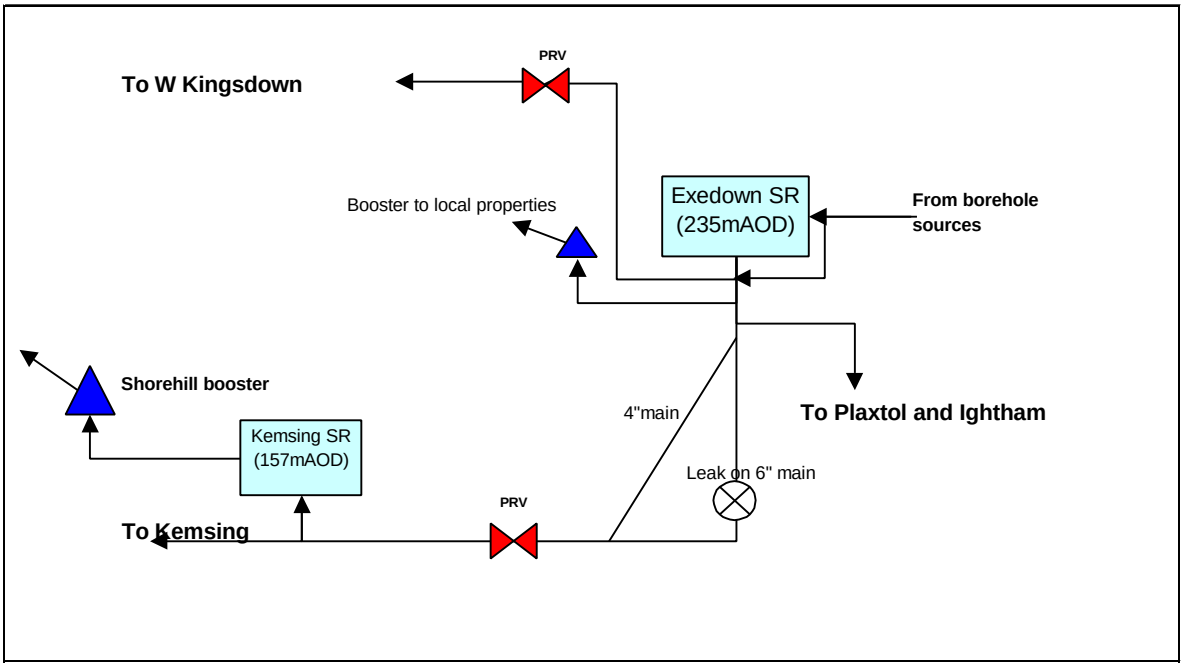
8.2. There are procedures for activating the customer service call centre outside working hours and for calling out call centre operators. However, call centre operators are not obliged to respond to call-outs. In the event of an out of hours emergency there is no automatic facility to transfer calls from the published operations telephone numbers to the customer service call centre.

9. SUPPLY AND DISTRIBUTION

9.1. At the end of July and the beginning of August 1999 a number of customers in the west of the Mid Kent Water area suffered interruptions to supply of up to 4 days in duration. The customers affected lived in the northern (and higher) parts of Kemsing village including parts of the North Downs above the village, and the high ground to the south around the villages of Plaxtol and Ightham Common. The properties affected tended to be fairly isolated, apart from those in the villages of Kemsing and Plaxtol. The area is part of Mid Kent's Stansted water supply zone.

9.2. The geography of the incident area means that the distribution system is characterised by long small diameter mains with numerous pressure reducing valves (PRVs) and booster pumps. High pressures are required to ensure that reservoirs fill and hills may be crested.

9.3. The area is served by the Exedown and Kemsing reservoirs. The figure below shows a diagrammatic representation of the supply arrangements.



9.4. Exedown reservoir (capacity 4.55Ml) provides storage and provides sufficient head for the Stansted supply zone. It is supplied from a number of borehole sources. Outlets from the reservoir flow by gravity (except for a boosted supply to properties near the reservoir) into distribution. Supplies are also balanced by the Kemsing reservoir (capacity 2.27Ml) which can 'rest on the system'. Exedown and Kemsing levels are continuously monitored in the control room at Snodland.

9.5. Water is supplied to the Kemsing areas and reservoir from the boreholes in the north and east of the area via Exedown reservoir. It is possible to take a supply though Wrotham but this is not usual practice because it would

mean introducing very high-pressure water directly into supply. (This was, however, done on Monday 2 August). The high ground to the north of Kemsing (Shorehill) is served by a booster pump which will only operate if there is water in Kemsing reservoir. Other parts of Kemsing may be fed directly from the 4" and 6" mains.

9.6. Water for the village of West Kingsdown to the north is supplied through a PRV from Trosley boreholes and the Exedown reservoir. The high ground around Ightham Common and Plaxtol in the south is supplied direct from Exedown reservoir. By changing valving arrangements it is possible as a last resort to serve some of the lower parts of the area around the village of Yalding to the south from the Bewl system to the east (this was done on Saturday 31 July).

9.7. In 1998 Mid Kent Water commissioned Halcrow Water Services to draw up a zonal strategy report for the Stansted water supply zone. The report looked at how the zone would cope with projected future demands. One of the conclusions was that some reinforcement of the mains supplying Kemsing would be necessary before 2015 and that the improvement should be carried out in 2005.

10. RESOURCES MANAGEMENT AND DEMAND FORECASTING

10.1. As for most companies in South East England, Mid Kent Water's water resource situation requires close management. Most of the company's available supplies are drawn from groundwater sources; 88% from 100 wells and boreholes, with the remaining 12% drawn from the River Medway via Southern Water's Burham treatment works and directly from Bewl Water.

10.2. For the current year 1999-00, on an average daily basis under normal weather conditions, company wide resource availability and demand is about 191 Ml and 159 Ml respectively (demand in this context includes water lost as leakage). Under average day peak week conditions, company wide resources are some 224 Ml/d compared to projected demand of 198 Ml/d. Peak day, usually at a weekend, is not included in the supply/demand forecasts.

10.3. It is these peak periods that are key to the company's resources management and planning. To aid management and planning the company has developed sophisticated computer models for resource planning, network management and long (25 years), medium (annual/monthly) and short-term demand forecasting. These are generally regarded as innovative within the water industry.

10.4. The functions of resource planning and demand forecasting are the overall responsibility of the Director of Strategic Planning. The Resources Manager, who reports to this Director, undertakes long-term planning on resources and demand as well as medium (annual/monthly) and short-term (weekly) resource management and demand forecasting.

10.5. The Resources Manager is responsible for advising the Operations Department on the resources and demand situation. On a monthly basis, the Resources Department and Operations meet to review analyses of demand and resource availability at water supply zone level and to advise on all the constraints imposed including abstraction licences. This is intended to indicate to Operations the "envelope of opportunity" for the coming month. Abstractions are licensed on an October to September cycle, and must be carefully managed throughout the year to ensure that appropriate volumes are available during peak summer months. The Environment Agency has indicated that at the time of the incident groundwater levels were at or slightly above the seasonal norm.

10.6. The Resources Manager also provides demand forecasts for each supply zone to Operations on a weekly basis (each Wednesday). This is not related to the monthly reviews and is solely about providing the Operations Department with information, after the operations managers' Tuesday review meeting, on the expected level of peak demand for the forthcoming weekend. These demand forecasts are produced upon receipt of forecast weather conditions (maximum temperature, rainfall and hours of sunshine) from the Met Office (Southampton) for the period Wednesday through to Sunday and are used to optimise the agreed Tuesday plan.

10.7. Resource availability in respect of average day peak week for the Stansted water supply zone in 1999-00 is reported as 28.8 Ml/d in Mid Kent's Supply/Demand Submission dated May 1998. This reports that an average day peak week demand of 28.7 Ml/d was met for the Stansted water supply zone in 1995-96. This compares with an average demand of 20.1 Ml/d in 1995-96, which illustrates the effect of garden watering and possibly horticultural irrigation in this zone.

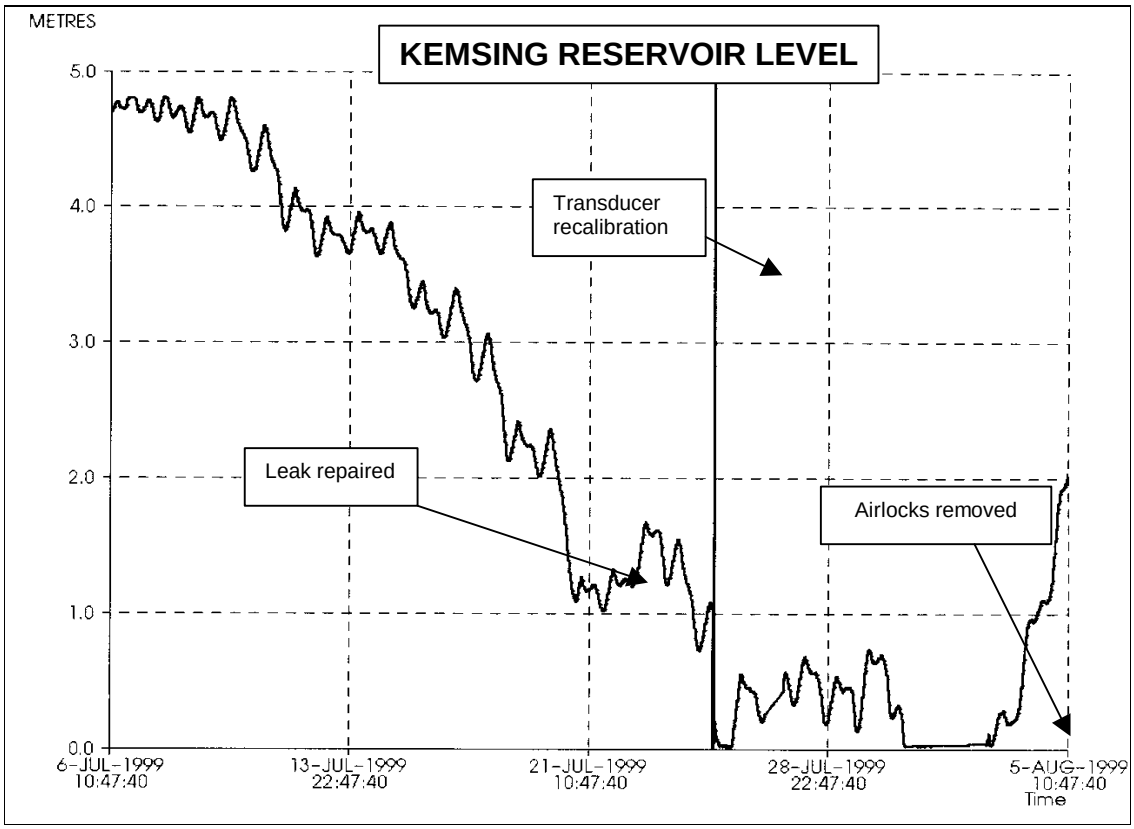
10.8. Mid Kent's long-term average day peak week forecast is based on analysis of household and non-household use using a formal methodology endorsed by the Environment Agency. Mid Kent advises that, due to the "averaging" techniques deployed in this methodology, actual localised peak demands by customers may differ significantly from the average day peak week forecasts for water supply zones.

10.9. For the week ending 1 August 1999, Mid Kent report an average daily demand of about 26 Ml/d for the Stansted zone (including demand not met on Saturday 31 July and Sunday 1 August). This is considerably higher than the normal average daily demand for the Stansted zone, but less than the average day peak week demand in 1995-96.

11. CHRONOLOGICAL NARRATIVE

11.1. Monday 12 July

11.1.1. The origins of the incident may be traced to sometime around Monday 12 July when the Kemsing reservoir failed to recover from the usual high demands associated with hot summer weekends. This is clearly shown on the Reservoir level trace below.



11.2. Monday 19 July

11.2.1. This is the first record of any concern at the falling reservoir level, when the Control Manager instigated checks on PRVs in case these were impeding the flow from Exedown Reservoir to Kemsing.

11.3. Tuesday 20 July

11.3.1. Investigations led to the discovery of a serious leak on the 6" main forming part of the distribution system which Kemsing reservoir balances.

11.4. Wednesday 21 July

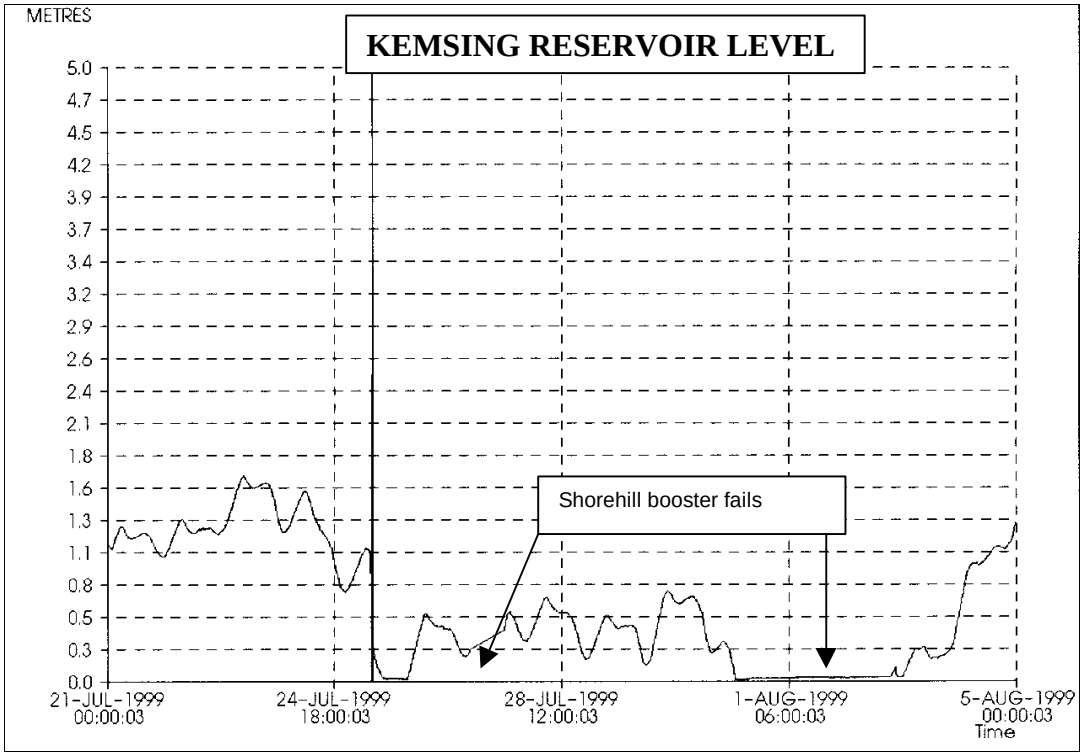
11.4.1. The leak was repaired fully by 0200.

11.5. Thursday 22 July

11.5.1. At the routine weekly 'production planning meeting' (to consider the action required to meet expected demands for the weekend ahead) the Maintenance Manager recorded concern that Kemsing reservoir was not recovering despite the repair of the leak and repair to the inlet mechanism. On the same day it was discovered that the reservoir depth transducer was faulty and the actual level was 0.5m less than indicated, (corrective action was taken on 25 July and is visible on the reservoir trace). Investigations as to the reason for the decline continued over the next few days but without success.

11.6. Sunday 25 July

11.6.1. At 0900 it became clear to the operations controller that Kemsing reservoir would be empty by midday (see reservoir trace below). The operations controller recorded that key managers (Production Manager, Maintenance Manager and Control Manager) were informed of this. Later that day the booster pumps serving Shorehill from Kemsing reservoir tripped out because of low reservoir levels. Customers in the Shorehill area reported that they were without supply and arrangements were made to provide containers of water. Key managers were informed of this. Later in the evening an extra operations controller was called in to deal with the customer contact. Overnight the level of the Kemsing reservoir recovered sufficiently to allow the Shorehill booster to be restarted.



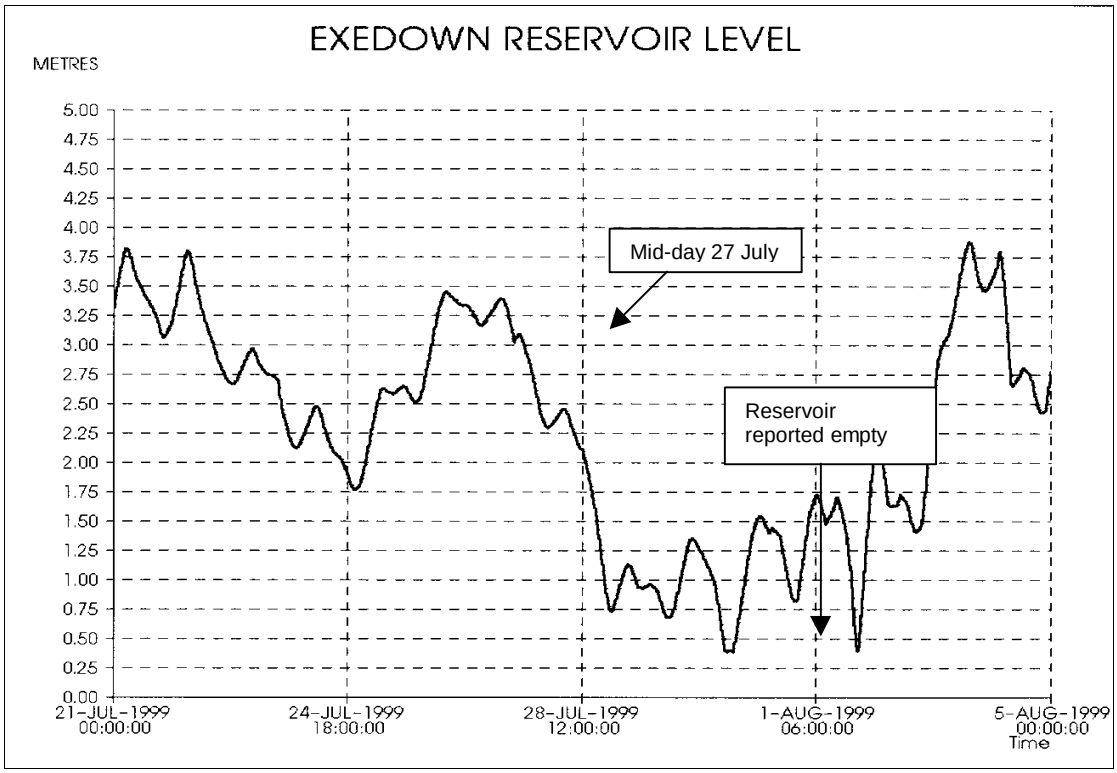
11.7. Monday 26 July

11.7.1. During the day the level of Kemsing reservoir recovered slightly as the supply arrangements were optimised. However, customers have said that low water pressure was evident throughout the following week and this is confirmed by the reservoir trace.

11.8. Tuesday 27 July

11.8.1. The Distribution Network Supervisor who had been acting as duty manager over the previous weekend reported on the weekend's problems to the production planning meeting in Ashford. The Production Manager, Control Manager, and Maintenance Manager attended the meeting. They discussed the problems at Kemsing and considered the possibility of making additional resources available but appear to have decided that this action was not yet necessary. Later in the day one of the key borehole sources (Trosley no 3) failed, reducing water available by 1.3Ml per day (about 5% of average daily demand for the Stansted zone).

11.8.2. Consistent with the borehole failure, Exedown reservoir began to decline rapidly (see reservoir trace below). Reservoir levels are monitored at the Snodland operations control room only. Copies of the graphs showing reservoir levels may be printed off and faxed to Ashford.



11.8.3. At the end of the day the Managing Director called into the operations control room to enquire about the position on the Kemsing reservoir.

Having discussed the range of investigations and actions underway he felt there was nothing further he could appropriately add to the decisions taken at that time.

11.9. Wednesday 28 July

11.9.1. 'The Times' weather forecast national outlook was "Sunny, showers in the west on Friday".

11.9.2. Weather forecast provided to the water resources team by Met Office at 0700 indicating for Saturday and Sunday:

- Maximum temperature of 24 C
- 3 hours sunshine
- rainfall on Sunday

11.9.3. The demand forecast produced by Resources Department was provided to Operations by 1000. The weekend forecast was for 190 Ml/d company demand with 24 Ml/d for Stansted supply zone. This is in contrast with the company-wide demand of the previous weekend of 203.5 Ml/d.

11.9.4. At the same time the Production Manager (based in Ashford) was updated on the actions being taken to understand the reasons for the Kemsing problems and the latest borehole situation. At the Supply Team Meeting, the Maintenance Manager advised the Production Manager and the Control Manager that the Trosley No.3 pump would not be replaced until 9 August, as Seeboard was unable to isolate its HV line until then. Careful adherence to safety procedures prevented crane access in the meantime. At this time, decisions were also being made to balance demand at Beech and Halling.

11.9.5. By mid-day it was clear that Exedown reservoir was in rapid decline and by midnight it was at 0.75 metres nominal (probably 0.35 metres effectively).

11.9.6. The Kemsing PRV bypass was opened (and on the following day the Kemsing reservoir ball valve was removed).

11.10. Thursday 29 July

11.10.1. 'The Times' national weather forecast outlook was "warm sunshine, showers in Ireland on Saturday".

11.10.2. At 0830 the Production Manager met with the Operations Director (in Snodland) and the Kemsing problems were discussed. The view remained that the forecast demands for the Stansted zone (including a major race meeting at Brands Hatch) could be met as the Kemsing reservoir was thought to be recovering. By this stage it had become clear that the

problem was not at Kemsing reservoir but somewhere in the supply/distribution network supplying the reservoir and the surrounding area. It is not clear whether the Production Manager was aware of the Exedown decline or whether he explained this in the meeting with the Operations Director.

11.10.3. At 1130 the Maintenance Manager returned from a team meeting at Hockers Lane (20km to the north west of Ashford) and reviewed the reservoir levels and source pumping figures in the absence of the Control Manager (on a day's leave). He was concerned enough to begin an immediate review of the sources, reservoirs, and distribution system. He took action to increase abstraction rates and improve the supply to Exedown reservoir. At 1410 the Maintenance Manager (in the absence of the Control Manager) initiated an emergency review meeting attended by the Production Manager, Distribution Network Supervisor, and Supply Network Supervisor. He explained his view that the supply system would not meet the weekend demands.

11.10.4. The rest of the day was spent maximising source yields and investigating the cause of the problem. It was suspected that there was an undetected major leak of between 1 and 1.5 Ml/d. Attempts were made in the early evening to increase take from Southern Water's Burham treatment works into the Burham WIS zone. This would allow more Trosley water to be transferred to the Stansted WIS zone. These foundered because the Operators at Southern Water's quiet hours control room were unaware of any agreement to vary water output. The Production Manager was unable to contact anyone with sufficient authority at Southern Water to make the required adjustments. It is only fairly recently that Southern Water closed its Chatham control room in the quiet hours, and transferred its functions to Falmer.

11.10.5. In the meantime the Operations Director had briefed the Managing Director at about 1200 on the basis of his morning meeting with the Production Manager that the system was 'set up adequately to meet expected weekend demand'.

11.10.6. At the end of the day the Production Manager briefed the Operations Director by telephone on the current situation. It was agreed that the aerial advertising planned for the weekend ('Sprinklers need a licence') would be prioritised in the Kemsing area although it was recognised that this would have little immediate effect. The Operations Director spoke again to the Managing Director, before the latter left the office in the afternoon. He contacted the Director of Commercial Development to hand over his duty as Duty Director for the weekend before he proceeded on leave at the end of the day. His view remained that there would be no unmanageable crisis in the Kemsing area, and they mainly discussed operational prospects relating to other areas in the company's region which he considered were more serious.

11.11. Friday 30 July

11.11.1. 'The Times' weather forecast outlook was "The east will stay dry and warm". Company staff told the Inquiry Team that they were aware that local forecasts indicated higher temperatures than previously forecast.

11.11.2. At 1100 arrangements were completed to increase the water taken from Southern Water into the Burham zone by 1 Ml/d and the source availability optimised into the Stansted zone. However, this had to be reduced at 2100 as Southern complained that Mid Kent was exceeding 15 Ml/d.

11.11.3. The table below summarises the volume of water available for supply to the Stansted zone on a daily basis during the week and the amount actually utilised:

Date	Mon 26 Jul	Tue 27 Jul	Wed 28 Jul	Thu 29 Jul	Fri 30 Jul	Sat 31 Jul	Sun 1 Aug	Mon 2 Aug	Tue 3 Aug	Wed 4 Aug	Thu 5 Aug	Fri 6 Aug
Available (Ml)	26.9	25.3	25.5	25.2	26.5	27.3	26.1	26.2	26.0	27.0	27.2	27.2
Used	24.3	22.4	23.9	23.4	25.3	26.1	25.2	25.7	25.5	26.5	25.4	22.1
Difference	2.6	2.9	1.6	1.8	1.2	1.2	0.9	0.5	0.5	0.5	1.8	5.1

The "available" row is the short-term output reflecting the outputs in the Company's Water Resources Plan less known outage. The "used" row reflects actual flows pumped to supply. The figures can only be applied at the WIS zone level. It does not follow that all outputs pumped at their full availability would end up refilling Kemsing Reservoir due to restrictions in capacity of the pipe work.

11.11.4. For balancing reservoirs like Kemsing and Exedown there is heavy reliance on recovery of water levels during the night. At a production meeting held in Ashford at 0830 on 30 July, it was concluded that Kemsing and Exedown reservoirs were now recovering. However, examination of the reservoir traces suggests that while maximum levels in the morning were increasing slightly, the minimum levels in the previous evening were as low as they had already been. In any case, neither reservoir was at a level which would allow for any increased weekend demand. Later in the day it was discovered that the Ridley No 1 borehole was failing due to a technical problem that could not be solved in the short term.

11.11.5. Throughout the day investigations continued in an attempt to pinpoint the underlying problem with the supply network – the focus was now on the possibility of a failed PRV and/or an airlock. At 1600 a meeting was held to agree operational responsibilities for the weekend should there be problems (the assumption was that all that could be done had been done). The Works Manager as weekend duty manager was briefed.

11.11.6. At 1930 the Control Room advised the Control Manager and others that the Exedown Reservoir was empty. The first no water call came early in the evening.

11.11.7. At 2300 the Operations Controller advised the Duty Manager that he had received approximately 65 "no water" calls from Ightham and Plaxtol, that he had deployed a bowser to Plaxtol Bakery and that an additional controller was on duty.

11.11.8. About 2300 the duty manager alerted the Duty Director (Director of Commercial Development) and explained the situation. The Duty Director had been briefed by the Operations Director as outlined above and, in Mid Kent's view, had no reason to be involved sooner. The Duty Director did not have his emergency plan to hand, as this is kept in the Control Room, but contacted the Managing Director to appraise him of the situation and the actions taken. The Managing Director advised the Duty Director to contact the PR Consultant to arrange for media messages to be put out over the weekend advising of the problem and asking customers to save water.

11.12. Saturday 31 July

11.12.1. 'No water' calls built up on the Saturday and bowsers and emergency supplies were deployed in response to those customers who were able to make contact. Customer contact for the whole of the Mid Kent area (where there were other less serious supply problems) was being fielded by two operations controllers. A total of 3451 calls were made to the company emergency number, only 16.4% were answered or received the recorded message advising of problems. Because there is no facility in the operations control room to monitor the number of incoming calls the controllers on duty were unaware of the level of call activity. As the problem escalated more operations staff were called out to assist in providing emergency water. The Duty Director contacted the Managing Director at 1100 to update him on the situation.

11.12.2. The Duty Director alerted the PR consultant early on the morning of Saturday 31 July and a strategy, including a media line was agreed:

> "Some customers may be experiencing disruption to water supplies, including low pressure, because of unprecedented demand in the Sevenoaks area. This is not in any way a resources issue – Mid Kent Water has water in the ground – we are meeting demand as we can – we are experiencing technical difficulties. Extra staff are being deployed."

11.12.3. Throughout the next two days the PR consultant kept in regular contact with the Managing Director and the Duty Director, and briefed local and national broadcast and print media.

11.12.4. The Duty Director supported by various operational managers manned the Control Room and directed operations throughout Saturday. Deployment of bowsers continued until 1900. At this stage these were being topped up by one tanker.

11.12.5. At 1100 the Duty Director and the Managing Director authorised breaking down DMA boundaries. Extra input of 0.7 Ml/d was secured at Pitfield. At 1600 arrangements were made to transfer Yalding demand from the Beech (Stansted) to the Paddock Wood system.

11.12.6. Late on Saturday evening a faulty PRV on the main serving the village of West Kingsdown was identified. The effect of the fault for as long as it had existed had been to increase flow rates into West Kingsdown (causing higher leakage possibly as much as 1 to 1.5 Ml/d) at the expense of Exedown reservoir levels. The fault was repaired.

11.12.7. Mid Kent has commented that:

"The feed to West Kingsdown is separate from Exedown Reservoir so the repair to the PRV would not affect the supply to Kemsing or Plaxtol whilst Exedown Reservoir contained water. Once Exedown was emptied then the situation for Kemsing was exacerbated but it did not trigger the problem."

and also

"Exedown can be run virtually empty without customers being out of supply and topped up overnight when demand is reduced"

and also (in respect of Saturday 31 July)

"demand exceeded ability of infrastructure to deliver water into the zone, particularly Kemsing, Plaxtol, Ightham and Wrotham"

and also (in respect of Saturday 31 July)

"the conclusion was that excessive demand was intercepting the water en route" (to Kemsing).

11.12.8. However, the situation was that Exedown Reservoir had emptied on the Friday evening, due to the loss of Trosley No.3 borehole, the faulty PRV and high (but not unprecedented) customer demand – including garden watering. This meant that air entered the Ightham/Plaxtol and Kemsing systems, and that supply interruptions resulted – almost immediately in Ightham Common and Plaxtol and on Saturday morning in Kemsing. When Exedown Reservoir recovered some air locks remained in the system which, despite the best endeavours of operational staff, in some cases took several days to overcome.

11.13. Sunday 1 August

11.13.1. Lower demands overnight, restored supplies to many properties (most of which lost them again the same day). At 0900 the Duty Director and Control Manager met in the Operations Control Room to discuss the situation. It was decided to begin calling in Customer Services staff to assist with dealing with customer calls. The Customer Service Accounts Manager was contacted and arrived at the control room at 0930 to begin answering calls. An additional customer service representative arrived at 1030 to provide further assistance. However, despite this of the 4481 calls received that day only 12.7% were answered or received a recorded message. This appears to have been due to a fault on the telephone switch that was supposed to route unanswered calls to the recorded message. Notwithstanding this, the level of calls may have exceeded the capacity of the 12 lines available on the operations number.

11.13.2. At 1030 the Managing Director contacted the Director of Customer Services and Regulation who then proceeded to the Snodland office and began calling out available staff and activating the call centre. Most of the customer calls that the Company was able to receive through faulty telephone switch continued to be received on the emergency number in the Operations Control Room. Because the company's IT Department had the Customer Service computer systems down over the weekend for planned Millennium checking work, and the floor of the call centre was lifted for re-cabling work, it was not until 1300 that the incoming calls could be switched through to customer services lines for action. At 1900 the company switchboard was closed because the only available trained operator had to go home and the recorded message (for unanswered calls) was amended advising customers to redial on the customer service helpline. By 2100 calls had subsided to a level that no longer required the call centre and the recorded message was again amended.

11.13.3. The table below shows the analysis of calls made to and from the operations number during the incident.

Date	Incoming calls	Calls answered	Calls engaged	Outgoing calls
Thursday 29 July	395	370	25	950
Friday 30 July	1226	440	786	750
Saturday 31 July	3451	567	2884	120
Sunday 1 August	4481	569	3912	220
Monday 2 August	1322	1131	191	940
Tuesday 3 August	793	731	62	900

11.13.4. The company considers that the number of outward calls on Saturday and Sunday is a measure of the activities to resolve customer problems by the Operational Management Team.

11.13.5. Neighbouring companies also received calls from customers unable to contact Mid Kent Water on the published numbers.

11.14. Monday 2 August

11.14.1. On Monday 2 August the Managing Director called a crisis meeting following which the customer services team was briefed and messages updated. A small team of specialists was formed to work on the problem and they worked continuously on removing airlocks and optimising the supply/distribution system. Steps were taken to maximise water resources. An extra 1.5 Ml/d was secured from Southern Water (Burham).

11.14.2. At 1000 the Customer Services Manager called the Ofwat Customer Services Committee to advise of the problem and explain the actions that had been taken.

11.14.3. Of 1322 calls received during the day on the emergency line, 1131 were answered or received a recorded message.

11.15. Tuesday 3 August

11.15.1. As Exedown reservoir level rose and airlocks were purged more elements of the system were brought back into commission and fewer customers were without water. Kemsing reservoir began to fill during the morning and full flows into the reservoir were measured later that day. The company assessed that all properties were returned to supply by 1400 on that day. However, one or two customers say that it was later than this.

11.16. Wednesday 4 August

11.16.1. The company decided to pay compensation of £50 to all customers in the affected area. The payment would be made as a credit on the next bill. A total of 3400 customers will be compensated, although the company does not know exactly how many customers were affected. It believes that the total number may be much less.

12. INCIDENT MANAGEMENT

12.1. Alternative supply arrangements

12.1.1. Making arrangements for alternative supplies is usually the responsibility of the operations controller in the control room. He will take details of customers without water and arrange for bottled water or a bowser to be provided. Customers with special needs are identified from lists held in the operations control room. The company reminds customers annually of the special needs facility but it is for customers to identify themselves to the company. The company also has a commercial customer representative who is an active contact for business/commercial customers enabling them to identify special needs.

12.1.2. During the incident customer services representatives were called in to assist in responding to customer requests for water. Bowsers were made available and positioned in 25 locations that were expected to be convenient to customers. However, as few customers managed to make contact with the company, many were ignorant of bowser locations. Bowsers were refilled using the company tanker and an additional tanker was hired on Sunday to provide water to agricultural users. The company say that the heavy traffic associated with the Brands Hatch race meeting over the weekend caused some delays in positioning bowsers, refilling from the HGV road tankers and providing bottled water.

12.2. Communicating with customers

12.2.1. The nature of much of Mid Kent Water's area of supply is such that in its view traditional communication methods used in emergencies (loudspeaker vans) can be of limited use as properties are widely separated and often set back some way from public roads. The company had initiated the use of banner towing aircraft to publish some key water efficiency messages because demand levels were increasing generally throughout July. During the incident a banner saying ' Sprinklers need a licence' was prioritised to the Stansted area.

12.2.2. Public relations at Mid Kent are formally the responsibility of the Customer Service and Regulation Director; however, the company retains the services of a PR consultant – a very experienced former BBC corporate affairs executive – to advise on media strategy.

13. CUSTOMERS' EXPERIENCE AND VIEWS

13.1.1. More than 200 customers contacted the Ofwat Customer Service Committee during, or immediately after, the incident. A further 16 customers wrote to Ofwat in response to an advertisement in the local media inviting comments.

13.1.2. It is clear from the above, and from information held by the company, that customers' experience varied both to the extent of their loss of supply and in their contact (or lack of contact) with the company during the incident and the provision of emergency supplies. It is, therefore, difficult to generalise but the following paints a broad picture.

13.1.3. Some customers lost their supply completely from Friday 30 July until the early evening on Tuesday 3 August.

"I am most concerned for the lack of a secure and reliable supply of water to my home. It is now Sunday afternoon and I have had no supply of water since Friday." [A customer in Ightham.]

"On Saturday 31 July, we lost all water supply at this address at 11.30am. Normal supply resumed on Tuesday 3 August at 2.30pm." [A customer from Kemsing.]

Others had intermittent restoration of supply at night during this period. Some customers experienced interruptions to their supply over a shorter period.

13.1.4. Most customers reported difficulties in contacting the company with the line either constantly engaged or receiving only an answer message. Some complained that when invited to leave their name and number no-one called them back.

"From the time the supply was cut I was not able to make any contact with the company at all. The number was perpetually engaged, I even tried it in the middle of the night/early hours, so I concluded the phone had been left off the hook. Certainly, no attempt was made to contact me so all we had to go on were rumours picked up in the local pub." [A customer in Plaxtol.]

Generally, customers considered that there was not enough information, but some acknowledged that the position improved on Sunday.

"Despite Mid Kent Water's shortcomings on the Public Relations front, I am honour bound to write again and say that since Monday 2 August direct contact was maintained between the Customer Services Director and myself.

He advised me what progress was being made, where a problem still existed, and gave his best estimate of when the situation was expected to return to normal. I cannot thank him enough for his effort – it helped information to be relayed as best it could." [A District Councillor in Kemsing.]

13.1.5. A common view is there were confused messages, especially in the media, about the causes of the incident and when supplies would be restored.

The engineering division has worked flat out to address the problem. However, Mid Kent Water Board of Directors has failed the public abysmally. Its emergency phone recording gave conflicting reasons for the supply disruption, and it gave no straightforward explanations for the media to broadcast.

Worse still, as far as Kemsing was concerned, it announced via Radio Kent that water bowsers were available, but MKWC did not say where these absurdly small containers were." [A District Councillor in Kemsing.]

A number have commented that the company appeared to blame everything but themselves.

13.1.6. There were complaints about insufficient information about the existence or location of bowsers; that there were not enough bowsers; or there were delays in providing them and that they were too small and soon ran dry.

The Manager at the Pavilion phoned Mid Kent Water on numerous occasions during the morning of Sunday 1 August as the Pavilion was hosting a 3-week Children's Summer Playscheme on behalf of Sevenoaks District Council and 50 children and their supervisors were expected on Monday morning.

Initially his calls were answered by recorded message but at approximately midday a call was answered in person with advice that a bowser would be delivered in good time for Monday morning. In the event the bowser did not arrive and on making a further call to Mid Kent Water, our Manager was advised that there was no chance of one being delivered.

As the children attending the Playscheme had now arrived, the Manager spoke to Sevenoaks District Council and the Environmental Health Officer who intervened with Mid Kent Water. A bowser of water was eventually delivered at 1800 on Monday 2 August." [A customer in Kemsing.]

Other customers, however, reported that they had received emergency bottle supplies from the company.

13.1.7. A few customers reported that they were not warned that when supplies were restored the water would be dirty for a while.

13.1.8. The Ofwat Customer Service Committee was concerned that the company had no procedures for informing it of significant incidents.

14. ANALYSIS OF THE KEY ISSUES

14.1. Resource management

14.1.1. July was a hot, dry month and the demands throughout all the company's supply zones had been very high. For the week ending 29 July 1999, average daily demand was estimated to be 198 Ml/d. While high, this is at about the level anticipated by the company in its strategic resource planning. The peak week average demand for 1999 recorded up to that time was 192.5 Ml/d. The previous weekend (24-25 July) daily demand was recorded at 203.5 Ml/d average over the two days.

14.1.2. The company has previously reported that during the drought year of 1995, successive peak week average demands were met of 207, 204 and 210 Ml/d. It now advises that these were over-stated by 3.5 Ml/d.

14.1.3. In a letter to those customers affected during the incident, the Managing Director provided as one reason for the interruptions "unprecedented levels of demand". For the days 29 July 1999 (Thursday) and 30 July 1999 (Friday) daily demands were respectively 203.1Ml/d and 202.5 Ml/d. On Saturday 1 August, the daily demand (including estimated demand not met) was 204.7 Ml/d. This compares with the Wednesday forecast of 190 Ml/d. As acknowledged by the company during Ofwat's inquiry the level of demand experienced at the time of the incident is more accurately described as "unpredicted" rather than "unprecedented".

14.1.4. At the Stansted zonal level the estimated weekly demand of 26 Ml/d and the estimated weekend demand of 28 Ml/d (both including estimated demand not met) are less than the average day peak week demand of 28.7 Ml/d experienced and met in 1995.

14.1.5. Three factors appear to explain why the actual level of demand in the event was "unpredicted":

14.1.6. First, it is clear that the Met Office prediction on Wednesday of 24^{o}C was some 9^{o}C below actual temperatures and the demand forecasts were inevitably understated. But the levels of demand experienced on Thursday and Friday and the more up-to date available information provided by local temperature forecasts did not result in any revision to the company's expectations for weekend demand.

14.1.7. Secondly, there is an absence of any indication to Operations about the range of uncertainty around the central demand forecasts. No range of forecast error was indicated for the weekend forecast of 24 Ml/d for the Stansted supply zone (The estimated actual demand, including properties with no water, being 28 Ml/d). Given the sensitivity of the demand model to weather-related factors, it is surprising that the same sensitivity to uncertainties with long range weather forecasting are not incorporated into the weekly advice. Mid Kent disagreed with this view, but advised that

such error ranges were provided in previous years. Mid Kent advised that the Meteorological Office five-day forecasts are considered 60% accurate.

14.1.8. Finally, there is the lack of knowledge about patterns of demand from agricultural and horticultural users. This introduces an additional uncertainty into the demand forecasts, and is an area where the company is working to improve its demand forecasting.

14.2. Causes of the supply failures

14.2.1. Some failure of supplies to customers served by the Shorehill booster off the Kemsing Reservoir may have been unavoidable given the complex supply fault with its origins in the major leak.

14.2.2. The relevant Directors were aware, during the preceding week (19 to 23 July) that there were problems with the Kemsing Reservoir. It is not clear, however, to what extent they were kept fully informed of the lack of progress in solving these, and that some customers had suffered interruptions over the weekend of the 25 July. By 27 July the problem was not responding to the efforts of the Ashford managers and would have benefited from a high level review of the situation.

14.2.3. However, the prolonged interruptions in supply were primarily due to the decline in the level of Exedown reservoir. The levels started to fall on Tuesday 27 July and on Friday evening the reservoir was empty.

14.2.4. Allowing Exedown Reservoir to fall to empty meant that airlocks formed, critically on the 4" main to Kemsing. The effect was that the incident lasted much longer than would otherwise have been the case.

14.2.5. The company's view is the judgement, made on Thursday 29 July, that the situation was tight but manageable, was reasonable given the Wednesday forecast of rain for Sunday and the actions that had been taken to increase resources to compensate for the loss of Trosley. The inquiry team's view, however, is that this ignored the change in the weather forecast; the low water level in Exedown reservoir; and the prospective increase in Friday/Saturday demand. At this stage it would have seemed prudent for either the managers to ask for advice or for the Operations Director to intervene and initiate action. In the event none of these happened, and senior managers were not sufficiently engaged in the problem. It was left to the Maintenance Manager, on Thursday 29 July (covering for the Control Manager who was on leave), to become seriously concerned and to take positive action. It is clear that action should have been taken at Director level on Thursday 29 July to initiate the remedial measures which were not initiated until 31 July and 2 August. Had this happened there would have been sufficient water in Exedown reservoir by Friday evening to avoid it emptying. It is not clear why on Thursday 29 July the Production Manager and the Operations Director were satisfied that adequate arrangements had been made for the coming weekend.

14.2.6. The company has said that its system requires up to five days to command changes in the management of its system. However, the events from 2 August, when a crisis team was put together, suggests that this was not the case. If it was true it adds force to the argument that the company should have taken a more conservative approach to short-term planning.

14.2.7. The company has implied that inadequate infrastructure contributed to the interruptions of supply. Although some pressure problems may be attributable to inadequate distribution mains, it is clear that this was not the cause of the supply interruptions described above. Water from the Exedown reservoir continued to reach all of the areas concerned until the reservoir emptied at 1930 on Friday 30 July.

14.3. Managing the incident

14.3.1. The combination of reduced resource capacity through outages and levels in both reservoirs, meant that, irrespective of the company's judgement about demand at the weekend, it should have been clear if proper account was taken of revised weather forecasts by Thursday 29 July, and certainly by the morning of the next day, that there was a high risk some customers were going to be without water. Yet no action was taken to review contingency plans.

14.3.2. The failure to recognise the potential impact of the problem resulted in a wider and more serious incident than was necessarily inevitable. Had a contingency planning meeting, bringing in public relations, customer services, and resource planning, taken place in the week of 26 July, even as late as Friday morning, it would have been possible to provide a better service to customers no matter how the incident developed. In particular, it would have been possible to:

- Locate and pre-position bowsers and emergency supplies
- Check communications circuits, including the switchboard
- Make arrangements for weekend call centre operations, including postponing the millennium bug work in the call centre
- Mailshot customers in the vulnerable areas, or prepare other communication plans
- Brief media and journalists or at least prepare messages
- Warn other relevant bodies of concern
- Take account of the effect of the Brands Hatch meeting.

14.3.3. The company has said that, in its experience, pre-positioning of bowsers and notification of possible water shortage is counter-productive because customers react by hoarding water and make the problem worse. This view is challenged by a number of customers, who were not affected by the problem, and who have commented that had they known there were difficulties elsewhere they would have been careful with their use of water, for example, by not using hose-pipes. Customers do, however, need to be

confident that emergency supplies will be readily available and they do need to be given sound information.

14.3.4. Many customers have said that there were too few bowsers and too little information about the location of those that were deployed. The company's arrangements for the distribution of bowsers and supplies of bottled water appear to have been generally satisfactory. However, the inability of many customers to contact the company, and some uncertainty about which customers were without supplies, meant that these arrangements did not work as well as they should have done. Some customers say that promised emergency supplies did not materialise or were subject to delay. The arrangements for refilling bowsers could have been better.

14.4. Customer Information

14.4.1. Customers reported that they received no information about the crisis or received confusing information. The company acknowledges that there were shortcomings in its communication strategy, but have suggested that the nature of the area made communications difficult. It is recognised that many customers lived in scattered properties, often set well back from the road. Notwithstanding that, advanced planning for a possible incident would have avoided many problems and more positive attempts could have been made to communicate with customers, and with other organisations such as local authorities (as is done in water quality issues).

14.4.2. It is clear that a certain amount of the confusion reported by customers is explained by delays in communicating company messages to staff in the field who were being questioned about the general situation by customers and reporters.

14.4.3. By the Saturday, it was clear that there were widespread problems. Although the company was responding to requests for emergency supplies the company was slow to muster the resources needed to deal with communication. It was not until Sunday morning that action was taken to bring in sufficient staff to manage this – and not until the next day that a full crisis meeting was called.

14.4.4. It would seem that the company does not have predetermined and clearly understood procedures for handling communications during incidents of this kind. The emergency plan shown to the Inquiry Team was appropriate for smaller incidents. It is understood, however, that steps have since been taken to rectify this.

APPENDIX 1: ACTIONS PROPOSED BY MID KENT WATER FOLLOWING THE INCIDENT

Customer Service & Communications

1. A "quiet-hours" standby duty roster for call centre Customer Services staff has been put in place.

2. ACD display indicating call waiting time and numbers has been extended into the Operations Control Room for "quiet-hours" monitoring. Trigger levels for call out of Customer Service Standby staff have been set.

3. A contract has been entered into with the new National Emergency Call Centre Service Provider organised by a consortium of water industry companies, capable of handling large customer call volumes.

4. Ofwat Southern CSC has provided a quiet-hours contact number to the Company.

5. Company telephone switchboard has been reconfigured to improve availability of incoming lines at expense of outgoing lines.

6. Procurement of a state of the art telephone switchboard to replace existing 6-year old switchboard has been authorised.

7. Installation of paralleled Local Area Communications Networks at the HQ site has been authorised to enable maintenance and repairs to be carried out whilst still maintaining service.

8. Protocols for issuing definitive agreed statements for public dissemination are being put in place.

9. Existing communications technology is being developed to improve "broadcasting" ability between Management, Operations and Customer Services staff.

10. The Company will use its existing advanced GIS-Billing database linking system to write to all customers using 1st Class post in zones where problems are foreseen, as the most direct means of communication available. It will, however, continue to use established links with local media for message broadcasting.

Operations

1. The Company has appointed a graduate to the core Operations Management and Control Centre team to develop and operate the Operations Data Information system for management use.

2. Consultants are already engaged in business process review work at Operations Management levels and their remit will be reviewed further to ensure that no areas of improvement potential are overlooked for implementation.

3. New Head Office Operations Building integrating Operations Management team with Control Room and Customer Service in one space is on schedule for occupation at the beginning of March 2000, removing the need for Ashford Office and attendant communication difficulties.

4. Installation and commissioning of upgraded SCADA/OPD system in new Control Room providing improved Operations data management and visibility will coincide with new building occupation.

5. Engage personnel consultancy expertise to test and evaluate judgmental, communication and decision taking abilities of all key staff in Operations Management. Re-organise management to recommendations accordingly to ensure either staff of appropriate calibre for modern operating conditions are in key positions or eliminate judgement by technology solutions.

6. Develop and populate a data storage system to centralise all operational technical data and information in a format accessible to all operational key staff.

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