

Environmental Audit Committee

Oral evidence: [Heatwaves: Adapting to Climate Change](#), HC 826

Wednesday 23 May 2018

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[Watch the meeting](#)

Members present: Mary Creagh (Chair); Colin Clark; Mr Philip Dunne; Zac Goldsmith; Mr Robert Goodwill; Anna McMorrin; John Mc Nally; Dr Matthew Offord.

Questions 242-363

Witnesses

[I](#): Professor Paul Cosford, CB, Director for Health Protection and Medical Director, Public Health England, and Stephen Groves, National Head of Emergency Preparedness, Resilience and Response, NHS England.

[II](#): John Edgley, Chief Track and Lineside Engineer, Network Rail, and Mike Wilson, Chief Engineer, Highways England.

Examination of witnesses

Witnesses: Professor Paul Cosford, CB, and Stephen Groves.

Q242 **Chair:** I welcome you all to our third evidence session on “Heatwaves: Adapting to Climate Change”. Can I ask our two guests to introduce themselves, please?

Professor Cosford: I am Professor Paul Cosford. I am the medical director and director for health protection for Public Health England.

Stephen Groves: I am Stephen Groves. I am the national head of emergency preparedness, resilience and response for NHS England.

Q243 **Chair:** Thank you. Can you begin by telling us how Public Health England and the NHS work together to provide strategic oversight and direction on emergency preparedness, resilience and the response agenda?

Professor Cosford: We have an overarching view of what the key risks and emergencies are that we have to be prepared for, and we have plans against those. Then we have systems to respond, because, inevitably, incidents arise that are not predicted or predictable. We have systems to respond to incidents and outbreaks, which can deal with any hazard, whatever that might be. Within each of our organisations, we have governance processes for establishing those systems and implementing them when there is an incident that needs a response to be put in place and co-ordinated.

We have a tripartite arrangement between NHS England, Public Health England and the Department of Health and Social Care, where we co-ordinate across the health system. Then there are of course arrangements with other parts of the Government nationally—the Cabinet Office and so on. Locally, there are local resilience arrangements.

Q244 **Chair:** Do you have anything to add, Mr Groves?

Stephen Groves: Additionally, the tripartite oversight group that Professor Cosford referred to also receives assurance from Public Health England and NHS England in relation to our preparedness levels.

Q245 **Chair:** Okay. What assurances do you seek from CCGs to confirm that they are planning for the increased risk of heatwaves?

Stephen Groves: NHS England has in place a range of what we refer to as core standards, and the core standards refer to all NHS organisations, whether they are acute trusts, ambulance trusts, mental health trusts or CCGs. One of the specific areas they address is that organisations are taking seriously, and are planning for, the impact of heatwave. Annually, we seek assurance from each and every organisation that they are compliant with all of the core standards. They are required to take that to board level for assurance and for sign-off. So, at a local level, every trust



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and CCG is required to look at the core standards and provide assurance that they are taking those areas seriously and are addressing them.

Q246 **Chair:** Who assures those plans? Are you saying that they're all great, or do you think there is variability between them?

Stephen Groves: There is variability in the plans. When we look at the plans, there is often peer review. So, at a local level, we have local health resilience partnerships, which essentially look at the same footprint as local resilience fora. It's a health-planning forum, and representative members of those groups will peer review each other's plans and provide some challenge of them, but also support organisations in enhancing plans.

Q247 **Chair:** Do you look at them, as NHS England?

Stephen Groves: The LHRP is chaired by a director from NHS England. It's co-chaired by a director of public health from one of the respective local authorities from within the LHRP footprint. So, at a national level, we don't get to see the individual plans, but at a local level they're reviewed by NHS England representatives.

Q248 **Chair:** The National Health Service Act 2006 says, "The steps taken by NHS England must include monitoring compliance by each CCG and service provider". Are you saying that the LHRP is the way that you monitor compliance?

Stephen Groves: The LHRP is one of the ways in which we monitor compliance, but the other is through the assurance, which is taken first to a board level, and then, secondly, each director of commissioning-operations level will seek and receive assurance from each of the respective organisations. That's then passed to a regional level. So, at a regional level, they would know where the gaps are, for example, in a director of commissioning operations, or DCO, area. If there's a gap—if there's an organisation that's non-compliant—that regional office would be aware.

Q249 **Chair:** You said that the plans are variable. What do you do to bring every plan up to the level of the best?

Stephen Groves: It is about working with organisations—it's supporting organisations, and it's providing guidance. Again, part of the work programme that we have with Public Health England assists in that. For example, on the PHE website there's e-learning around heatwave planning. There's also an off-the-shelf exercise that we encourage organisations to look at and to use to inform their planning.

Q250 **Chair:** You are also responsible for making sure every provider complies. Does that include care homes, nursing homes, step-down facilities that are commissioned by hospitals? It would, wouldn't it?

Stephen Groves: Not care homes, but nursing homes that are commissioned by the NHS—yes, it would include those. As yet, we haven't



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sought and received assurance from that level. We are building each year—

Q251 **Chair:** Why not?

Stephen Groves: We are building each year on our assurance. There's a capacity issue. So we work predominantly with the major provider organisations—acute trusts, mental health trusts and ambulance trusts—and we're seeking in-depth assurance in relation to their preparedness.

Q252 **Chair:** The evidence we have heard so far is that nursing homes and care homes are by far and away the places that are most likely to overheat, and that that is where the burden of mortality occurs—for example, when the heatwave struck in 2003. Why is that not the main priority for you? Why are we here in 2018—15 years after that heatwave—and you're saying you're developing it now?

Stephen Groves: The assurance covers a full range of EPRR acts, not just around heatwave planning. It literally is a full range of activities around emergency preparedness and the range of risks in the national risk register.

Q253 **Chair:** So you are saying that care homes are not prepared for a flood situation either?

Stephen Groves: No, I am not saying that. Certainly our CCGs and local organisations are engaging with them, but at present we haven't sought and received assurance from individual care homes.

Q254 **Chair:** Are there any plans to do that?

Stephen Groves: We are looking at extending the EPRR assurance—

Q255 **Chair:** What is the EPRR? Oh—emergency preparedness, resilience and response.

Stephen Groves: Yes, emergency preparedness, resilience and response. So it's looking at that, and it's also trying to identify the key aspects that we can expect the providers to look at. Our first target—or should I say area of interest?—would be the major provider organisations.

Q256 **Chair:** Okay, thank you. In the 2003 heatwave, excess mortality in hospitals—your acute trusts—rose by 36% for the over-75 age group, so the frail and elderly who are already in hospital. What analysis has been done of excess mortality in hospitals in subsequent heatwaves, Professor Cosford?

Professor Cosford: There are no specific studies on excess mortality outside of that 2003 heatwave. That is the most effective and best study of mortality in different locations, and that is where, I am sure, you got the information about care homes and residential homes from.

The mortality in hospitals in that study is roughly similar to the excess mortality of people in their own homes. That is not a good position, but it

perhaps suggests that hospitals are caring for people similarly to how they might be cared for in their own homes.

In subsequent heatwaves, the data that we have on mortality will be on overall all-cause mortality. For the two heatwaves in the 2000s, in 2003, there were roughly 2,000 excess deaths overall from that heatwave, and that was repeated in the subsequent heatwave. In the latter few years, when we have had heatwaves, the number of deaths has been significantly lower than that.

The only caveat I would put on that is that, for the 2016 heatwaves, which we are currently assessing the deaths from, we have not got that data completed. It looks like it might be between the two. It will not be as high as the 2003 and 2006 ones, but it is probably slightly higher than we had been getting to in terms of overall mortality excess from heatwaves.

Q257 Chair: When will that data be completed?

Professor Cosford: I believe it will be the end of this year, but I would need to come back to you with a date, if you would like that.

Chair: Okay, thank you.

Professor Cosford: On the local health resilience partnerships, there is an assurance process for their general emergency preparedness, resilience and response functions that we have been through alongside NHS colleagues over the last year or so, which has asked for self-reporting from those local health resilience partnerships on the breadth of aspects of emergency preparedness and response. We have just replied to the Health Committee on that issue—there is a paper that you may wish to pick up on—to essentially say that we have got reasonable assurance across all of them; there are certain specific areas for improvement in some of them, and we will be undertaking some compliance visits with those. Although they are partnership arrangements, we do not hold any kind of managerial or performance management responsibility for those.

Q258 Chair: The Met Office predicts that, by 2040, summer temperatures could reach 38° every other year. If high temperatures become the norm, how will the NHS's approach change, Mr Groves? What are you doing to plan for that risk today?

Stephen Groves: There are a number of aspects in relation to EPRR with regards to our staff. First, we are raising awareness. Annually, we ensure that staff have access to the heatwave plan and its appendices, which are very helpful in terms of some of the impacts and, particularly, in relation to some of the at-risk groups. It is not just in relation to hospitals; it is about other staff in primary care and about supporting patients in their own homes. We are raising awareness about that.

The other part would be working with colleagues from NHS Improvement in relation to the ERIC return, which looks at some of the information in relation to the estates and facilities, raising awareness about that and ensuring that we have compliance in it. The core standards that I referred



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to are a contractual obligation on organisations, which helps us in terms of trying to ensure that we see change within the NHS.

Q259 **Zac Goldsmith:** We are looking to try to better understand the role of local authorities in preparing for heatwaves, and unfortunately, the LGA has not, for whatever reason, submitted evidence to this inquiry. Before we go into the specifics, can you explain, for people like me who do not fully understand, how those local health resilience partnerships actually work? What sort of area do they cover geographically?

Stephen Groves: Geographically, they cover predominantly the same areas as the LRFs—the local resilience fora, which are around police force areas. We have merged some areas—my old patch was the County Durham and Cleveland area—and brought them into one local health resilience partnership.

Q260 **Zac Goldsmith:** I do not want to make this London-centric, but what does that mean in the context of London?

Stephen Groves: There is the London Resilience Partnership, which feeds into the London Resilience Forum. It brings all the key health partners together in relation to planning.

Q261 **Zac Goldsmith:** To be absolutely clear, when you talk about the local health resilience partnership for London, you are talking about an organisation that speaks for the whole of London, so there will be co-operation among all those local authorities.

Stephen Groves: It is a partnership, but they do not necessarily speak. Some of the partners have, by design, a place on the LRF. The London Ambulance Service NHS Trust has a seat at the LRF, and Public Health England are members of LHRPs. Some of them have a dual role.

Q262 **Zac Goldsmith:** What sort of role do local government officials and representatives have in those partnerships?

Stephen Groves: In relation to the local health resilience partnerships? One of the directors of public health is co-chair of the LHRP.

Q263 **Zac Goldsmith:** I do not want to focus on this for too long, but in practical terms, would the Borough of Richmond, for example, have someone representing it on the London partnership? How localised is it?

Stephen Groves: I do not have that detail, but I can certainly get it for you.

Q264 **Zac Goldsmith:** Would it be unusual for a single borough to have a representative, or is it necessarily high-level?

Stephen Groves: It is probably a higher level than each individual borough having a representative on there, but the health organisations from there would have places on the LHRP.

Professor Cosford: We would expect them to be clear on how they are represented on it, so the group of directors of public health across London



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will be clear on which of them is representing the directors of public health, and therefore local government, on that, but the precise nature of that is for them.

Stephen Groves: While it is not a statutory body, the expectation would be that that director of public health would talk to his or her colleagues and elicit information.

Q265 **Zac Goldsmith:** I will ask Mr Groves a follow-up question. How important are the partnerships for accounting for the local impact of climate change, and how important are they as organisations?

Stephen Groves: They are very important. Previously, we did not have the opportunity for all the health organisations to get together in the way that they do now to look at the elements of climate change and emergency preparedness, resilience and response, and the elements of the national risk register. This brings them together. It is a better opportunity for them to work together, support each other, share information in relation to their plans, and assist each other, in terms of peer review of plans.

Q266 **Zac Goldsmith:** In terms of NHS England's role, what sort of assurances do you expect from partnerships? What sort of assurances do you need in order to know that the level of preparedness is adequate?

Stephen Groves: There is a huge number of aspects to the assurance. We are looking to make sure that organisations are reporting a significant level of assurance, and that alongside that assurance, there is an action plan that helps them to move towards full compliance, but I have to be honest with you: the assurance is built on annually, and each and every year, we look at the elements of the assurance and add new elements.

We also do a deep dive into certain elements. We are proposing that the effect of climate change be the subject of a deep dive in one of our future annual assurances—possibly the annual assurance for '19-20.

Q267 **Zac Goldsmith:** And that is a deep dive into a particular area? Or is it a thematic deep dive, covering a whole area?

Stephen Groves: It's a thematic deep dive for each and every organisation, so we would expect, as well as the general report on, for example, how Guy's and St Thomas' Hospitals are performing, a particular element around the deep dive. That topic changes annually.

Q268 **Zac Goldsmith:** Professor Cosford, how engaged do you feel that local government bodies generally are?

Professor Cosford: Of course there is variation, but generally I think they are very engaged. It is clear to me that a heatwave is essentially a community resilience issue, and a community resilience response is needed. Local authorities are clearly responsible for all aspects of the wellbeing of their local communities, and the directors of public health that we talk to are clearly engaged in this process.



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Q269 **Zac Goldsmith:** Is that true across the board?

Professor Cosford: We examined the plans, as I mentioned, for the local health resilience partnerships. Of the 36 across the country, we have gone back to 19 with some further questions, but all of them have, we think, fair plans in place across the board of emergency response.

Q270 **Zac Goldsmith:** Is either of you concerned that the LGA has told us that it no longer has a work programme on climate change adaptation? You will know that their funding was withdrawn a couple of years ago by DEFRA, in 2015-16. Is that an issue for you?

Professor Cosford: Rather than answer that specific question, because clearly that is an issue for the LGA, the impact of climate change on people's health and wellbeing is a critical issue for the future for us. It is not only about heatwaves, of course. Air pollution and a range of other things are of equal importance, if not greater importance in some ways.

Stephen Groves: We engage with local government on a range of EPRR issues, and they continue to engage with us across the range of issues that we ask them to engage over.

Q271 **Zac Goldsmith:** During the 2003 heatwave, we are told that hospital admissions for the over-75s rose by 16% across London. Public Health England put out a number of recommendations. Can you tell us what progress has been made, particularly in relation to local authorities, which were asked to identify those people who are most at risk?

Professor Cosford: We do not monitor local authorities in a performance management-type relationship. We do not publish the specific responses to the recommendations. I think you are referring to our "Making the case" document and the accompanying heatwave plans. That had a number of recommendations for where actions need to take place—quite a breadth of actions. Of course, there are issues for local authorities and local CCGs in identifying vulnerable people. Part of the alerting system that we use during heatwaves is to try to make sure that people are aware of those vulnerable people in their communities and support them.

Q272 **Zac Goldsmith:** I get that you cannot monitor in, perhaps, the way that I phrased my question, but you must have an idea of whether or not local authorities are better placed to identify vulnerable people now than they were in 2003? That was a headline recommendation that you made. Is there anything to suggest that things are moving in the right direction in relation to their ability to know who is likely to feel the impacts hardest?

Professor Cosford: If we are looking, as we would be, at people who are most vulnerable being cared for by GPs, by community nurses and in social care facilities, I think the awareness of that is greater. That is more of an NHS issue. The ones who we would be more worried about would be homeless people and other people who are under the radar and not identified through those usual systems.

Q273 **Zac Goldsmith:** Do you want to add anything to that?



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Stephen Groves: Probably my greatest experience would be around the cold weather and the fact that, certainly during periods of cold weather, we work with the local authority to identify individuals to whom we must prioritise access. I am thinking about if we need to make sure that roads are clear. We certainly work with local authorities, and they share information that they have. However, I agree with Professor Cosford that it is the individuals who are under the radar whom we are not aware of.

Q274 **Zac Goldsmith:** You mentioned homeless people, but how many people would fit that category of being under the radar and not on a local authority register of any sort?

Professor Cosford: I am struggling to remember the numbers of homeless people according to the most recent surveys and the various local authority surveys.

Q275 **Zac Goldsmith:** But you are not just talking about homeless people—or are you talking about that as a specific category?

Professor Cosford: I think that is a specific category that I am talking about. What I would say is that, where we have had to make significant responses—for instance, in floods, where vulnerable people need to be identified and sometimes moved out with specific care and support—we do not see problems identifying them, moving them and providing them with care and support. That comes through the CCG processes, and that has worked—as far as we have seen—really very well up until now.

Q276 **Chair:** Can I just do a follow-up on that? We know that there are about a million people in England who are not getting the care package that they would have been entitled to in the old days. We have got more frail elderly people, and more of them living unsupported. Do you think that that is a particular group? Meals on wheels is not going in three times a day, and there is not a nurse or carers going in to get them up and dressed. People with those things would be seen. Is it not the people who may have needs that are not being met who are the most at risk in a heatwave situation? They may not be able to open a window. They may not be mobile, and they may not be able to mobilise to adequately rehydrate.

Stephen Groves: Those are some of the individuals who we would be concerned about, yes.

Professor Cosford: Those are the people who are most vulnerable and who are alerting systems to target them specifically. They are older people, isolated people, people with pre-existing health conditions and very young children, who we need to take particular care of in heatwaves. They are exactly the same groupings we are concerned about with our cold weather planning, as Stephen mentioned.

Q277 **Chair:** On the babies, would you be going to social services and saying, “Who are the babies who have a plan around them? Who are the children at risk? Are they being properly looked after in their homes?” Is that something that the public health director would be saying to social



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services?

Professor Cosford: The alerting system comes from the Meteorological Office to us and the NHS. We will cascade that through our internal PHE systems and to directors of public health, who will then have the responsibility to ensure that the relevant people across the local authority, which would include the director for social care and the director of children's services, would be aware and alerted. The NHS has a cascade system for GPs and hospitals, and through them, patients commissioned into care facilities.

Q278 **Chair:** I understand the NHS thing. I am trying to get to what the local authority system does. You have just mentioned children's services. Have you seen plans where children's services are alerted during a heatwave and babies are protected?

Professor Cosford: We do not specifically monitor those plans. That is for the local authority to do. Our alerts go to the director of public health, who then has a responsibility to make arrangements.

Q279 **Chair:** Don't they ever feed back?

Professor Cosford: Not to us, no. That is not the system. The system is local democratic accountability. We are there to support and to help ensure that they have appropriate plans, but we don't performance-manage them.

Q280 **Zac Goldsmith:** Does anyone do that role? Is the only way to judge whether local authorities are on top of this issue to check the data after a heatwave and see how many people have been affected? Is there any monitoring or any process for checking the preparedness of local authorities? If it is not either of your organisations, who—

Professor Cosford: We have a support role. As I said, we have recently done an assurance process for local health resilience partnerships that looks at assurance across the board. We have picked up some specific issues where there seem to be concerns, and we are going back to look at those. Heatwave plans and cold weather plans have not come up as a particular flag that we need to look at further. That is not to say that it is implemented perfectly, but on our worry list—our radar of things not going right—those are not our key things.

Q281 **Zac Goldsmith:** That is reassuring. I know I am taking a lot of time, but I struggle to see how it can make sense to have a local health resilience partnership that covers an area as big and as diverse as London. Is that a concern? Do you agree that it is a huge area? The difference between Kingston and Lambeth or between Kingston and Redbridge is huge in every conceivable way. Is there a case to be made for having a slightly more localised approach in London?

Stephen Groves: There is a single LHRP for London. In terms of the work programme, that is done across London split into four. It is divided up into four areas. When they are doing the work, they work in much smaller areas and much smaller groups. In terms of the LHRP, there is one pan-



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London group, but there is a number of smaller groups in terms of delivering a programme of work.

Q282 Zac Goldsmith: Lastly, the LGA has said that public health budget reductions are counterproductive. Do you think heatwaves are an example of how public health action can prevent unnecessary strain on the system and the NHS? What do local councils need to achieve this?

Professor Cosford: Of course planning for any eventuality, heatwaves included, is the best way to reduce the impact of that when it occurs. Our heatwave plan does not just talk about what you do when there is a heatwave; it talks about how you prepare and how you reduce the impact of heatwaves—any aspect of that. But I would say it is not just those things that are within the public health budget. The actions that you can see in our heatwave plan include a whole range of things, including greening of the open environment, good transport planning, making sure there is good planning that supports physically active transport and so on. There is a whole range of things, as well as school and hospital preparedness and other things. To focus it solely as an issue related to the public health budget is incorrect; it is a much broader issue than that.

The other point, going back to your previous point, is that LHRPs are about a partnership that prepares and is able to support a response. When you come to an incident that needs a response it is entirely flexible, depending on the location of the incident and what the hazard is. If it's a local flood, the response would be a very local one. The response would not be a London-wide one for a local issue in Richmond, for instance. But, of course, a heatwave is a big event. You don't get local heatwaves in Richmond compared with the rest of London, so the response system is a much broader one. On the issue of, "Is it right to have a big LHRP when responses need to be local?" that is perfectly okay; it is about the best way organisationally of bringing the right organisations together, which for London appears to be the London-wide health resilience partnership.

Q283 Mr Goodwill: My question is probably best directed at Mr Groves. We have learned that since last year guidance on preparing for winter pressures—I guess a flu epidemic would be the classic example, or respiratory disease or hip fractures—has been issued by the national urgent and emergency care director. Do you intend to produce similar guidance on summer pressures?

Stephen Groves: It is important that, when we look at surges in activity, we look at the year-round surges in activity. You are quite right that last year guidance was issued on winter and those effects, but the plans that were put in place to prepare for winter and the surges that were expected as a result of the winter period would be plans that could be used during the summer and could be used during a heatwave. What is important is, as the Chair alluded to earlier, that we raise awareness of heatwaves and the signs and symptoms that individuals should be looking for.

Q284 Mr Goodwill: Could it affect things such as holiday rosters? A lot of people like to go on holiday when their children are off. Is that something



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you might need to look at to check you have enough staff there when you might get that peak demand?

Stephen Groves: I think that is right. That is something we did for winter. When I look at our generic emergency response plans, which each and every organisation has, they allow us to look at the rosters and to bring in staff so that, should a heatwave occur and should we see a surge in activity, we can call in additional staff should we need to do so. That gives us some flexibility.

Q285 Mr Goodwill: Heat-related deaths, we have been told, are projected to rise to 7,000 per year by the middle of this century. That is a 15% increase in weather-related deaths, even when the milder winters, which are likely to take out fewer people, are accounted for. However, a survey found that frontline staff did not consider heatwaves to be a priority. Do you think this assessment of priorities is correct, and if not, what needs to be done about it?

Stephen Groves: In our work in the emergency preparedness network, we look at the National Risk Register, and clearly climate change and heatwaves are a long-term risk on the National Risk Register. It is extremely important that we raise awareness, through the systems and processes we have established—again, every NHS organisation has an accountable emergency officer at board level. What are the risks on the National Risk Register and where should they be looking at and addressing those gaps? If there are gaps in their plans and planning, we need to take that back through accountable emergency officers and make sure that they are addressing those gaps.

Q286 Mr Goodwill: It occurred to me that when looking at excess deaths, you may have a situation where a patient undergoing palliative care dies a few weeks earlier than they would have done, but in other cases a person who dies might have lived another decade. Has there ever been any attempt to quantify how many life years are lost through this? Sometimes people are in a very fragile state of health and their death in a heatwave may not be as significant as that of a person who is perfectly well and dies because of the conditions.

Professor Cosford: In terms of the excess mortality, of course some of it involves people who would have died within a short period anyway, but actually the evidence is that many of the deaths probably would not have occurred otherwise. I haven't got quantification of that for you, but it is definitely an important issue, which is why we are so keen to have effective heatwave plans—and cold weather plans, because there is the same issue in cold weather.

There are two other things. One is that if you look at cold weather, the majority of the cold weather deaths occur between 6° and 0°; they don't occur when temperatures go below zero, because people who were going to die because their cardiovascular systems get under strain from cold weather actually suffer the adverse effects at a higher temperature than that—it's as you begin to get cold. And it's the same with heatwaves. Although our thresholds for heatwave plans are above roughly 30°, it



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looks as if actually the mortality begins to increase when temperatures get into the late 20s. That is an important issue for resilience, planning and so on.

The other point I was going to make is about the evaluation that we've got going on of the heatwave plan. We have had exactly the same questions as you are asking us. We have an evaluation going on at the moment. It should publish around November of this year and will include looking at whether the heatwave plan actually reduces mortality from heatwaves. We need to try to understand that—it is a complicated question to answer for various technical and scientific reasons. That's the first thing it will look at. The second thing is looking at whether it is being implemented. Is it understood by staff locally? We will be doing some case studies with staff in different local areas to understand whether they understand the risks of heatwaves and are implementing the plan appropriately. It is easy for us to think we have given an alert and therefore we have done the job, but actually you have to check right down to the frontline as to whether that is the case. That's something we've got ongoing at the moment.

Q287 Mr Goodwill: Thank you; that's interesting. I think some of the evidence we received earlier was that it is at the start of the heatwave that people have health problems.

Professor Cosford: That is correct.

Q288 Mr Goodwill: The question is whether that is due to the fact that people who are frail have health problems or it is due to the fact that people become acclimatised. I think there was some confusion as to which of those factors was there.

Professor Cosford: It is probably both, but I think acclimatisation is probably more the issue. For instance, in 2016—as I said, we are not quite clear on the data yet—it looks as if, of three heatwave episodes, there was a higher rate of illness and problems from the first one, and with the second and the third we gradually saw a reduction in the harm due to those heatwave episodes. It looks as if, within a heatwave, you get the greatest problems in the first two or three days, and if you get successive heatwaves in the same year, you get the greatest problems in the earlier heatwaves, which points to preparedness. Of course, once you have been in a heatwave for a week, everybody suddenly is up to speed.

Mr Goodwill: Yes, you go and buy a fan.

Professor Cosford: It's the first day when you really need them to be up to speed and that's always a challenge for us.

Q289 Chair: We also heard that the temperature was lower. You said the temperature problems kick in in the late 20s, but we heard, I think from one of your more junior colleagues in a private session, that it was actually around 24° when mortality started to rise.

Professor Cosford: Yes, roughly 25°, we would say—25° to 30° was what I meant by late 20s.



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Q290 Mr Goodwill: Let me turn back to Mr Groves. Written evidence we received from the Government notes that NHS organisations may choose to publish a climate change adaption plan. What percentage of NHS organisations publish a climate change adaption plan, and how do they account for heatwaves?

Stephen Groves: From the information I have, 32% of organisations have produced adaption plans and 71% have produced SDMPs. We believe that some of the information is erroneous, in that some of the organisations have not indicated they have produced this because they have put it in the alternative plan. That's something we are going back to. Through the Sustainable Development Unit, we want to clarify that and continue to monitor that. Essentially, we are looking to make that a mandatory requirement for reporting.

Q291 Mr Goodwill: Is there a lot of cutting and pasting going on, where people look at somebody else's plan? Or are the plans tailor made for the particular locations?

Stephen Groves: Some of the plans that I have seen have been produced by the local organisation. Clearly, there will be some cut and paste, but some of the ones that I have seen I believe have been developed locally by some of the staff in those organisations.

Q292 John Mc Nally: I want to move you both on to heatwave resilience, particularly of buildings and equipment, and how overheating is monitored. You probably are both aware that healthcare trusts must now report instances of overheating as part of their estates return information collection. What were the results of the data collection?

Stephen Groves: In '16-'17, there were 2,980 events that triggered the need for a risk assessment. That is a temperature of more than 26° in any given 24-hour period. What the trigger does not say is how long they have gone over 26° for. That resulted in a risk assessment in the individual organisations. Again, that was year one of the data collection. We believe that there were a number of organisations that had over-reported; we are looking at that and we are trying to make sure that we have better information for the next reporting year.

Q293 John Mc Nally: Do you have any comment on that, Professor Cosford?

Professor Cosford: No, that is an NHS issue.

Q294 John Mc Nally: Could you tell the Committee whose responsibility it is to ensure that hospitals with significant reports of overheating take appropriate adaptation measures? Where does that responsibility lie?

Stephen Groves: The reporting is undertaken through a system called ERIC—estates return information collection. That information goes back to NHS Improvement. At the moment, that does not form part of the EPRR assurance that we have. I think it is one of the areas that perhaps we need to look at, to make sure that NHS England and NHS Improvement, in working closely, are not duplicating the information that we are collecting from organisations.



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Q295 **John Mc Nally:** How has best practice on the design, engineering and operation of healthcare facilities been reviewed in respect of extreme temperature resilience? What guidance has been provided, particularly for the Care Quality Commission, for assessing hospitals' level of preparation for overheating risks?

Stephen Groves: The estates and facilities function sits with NHS Improvement. Unfortunately, it is not an area that technically I can comment on—I apologise. I can get a report from NHS Improvement should you wish.

John Mc Nally: That comes across as quite a weak area, I would say.

Q296 **Chair:** This is one of our frustrations in dealing with this: we have had no evidence from local authorities, who you were saying are your primary partners in climate resilience. We are trying to talk to the NHS both at ground level and at your level, but there is a fragmentation that is making it hard for us to get answers.

Stephen Groves: Certainly, I can get a report for you from NHS Improvement in relation to this issue. We work closely on emergency preparedness. The estates function is slightly different, but I am happy to get information for the Committee.

Q297 **John Mc Nally:** That leads me to my final question, which is extremely important. To what extent have the guidelines in the heatwave plan, such as maximising green space near hospital buildings, been introduced? Whose responsibility is it to ensure that these measures are introduced? We have heard an awful lot on buildings being too close to each other and that there is not enough space between buildings, we have heard a lot on the impact of heatwaves on bigger cities. Can you give us a wee bit of information on that?

Stephen Groves: NHS foundation trusts and organisations work with local planners and local authorities on the design of hospitals. There are health technical memoranda and building notes that are utilised when designing and building hospitals. They would be responsible for looking at the design and ensuring that it meets the needs of the resident population that the hospital is serving.

Q298 **Chair:** This was a specific question about the heatwave plan. The Government's national heatwave plan says maximise green space near buildings. Who is responsible in the NHS for maximising green space near buildings? Local authorities?

Stephen Groves: I think it will be a joint responsibility. In terms of the space that the NHS is looking at and is utilising, clearly it will be working with local authorities for that, but I am unclear who would be responsible for monitoring it.

Q299 **Chair:** Okay, thank you. You mentioned the 2,980 over 26° heat events triggered. When will the data for 2017-18 be available and published?



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Stephen Groves: I asked for that information as I was coming to this Committee today and it wasn't available to me.

Q300 **Chair:** Did you ask when it would be published?

Stephen Groves: I didn't ask when it would be published, no.

Q301 **Chair:** Can you go back and ask and write to let us know?

Stephen Groves: Yes, of course.

Q302 **Dr Offord:** We have heard about unseasonal heatwaves and how the first one of the year is often considered the most deadly, conversely to your point about the deaths during winter, which was that people are likely to die between 0° C and 6° C. We have experienced a pretty hot April this year. Do you think that commissioning the Met Office to predict heatwaves only during the period of June to September is acceptable?

Professor Cosford: We are concerned about a heatwave whenever it occurs. Although the routine system is in play between certain dates, as you suggest, that does not prevent the heatwave plan being implemented whenever it is required. We would still alert through our systems and NHS England would alert through its systems at whatever time of year. I'm not worried—well I am worried—if it's March or April, or the middle of the summer. My responsibility is to ensure that the response is implemented whenever it is needed and not whenever there is a particular date that is in somebody's mind.

Q303 **Dr Offord:** One piece of evidence we have received is that up to a third of GPs do not have communications with vulnerable and isolated patients. How would we improve the ability for the GPs to contact those people and how do you communicate with people who are not involved with the heatwave plan?

Professor Cosford: Stephen is better placed to comment on the detail. We are concerned to alert through all possible routes: GPs, school nurses, district nurses and all the community nursing services, and social care systems through local government as well. On the community issue, we are really keen that our public advice stimulates people to think about who their vulnerable relatives and neighbours are and give advice to and check on them. Stephen can answer more about whether GPs have the specifics into all vulnerable patients, but they certainly should know about those on their list. As I said before, when we have had instances where we have had to evacuate communities in the past, we haven't found it impossible to find all those people who are vulnerable and move them.

Stephen Groves: The cascade that the NHS has is only one part of it. Many general practices, hospitals and CCGs pre-register with the Met Office and receive the information directly. So it is a very much a belt and braces approach that NHS England also cascades information through our regional and local route to hospitals, CCGs and pharmacies. Again, the information is not just going down to general practice. We do send into other areas, such as pharmacies, and would encourage dispersal of information. The other element is that in the event of a heatwave, it is



likely that the local resilience forum would establish something referred to as a strategic co-ordinating group, which brings all resilience partners together. We would be drawing on information from other partners who might have information about vulnerable individuals such as the utility companies.

Q304 Dr Offord: Is it a targeted approach or more of a blanket approach? The reason I ask that is, first, that in 2003 in Paris, when they had a heatwave, about 92% of the people who died were people who lived alone. Secondly, women are more likely—I am not an expert, but perhaps as a result of the menopause—to have a problem with heat.

Professor Cosford: The issue of women versus men is obviously an interesting one. We haven't quite bottomed out the reasons for that. It is actually variable: we have seen heatwaves in parts of the world where men are more effective than women, and in others the other way around. There is sometimes some thinking about hormonal issues post-menopause; there are some issues of older people being more vulnerable, and older people are more often women than men, because of differences in life expectancy; and there may be some cultural issues as well, where women in some cultures wear heavy clothing that keeps them warm. So we haven't quite bottomed that issue out.

The answer to your question of whether this a targeted approach is yes. There is a very strong targeted element, because we go through all the healthcare system and the social care system to try to make sure that individuals at risk are identified. But of course it is also a blanket approach where we put out public messages and try to work through communities to make sure that everyone is aware of all of our responsibility to look out for vulnerable neighbours and relatives.

Q305 Dr Offord: What involvement did you have with the Environment Agency's Climate Ready programme?

Professor Cosford: We haven't had a huge amount of involvement in that. Stephen?

Stephen Groves: Not at present.

Professor Cosford: After all, the Climate Ready programme stopped after all, didn't it? It is no longer in place.

Q306 Dr Offord: What is in place in its absence?

Professor Cosford: It was a system for professionals and other bodies to make contact with the Environment Agency, so I think from a health perspective the cascades we got into the public health system through to local government and the NHS system we would wish to rely on more than we did, and on our messaging to members of the public. I know the programme has not been replaced, but from where I sit our own cascade systems are the ones that we would rely on anyway.

Q307 Chair: May I go back to your school nurses? You talked about school nurses being a key plank of your community resilience response, but we



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have a story in the *Mirror* today that more than 700 school nurses have been axed since 2010—23% of the total workforce in classrooms.

Professor Cosford: In terms of heatwave, when we have a heatwave alert, our alert through to local government will go to appropriate places through the education system, children's services and schools, so schools should be alerted through that route. School nurses through the NHS system are an extra, and a good way of supporting the preparations and responses that are appropriate in schools.

Q308 **Chair:** But if a school doesn't have a nurse?

Professor Cosford: That doesn't work, clearly.

Q309 **Chair:** The children with asthma, breathing difficulties or suppressed immune systems in that school will not necessarily be alerted. Do you think the headteacher will go down to them, pull them out of class and tell them to take things easy, or not do games that day?

Professor Cosford: Ultimately, it is the headteachers who have responsibility for what happens in their school, and they will take those decisions. That is not—

Q310 **Chair:** So you are expecting the headteacher to know what the appropriate medical response is.

Professor Cosford: The advice—the alert and the advice—goes to schools, and ultimately the responsibility for actions taking place in schools is with headteachers but of course the healthcare system and school nurses are key in supporting that across all schools. I am not arguing that not having school nurses is not a problem, if you will forgive the triple negative.

Q311 **Chair:** So not having school nurses is a problem is what you're saying?

Professor Cosford: Schools need healthcare support and advice, and they need an adequate school nursing service. Obviously, there are debates and decisions around what is adequate or not, but that is not what I am here to talk about. I am here to talk about the importance of health alerts in heatwaves getting to vulnerable people everywhere, including schools with some vulnerable children in them.

Stephen Groves: For me there are other elements as well. Headteachers and members of teaching staff will be able to access health information via NHS 111 and other routes. If it is specific to an individual, I would be expecting them to draw on alerting parents—they would also know exactly what medication children are on and whether it would be affected adversely by the heatwave.

Q312 **Chair:** The parent might know. I don't think a teacher would know.

Stephen Groves: But they would be able to make contact with a parent and ascertain what medication they are on and see whether it is something that either they want further health advice on, to be able to



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draw on that advice, or to take the child out of school, if that is absolutely necessary. Clearly that would be a last resort.

Q313 Mr Dunne: I just have a very quick question. Thank you for coming today to talk to us. Just picking up on Matthew Offord's questions about the relationship with the Met Office, we have seen some quite significant variation in temperature over a short period this spring, so we had, just before Easter, the cold patch, followed by quite a hot patch above 26° for the first time in April, I think, for years. Yet the Met Office system that you have does not kick in till June, for the summer heat. Are you reviewing that? Do you get alerts from the Met Office in advance when unseasonal weather at strange times happens?

Professor Cosford: We do get alerts. We have regular communications with the Met Office—continually—about all extreme weather events, so the fact that the routine system does not kick in till 1 June does not stop us getting alerts. We would certainly put alerts out if it was an unseasonably hot season. It did not meet the criteria for a heatwave, which is not only temperatures above the threshold—on average 30° across the country—but nights that do not go below a threshold either. It is about lack of physiological recovery at night, which is particularly important in terms of the harms from heat.

Q314 Chair: I have a couple of supplementaries. First of all, in your evidence you talked about the issues for people with diabetes and sickle cell anaemia. Can you explain to colleagues why those groups are particularly vulnerable to heat-related issues?

Professor Cosford: Diabetes is a general risk factor for cardiovascular disease and a number of other things which mediate the impacts of heatwave on to people's health. Also there are hydration issues. I would have to come back to you on the precise physiology in respect of sickle cell anaemia, but I understand it would be about hydration, but any physiological strain for somebody with sickle cell anaemia may well precipitate a crisis, and make a crisis more of a risk. They would be among the vulnerable groups that we would be worried about.

Q315 Chair: Do you think the parents of children with sickle cell would know that?

Professor Cosford: I think they would, but obviously you can't ever—

Q316 Chair: You don't seem certain.

Professor Cosford: You can't always assume that everybody knows everything that they should do about their condition, but our experience is that most people with long-term conditions are pretty good at managing them. Certainly we do a lot of work around shared decision making, shared support and enabling people to care for their own condition. That is of course where we want to be and where, mostly, we are. There will always be some exceptions.

Q317 Chair: Can I take you back to the previous question on the heatwave plan and this issue of green space? The heatwave plan is a Public Health

England document.

Professor Cosford: It is. We maintain it and review it at this stage. It was originally developed by the Department of Health, previously.

Q318 **Chair:** How are you maintaining and reviewing the issue of green spaces around hospitals?

Professor Cosford: The plan is about the evidence and what needs to happen. The actual action to put it in place, of course, lies with the different organisations that it refers to, whether it is local government or the NHS, so it is not for us in PHE to monitor whether hospitals have sufficient green space or not. We are clear that that is an important element of heatwave planning that is required, as it is for urban planning, for local government planning, and for all the different aspects of how the environment impacts on people's health.

Q319 **Chair:** So you would monitor what? Would you monitor their physical infrastructure? Would you monitor the condition of their buildings or is that done by another department?

Professor Cosford: That is the NHS.

Q320 **Chair:** The NHS, yes. So you monitor the buildings?

Professor Cosford: Or the NHS monitors the buildings.

Chair: You monitor the workforce but you don't monitor what happens outside, in terms of this issue, which is a specific thing which is about natural shading.

Professor Cosford: What we are doing is reviewing the impact of the plan. As I said, that will be published around November this year, and that will look at the extent to which the plan is being applied in practice as well as whether it has had its impact, which we are keen on, to reduce mortality from heatwaves. We will do—and we do do—all that we can within the powers that we are given to ensure that the evidence around how to reduce harm from heatwaves is applied, whether in the NHS, local government, local planning decisions or industry, wherever it is. But we do not have the specific management levers into NHS hospitals; that is an NHS responsibility.

Q321 **Chair:** Do you need more powers?

Professor Cosford: At the end of the day, the key issue is leadership and awareness. Whatever the system we are given, there will always be some areas where we can influence more than others. For me, the most important issue is a real understanding of the importance of how we design the environment—the urban environment, hospital environment, and healthcare environment—for people's health and wellbeing. It is hugely under-represented and misunderstood—or not understood sufficiently. If you want a view on where the greatest gains in the public's health are to be found in the middle to long term, this area is among those at the top of that.

Chair: Great. Thank you very much indeed, gentlemen.

Examination of witnesses

Witnesses: John Edgley and Mike Wilson.

Q322 **Chair:** Let me welcome our second panel to this, our final session on heatwaves before we meet with Ministers after the recess. Will you introduce yourselves for the purposes of *Hansard*, please?

John Edgley: Hello, I am John Edgley, the chief, track and lineside for Network Rail. I work within the safety, technical and engineering part of Network Rail. In our part of the business, we set the policy standards and undertake a large proportion of the assurance activities.

Chair: Thank you. Can I ask you to move your chair a bit forward and project your voice as well? Thank you. *[Interruption.]* And watch out for the metal under the table. There is a whole range of hazards in these rooms.

Mike Wilson: Good afternoon. My name is Mike Wilson. I am the chief highways engineer at Highways England.

Q323 **Chair:** You are both very welcome. We will kick off with a general question about the evidence you have that heatwaves cause disruption to UK transport. Is it just about delays, or is there a genuine risk to human health? I have been on some pretty hot trains in my time on East Coast—sauna levels, where I have threatened to take off all clothing. Is it just about delays, or is it actually about risks to passengers, and vulnerable passengers in particular?

John Edgley: There are two levels of risks. There are safety risks and performance-type risks, which you just mentioned. Specifically, we have a number of performance measures—KPIs, if you like—so we can use that data to understand the size of the delays and the performance drop that those have during periods of hot weather.

Principally from the engineering perspective, we have a particular measure called service-affecting delays or service-affecting failures. What we do see in spells of hot weather is that the number of failures we get double, in the round. I will put a bit of context on that to give you an understanding.

In the last period of hot weather, 18 and 19 April, we had an increase from what we would expect as the background norm of around 70 a day up to about 160. Contextually, the number of assets we have got is important. We have 20,000 miles of track, but we have also got 23,000 point ends and we have lineside cabinets, where a lot of the electrical equipment is housed. That is in the vicinity of 63,000. It is a big increase from 70 to 160, but it is actually quite small in the context.

Q324 **Chair:** What are the top three failures? Are they electrical, metal, sleepers?



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John Edgley: There are two broad mechanisms. As we know, when it gets hot, metal expands. That has an impact, for instance, on the point-operating equipment. Those are kept at a level of adjustment, so when the metal expands, they can go out of adjustment. The kit is designed so it is what we call fail-safe. That has a knock-on effect on performance, because we have to send people out to readjust those switches.

On your point about electrical equipment, the lineside cabinets that we have are by and large made of metal. When they get in direct sunlight, they can get quite hot. A level of heat can provoke an early-life failure of some of the assets.

In the round, what happens is that we have point failures and we have certain electrical signalling activity—

Q325 **Chair:** Did you just say end-of-life failure?

John Edgley: Sorry—early-life failure.

Q326 **Chair:** Okay. Does that mean the whole thing is broken and has to be fixed?

John Edgley: It is part of the componentry. It is not that the whole thing is broken. An electrical diode or switch fails early and we have to replace that.

Q327 **Chair:** Okay. Mr Wilson.

Mike Wilson: It is worth putting in context the responsibilities of Highways England. We are responsible for the motorways and major A roads in England, which is incredibly important economically and socially to the country, but only represents about 2% of all the roads in England.

There are two areas of consideration for us. One is around the resilience of the infrastructure itself. Of particular concern, in a similar way to Mr Edgley, we are interested in expansion due to heat. We are looking at road surfaces and also bridges. We have well-established plans in place and generally high levels of resilience to extremes in temperature.

The other area of consideration is around people who are trapped in vehicles for long periods of time.

Chair: The M62, last month.

Mike Wilson: We have well-established incident management arrangements to help people avoid the back of the queue and to get people past the incident so that they can continue with their journey and provide for their own welfare. In extreme circumstances, we have capability through local resilience forums for them to provide welfare on to the network.

Q328 **Chair:** As we saw near Huddersfield. It was only six weeks ago that we had the M62 incident where the motorway was closed overnight because of snowfall. It all seems a very long time ago now, but it was very significant in my area then.



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What about different types of road surfacing? Are we going to have to be like the Italians or learn from Egypt or Morocco, in terms of the different sorts of road surfaces we are going to need?

Mike Wilson: We had a very hot summer in 1995, where we saw a combination of very hot weather and a change in tyres in HGVs. They moved from double tyres on the back of trailers to what they call super-single tyres—a much greater concentration, and we saw an increase in the amount of rutting particularly on the strategic road network, particularly uphill. At that time, we changed the specification for the road surfacing that we use, so we now have surfacings that are resistant to high temperature and the early-life rutting that was prevalent in the 1990s. Subsequently, we have seen good levels of resilience to high temperature.

We have challenges with concrete road surfaces. What is really important for bituminous surfaces, asphalt and concrete is good routine maintenance, so that the expansion joints that are built into those structures are working properly, and so that they can accommodate the movement. When we see problems, it is when that routine maintenance is not as good as it should have been. We have a continual programme of improvement around that routine maintenance activity.

Q329 **Chair:** I have mentioned the snow issues on the M62. Have you had any issues where people have been trapped in severe heat, say, after festivals or—I am trying to cast my mind back—where you have thought, “We could be getting into a bit of an emergency situation,” in the past 10 to 20 years?

Mike Wilson: You mentioned other forms of severe weather. Snow, ice and gales particularly have had an impact on the strategic road network, and are actually much more frequent. Our processes are designed around those events. We use exactly the same processes. Clearly, if people are in very hot or very cold weather, that adds additional risks to their being on the network. As I said, we would call a major incident. We would be working with the local resilience forums.

We have provided welfare through those local resilience forums to people in need. In extreme circumstances, we have considered removing people from their vehicles to provide them with wellbeing. Our primary focus, though, is to resolve those incidents quickly, and allow people to continue their journey and provide for themselves.

Q330 **Chair:** What about you, Mr Edgley? We had people getting off hot trains and walking down the track, taking matters into their own hands, last month in the heatwave. Obviously, that poses massive risks because then the whole network is stuck while people are just walking off a train that has been stuck for three hours. Have you had incidents on the rail network that have impacted you as a company, where it has been hot, people have been stuck, and there have had to be evacuations?

John Edgley: I confess that I do not have data on that to hand. I am happy to follow that up in written evidence. What I can say is that we have quite robust procedures. When there is an incident and a failure, the



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protocol is for passengers to remain on the train until recovery can get to them. I recall the particular incident you mentioned.

If there are instances where members of the public are taking matters into their own hands, we have staff who can go out to site and effectively block all traffic to make sure that people remain safe. We certainly do not encourage people to de-train in what is fundamentally an unsafe environment. Our procedures are to get the trains to a station, which is a safe way of de-training people.

Q331 Chair: We have heard that the frequency and intensity of heatwaves will increase over the next period, and we have already had nine of the 10 hottest summers on record, or five of the six hottest summers in the last 10 years. This is something that is happening and changing now. What contingencies are you putting in place in your planning? Obviously, there is the bolt maintenance. Will the maintenance become more frequent? What about the trackside? There has been controversy over trees. What is happening? What are you changing in your systems to prepare?

John Edgley: I would step back to the public performance measure. What we can see specifically in terms of heatwaves since 2004, if I remember my numbers correctly, is that we have had a steady improvement in PPM. However, it is important say that through this current control period—we work in five-year control periods, starting in 2013—the public performance measure has unfortunately decreased. I think it has dropped by around 6.5% in periods of hot weather. That is a factor of the success of the railway, because we have got more and more passengers on the trains and more and more traffic, so when we do have a service-affecting failure or something does not work as it should do, we end up having more trains affected, which in turn affects the public performance measure.

Specifically, I can advise you that the number of faults is decreasing, and that is the area that we are focusing our efforts on to improve the resilience and reliability of the assets so that failures do not actually happen. That is a large area where we are focusing our maintenance activities and also our research and development for new materials and more reliable equipment.

Chair: Mr Wilson?

Mike Wilson: For us it starts with the evidence. We are basing our plans on Government-published projections for climate change—the 2009, primarily—and we undertook a risk assessment based on that to look at the wide variety—

Q332 Chair: Have you not used more up-to-date climate change risk projections?

Mike Wilson: We are expecting an update in 2018. We published our risk assessment and our plan for how we were going to deal with those projected changes in climate in 2011. We updated them in 2016 and we will update them again this year when the new projections are published.



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On the way that those manifest themselves, they are changes in standards. We have talked already about changing specification. We are responsible for a thing called the "Design Manual for Roads and Bridges", which is a specification for which a strategic road network in England, Scotland, Wales and Northern Ireland is published, designed and built. We are undergoing a process at the moment of updating that manual to reflect our expectations. After we have done our risk assessment of the 2018 projections, we will again make the changes necessary.

We also have a research programme. We are working with an organisation called the Conference of European Directors of Roads, so we are looking across Europe. Earlier you mentioned southern Europe and our experience there. We are looking at learning from other transport operators who operate in a range of higher temperatures. Our challenge, of course, is that our roads have to operate in much colder temperatures as well, so it is about finding the right balance in an operational range that deals with the full variety of English weather.

Q333 Chair: That is a challenge. Your written evidence says that half our strategic road surfaces use thin surfacing course systems, which are more resilient. Are these roads geographically placed to minimise the effects of high temperatures? Are they in London and the south-east or are they universal? Will that be the new standard?

Mike Wilson: This is a system that we brought over from Europe. Its main property that we are interested in is the low-noise surfacing. There is no prioritisation in certain parts of the country based on climate change. It is more about looking at where noise is a particular issue. A very important side effect of that low-noise surfacing is that it is highly resistant to rutting and deformation in hot weather under traffic.

As I mentioned, the other type of surfacing we use is a surfacing called hot rolled asphalt. We changed the specification for that in 1995 to make it more resilient to deformation and to rutting. The new surfacing that we are putting down, whether it is thin wearing course or hot rolled asphalt, is resistant to climate change as we currently understand it.

Q334 Chair: Mr Edgley, we have heard that rail buckling is a much bigger problem once the temperatures hit the 30s. Over the next 50 years, buckling and heat-related delays under a high climate change scenario could increase eightfold. The rail network was not built to one specification; it was built by a lot of Victorian entrepreneurs. Presumably the new rail—High Speed 1 and High Speed 2—is being built to withstand that buckling. What about other parts of the network? Are any particular parts more vulnerable than others?

John Edgley: You are absolutely correct that we have a mix of types of design of asset. I will focus on the track specifically, as you mentioned buckling.

Mr Goodwill: They always had gaps to prevent buckling.



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John Edgley: They were the good old days, if I am allowed to say that. Because we are an industry that is slightly long in the tooth, we still talk in imperial measurements, so forgive me if I dip between metric and imperial—it confused me hugely when I started my career, if I am perfectly honest.

We have jointed track, which can be made up of rails that are called bullhead rails, which, if you imagine, are shaped like a figure of eight, or a more modern flat-bottom rail, which strangely enough has a flat bottom. That is in 60 foot lengths, or potentially up to 120 foot lengths in jointed track. Of the national asset, that makes up about 11% of the network. The rest is made up of what we call continuous welded rail, which is rail that can be several kilometres in length, because all the rails have been welded together from a number of different types of welding. They sit on concrete sleepers. All track is fully ballasted with the angular stone you would be familiar with when you look out the train windows.

Q335 **Chair:** Which of those three is the most resilient?

John Edgley: The continuous welded rail.

Chair: So that is 89% of the network.

John Edgley: Yes.

Chair: Where is the 11% that has the old-fashioned stuff—the figure of eight and—what was the other type?

John Edgley: Bullhead and flat bottom. Actually the continuous welded rail is also flat bottom, but it is all welded together.

Q336 **Chair:** Stop sniggering at the back. Where are the flat bottoms and the figures of eight?

John Edgley: In essence, where we have the highest level of usage, we will have the more modern rail. The way we manage the asset is by looking at used life, so it is not necessary physical age of when it was installed, but a conglomerate calculation of how much traffic has gone over it and how much wear and tear it has actually had—something we call gross annual tonnage. You might have a light train running up and down several times, or you could have one hugely heavy train. That calculation allows us to understand how old the asset is in terms of wear and tear. Those areas, say in the south-east, the west coast mainline and so on, will have the newer rail, and those sections of the network that are less heavily or well-used will have the residual 11%. That might be places on the west highland line up in Scotland, for example, or parts of Wales and so on.

Chair: Parts of Northern.

John Edgley: If you wish, I am perfectly happy to provide—

Q337 **Chair:** I think we would all be interested. All politics is local. We want to see where the figures of eight and the flat-bottom rails are. I think I can



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hazard a guess—

John Edgley: I don't think we have much flat bottom left, if I am perfectly honest.

Chair: That is good to know.

Q338 **Anna McMorris:** As part of our inquiry, we heard from Transport for London that they are concerned about the interdependencies of transport with other infrastructures, such as electronic equipment failing. Do you share those concerns? Have you looked at the knock-on effect of that? Is more collaboration needed? Are you collaborating? Can you expand on that?

John Edgley: Is more collaboration needed? We are in quite a good place in terms of collaborating within the railway family with the operators and so on. In terms of the interdependencies specifically, yes, we have a huge interdependency with power. We work very closely with our power supplier, Npower. Our network is designed so that if there is a problem with the national grid in one part of the country, we have the facility to draw power in from another part of the network so we can keep our trains operating. Forgive me if it sounds a bit glib, but if we have a wider problem with the whole of the national grid, I would suggest that we have got a bigger problem than just running the trains. If there's a problem with part of it, we can keep operating our services.

As for the wider collaboration and interdependencies, there is a system operator part of Network Rail, which works closely with the local authorities and organisations such as Transport for London to understand passenger and traffic flows and needs. So we have quite a good long-term planning regime in place to permit us to know where we are likely to need additional trains, and a short-term planning arrangement can be called into play as well. For instance, with football matches we need more trains. We are now helping to run those, and that's from a close collaboration with, as I say, the local authorities and so on.

Primarily it's power, but we do understand that there is a wider level of conversations that we are undertaking.

Mike Wilson: For the strategic road network, we are less dependent for our resilience on those interdependencies. We do require power, for electronic signs that sit on the motorways and for lighting, but the assessments that we do show that you can run those networks without the power. Clearly they work better with the power, and we work with the power industry through the national infrastructure resilience council and others to understand the dependencies.

Could we do more? I think that we could perhaps do more to build a better understanding of power and dependency on power, but, as I say, the vehicles will still move without electricity. Our challenge is to keep road users safe, but there is much less dependency on electricity to provide that safe environment.



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As we move forward and talk about connecting autonomous vehicles, the chances are that we will become more dependent upon electricity, and therefore we will have to build our resilience to ensure the continuity of the service.

Q339 Anna McMorris: If we are looking at workplace productivity and the economy being affected by heatwaves as a consequence of disruptions on transport and that link, have you done any work to quantify how much productivity or the economy is affected by some of what you have just talked about—those disruptions?

John Edgley: In terms of the linkage to the economy, I'm afraid I don't have sight of that, but it's something that we can happily take away and provide a written response on.

Q340 Anna McMorris: That would be useful. As I have said before, we have heard in our evidence that there is that huge interdependency between transport and infrastructure, particularly in a heatwave. So the effects of that on our economy and on our workforce would be huge. It would be interesting to find out more from you on that.

John Edgley: I would be very happy to provide a response on that. My initial thoughts are that we do know that performance drops somewhat on those occasions, but we are not talking about wholesale failure to get people from one point to another. What we are actually talking about is maybe some delayed journeys.

If I'm honest, I'm not sighted on the knock-on impact to the economy. It is certainly something that would be interesting to investigate.

Q341 Anna McMorris: It is about people not travelling to work for example—you know, things at that very basic level—if trains aren't running.

John Edgley: Trains do run, but they may be slightly delayed on certain occasions.

Mike Wilson: We haven't done a study either, looking at the impact on the economy of high heat. As I said, the strategic road network is generally resilient to high levels of heat. Clearly there are incidents that take place and there are many studies looking at the impact on the economy of incidents, but those are not necessarily dependent upon extremes in temperature, particularly heatwaves.

Q342 Chair: Have you done any work on delays in general? Obviously, councils are implementing lane rental schemes to stop the huge economic consequences of congestion on their local areas. Councils and the Government have done that work.

Mike Wilson: We have done studies, and the Government have done studies, looking at the impact of congestion on the economy and the cost of congestion for the economy.

Q343 Chair: But you haven't disaggregated out any heat-related—

Mike Wilson: No, we haven't.



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Q344 Anna McMorris: Mr Edgley, does Network Rail consider emissions associated with mechanically cooling trains? Are any measures taken to compensate—recycling waste energy through regenerative braking, for example?

John Edgley: I am just trying to find a couple of stats to provide you. We issued our new environmental policy in 2017, in which we committed to reducing carbon and power emissions—I will see whether I can see the actual numbers in my notes. Yes, we have a commitment to reduce carbon and power usage, and we are doing that through a number of different initiatives. For instance, the recent renovation of Birmingham New Street station was designed using modern building standards and with an eye to the environment. I think it is estimated that the completed building will save 3,000 tonnes of carbon a year, and it does all these innovative things such as recycling water for the toilets and so on. The residual heat generated from that building goes out and heats a number of other local amenities. The short answer is yes, we are considering that. We have commitments in that particular area.

I would like to share with you quite an exciting strategy, or innovation, that we are looking at—the train energy strategy, which involves not just Network Rail but the train operators and industry, and various partners. Obviously, we operate the infrastructure and the train operators run the trains, but we need to look at the network as a whole system. We have interrelated dependencies internally. You no doubt will have heard of the new fleet of trains—the IEP trains, which are hybrid, so they can draw power or use battery power, and so on. What is the next generation after that? Is it hydrogen fuel cells? Is it solely batteries? How does that work? What does the infrastructure look like to support that? That is what the train energy strategy is set up to investigate. Part of what it has to deliver is reliable services, reliable trains, reliable infrastructure, less power usage and lower carbon emissions, and those sorts of things.

Q345 Anna McMorris: Mr Wilson, going back to your answers to the Chair earlier, do you know how the varying surface types used for roads contribute to an urban heat island?

Mike Wilson: The answer to that question is—hmm. *[Laughter.]* I am trying to think. The strategic road network tends to be an inter-urban network, so I am aware of the urban heat effect but I am not aware of how the road surface contributes to that. It is not something that we have specifically looked at. Clearly, there is the colour of roads—they tend to absorb heat by their very nature—but I am not aware of the proportion they contribute to that effect, and it is not something that we, as the strategic road network, have looked at specifically.

Q346 Mr Dunne: We all anecdotally experience an increase in traffic when the weather gets better. Does that apply when there is a heatwave as well? If so, how do you cope with that on the rail and on the roads?

John Edgley: The short answer is yes. As I alluded to earlier, we work with our partners in the train operating organisations to create contingency within the timetable. For instance, taking in a bit of a Donald



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Rumsfeld, there are the known unknowns, as it were. We know that more people will want to use the railways. We don't know exactly how many, because it depends on the weather itself, but we know when there is going to be a period when additional trains might be required to go to the coast. I mentioned football matches; I think I mentioned the royal wedding and things like that. We know when we need to have extra capacity and how to plan that into the timetable.

Q347 Mr Dunne: Can I question you on that? Of course you don't know when the heatwave is going to happen. You know it will be warmer in some months of the year, but you can't anticipate in time to adapt the timetable in the event of a heatwave as such, can you?

John Edgley: Understood. We have the additional trains put on over the summer period, for instance, which cater for that, but if there is a special event we have the capacity, working with the train operators, to lay on extra rolling stock. It is a very fair challenge, because this is not something that happens when somebody wakes up in the morning and thinks, "I'm going to run another train." It takes a few days to organise and put in place. On the primary concern you are talking about, yes, we know we potentially need more trains to go off to all the coastal destinations in the summer period, and we will allow for that.

Mike Wilson: Similarly, we see a change in patterns of travel when there is warm weather. We have a bank holiday approaching and the weather is expected to be warm. We will have been planning for that for some time. There are a number of things that we do. First, we try to provide people with travel advice about how to be prepared for their journey, not just themselves and what they might take with them on their journey, but preparations to their vehicle. We have just issued press releases—I think today, or it might have been yesterday—in preparation for this week's bank holiday, helping people to be prepared for their journey.

We look at our occupancy of the network and where roadworks are, and we remove roadworks for particular things such as bank holidays. We announced yesterday that we are removing 237 miles of roadworks in preparation for this weekend. We look at our operation of the network and how we will work with our traffic officers, who patrol the network on a 24/7 basis—do we need to have a different mix at different times?

I was the operations director for the south-west before I was in my current role, and we talked a lot about the six summer Saturdays, the summer Saturdays in the school holidays. You see very distinct travel patterns, and we prepare for those: everything is going to Cornwall and Devon on a Saturday morning and coming back from Cornwall and Devon on a Saturday afternoon. We prepare for that, and we see different types of traffic as well, with lots of caravans and trailers.

At particular times of the year we can see trends where trailers have not been maintained over the winter and we see lots of failures, so we tend to work with caravanning groups and other organisations. We have recently been at the Tow Show, encouraging people to prepare their vehicles for



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the journeys they might take this summer. We see changes in vehicle mix and the types of journeys taken, and we prepare for those. Do I see those increasing as the good weather does? I suppose it will become a question not just of the hot weather, but of people's free time. It is when free time, as in a bank holiday, coincides with hot weather that we see the influx of people who wish to travel to the seaside, or wherever else it might be.

Q348 Mr Dunne: I am a member of the caravanning club, and I have never heard of the Tow Show. Where does it happen? Where is it?

Mike Wilson: I think it happened at the NEC, but there are a number of events that happen almost on a weekly basis, where we work with organisations to encourage people to travel safely.

Q349 Mr Dunne: Thank you; that is very helpful.

We are concerned about events that have calamitous effect. Have you ever had to prevent a train from operating on the network as a result of excess heat, either because the carriage heating system persists on working in a heatwave—that happened to me during that hot weather in April, although not in a heatwave—or because it is too hot for people to travel?

Chair: It would be rail buckles, wouldn't it? That is from the engineering side, rather than the train side.

John Edgley: I am just thinking about how to frame the response. Yes, in terms of the management procedures for the train operators, if there is a problem with air conditioning for instance, although I am not sighted on it, I am sure they have got procedures in place to take some stock out of service.

In terms of the infrastructure side—I can talk about that authoritatively—if there is a potential safety hazard with a section of line, we do have procedures in place to close that line. That is extremely rare, but what we do is empower our staff out on the ground to make these safety calls, because quite frankly safety is our key priority—we want passengers getting to their destinations in one piece. More often than not, what we actually see is a performance-related challenge. In hot weather, where we believe there may be a potentially higher risk of a track buckle, we can take the option of putting in a speed restriction.

The mechanics of that, effectively, are that when a rail is under pressure, it wants to push together, and it will find a weak spot and want to buckle. Energy is put into the rails not just by heat but actually by moving traffic. So a way of reducing the amount of energy going into the track is by reducing the speed of the stock.

Q350 Mr Dunne: Mr Wilson, have you ever had to close a road because of heat pressure?

Mike Wilson: I am not aware of us ever having to close a whole road. We have closed lanes. In the past, particularly with the older concrete roads I was talking about earlier, for the same reason we have seen roads buckle.

Again, we have processes and procedures—we undertake safety inspections on a daily basis, we have traffic officers patrolling the network and we have procedures for closing lanes—but I am not aware that we have ever had to close a road as a result of hot weather.

Q351 **Mr Dunne:** Mr Edgley, I have heard on Transport for London some audio messages to hydrate when clearly there are hot conditions. In your written evidence you talk about some video messages that you have put out to help passenger comfort. Do you have a similar system for putting out audio messages when it gets very hot?

John Edgley: Yes. Specifically, I understand Network Rail operates 20 stations—the contracted licensees operate the remainder. So I can say that, for the stations that Network Rail operates, in hot weather we do undertake similar activities to TfL and remind people to hydrate. I believe in five of our stations currently there are free water fountains that people can use. There are plans to install them at a number of others, and that is obviously combined with the fact that, at the major stations—let us be perfectly honest—there are opportunities to purchase stuff.

Chair: We are working on that.

Q352 **Mr Goodwill:** Mr Wilson, how has the national adaptation programme informed the work of your climate change adaptation strategy and framework? Is this strategy longer term than the five-year funding cycles for the road investment strategy?

Mike Wilson: Our climate change risk assessment is based on the national adaptation programme. We have an obligation under our licence to take into account the impacts of climate change, and that risk assessment is part of our fulfilling those licence obligations.

Our adaptation strategy is looking beyond the five-year period. It is looking up to 2080, which is where the current projections of climate go to. We are looking over that period of time at the impact of change. The opportunity over the five-year funding stream we have through the road investment strategy allows us to invest for that longer term. We are starting to look not just at the first RIS period, which is the one we are in at the moment, but the next five-year period, starting in 2020. We are also thinking about asset management in the longer term and the changes we will need to make in that longer term. In that context of that long period of time, we are making decisions now about climate adaptation and investment in the asset itself. We were talking earlier about routine maintenance, for example, and the importance of routine maintenance and day-to-day maintenance of the asset in keeping the asset resilient to those high temperatures.

Mr Goodwill: I suppose an example of that would be the Hopgrove roundabout project on the A64, which, as it gets warmer, more people will be using, but that's just a plug for our own little backyard project.

Chair: It is nearly on the way to Bridlington.



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Q353 Mr Goodwill: Exactly. You have talked about the adaptation you have already undergone, changing the recipe, for want of a better word, of the surface. Have you assessed whether that is working or not? Is that ongoing?

Mike Wilson: As part of our routine maintenance we inspect the network. We undertake network-wide condition surveys on an annual basis, so that the network is looked at in terms of its skidding resistance, its longitudinal profile, meaning ride quality, and its transverse profile, looking for rutting. We are seeing very consistent performance year on year. We are not seeing a change in the condition of the asset as the climate changes at the moment. That doesn't mean that we are resting on our laurels. We are working hard to understand what that might mean for the future and what changes we might need to make. We are not complacent.

Mr Goodwill: You have already pointed out that you only manage 2% of the network, although that is the most heavily used.

Mike Wilson: It is.

Q354 Mr Goodwill: Do you liaise with local authorities to trickle down your experience and expertise to ensure that they don't repeat mistakes or make mistakes that you have headed off?

Mike Wilson: Yes, we do. Very few journeys start or end on the strategic road network, so we work hard with local authorities to share our experience and knowledge. They are not required to utilise the "Design Manual for Roads and Bridges", but it is an industry-wide recognised standard and they do use it, but there is no necessity for them to do so and frankly, as you mentioned, there are differences between the strategic road network and the local road network, and it is sensible for them to pick and choose between those standards. We have a number of formal arrangements. The main one is through the UK Roads Liaison Group—chaired by the Department for Transport—which is a professional series of committees aimed at sharing good practice between the various highway authorities in the United Kingdom.

Q355 Mr Goodwill: Have there been trade-offs or compromises by having a more heat-resistant surface? Are there changes or is it more likely to have potholes in winter, or is it a win-win situation?

Mike Wilson: As I said earlier, changing the recipe has allowed us to accommodate expected temperature ranges from the middle of winter to the height of summer. We expect high levels of performance in all expected weather conditions.

Q356 Mr Goodwill: Do you think that the national adaption plan action point to build capacity and knowledge on local transport climate resilience has been successfully achieved? What are the remaining barriers to climate change adaption in the transport sector?

Mike Wilson: Could you repeat the question please?

Q357 Mr Goodwill: Do you believe that the action point from the national



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adaption plan, which is to build capacity and knowledge on local transport climate resilience, has been successfully received or is there more to learn? Is it a work in progress?

Mike Wilson: Again, that is a question for the local transport operators. I am not aware of the action that has been taken on that point, or whether there is more to be done for that action to be delivered. Highways England has its own part of that adaption plan. We are working hard on getting it delivered and on sharing our experience with those local authorities.

Q358 **Mr Goodwill:** Finally, the United Kingdom's National Infrastructure Deliver Plan 2016 sets out £88.4 billion—a record amount for any Government and was when I was at the Department for Transport—to spend on transport infrastructure. Do you think that that has helped to improve the resilience of UK transport and is sufficient to adapt to future climates, across rail and roads?

Chair: It depends on how many years. Is that over 10 years, or 20 years?

Mr Goodwill: It's over the RIS period.

Chair: So the next 10 years?

Mike Wilson: Yes is the simple answer. The investment in new roads and in maintenance means that we are designing more roads and maintaining more roads to the latest standards. That means that they are resilient to that climate change that we have been talking about.

To go back to that five-year funding programme that allows us to make long-term investment decisions, that is an incredibly important part of that resettlement. It enables us to do the asset management for the long term and to make decisions today that will have an impact in future.

John Edgley: I want to frame the response to the question, but steer me if I am going in the wrong direction, please. We have a research and development portfolio to help us become more resilient moving forward. That is set out in the vicinity of £800 million of work to be done—in the railway terms, in control period 6, which is the next five-year plan. That should start from 2019. That is specifically focused on how we will be more resilient and how we will increase our performance. Half of that money has been committed. The other half of it is locked in with final determination or the settlement for the railways. We are in that discussion with our colleagues at the ORR. Securing that funding will give us the focus and funding that we need to provide the resilience we want. My colleagues are engaging in those conversations.

In the wider piece, do we have sufficient to undertake the maintenance and renewals activities to the network that we wish to do? In the run-up to this control period, we have been party to some extremely detailed and considered views and discussions, if I am perfectly honest, about how much we should put forward to renewal and to maintenance, and how much should be part of research and development. Given that we are a public body, we want to make sure that the money is being spent



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effectively. That is basically what we have put forward. I believe that we have enough money, given the settlement that we are discussing with the ORR currently.

Q359 Mr Goodwill: Would it be right to say that the High Speed 1 section of line is more resilient than the traditional Victorian network? Is that likely to mean that, as we move into more high-speed specification lines, we will be more resilient?

John Edgley: That is a very good question. It is newer, therefore it will be built to modern standards with more modern materials, so yes I would expect it to have a higher level of resilience to heat.

One point I omitted to make in answer to some of the earlier questions—please forgive me—is that modern, continuously welded track should be resilient up to 59° rail temperature, which is broadly speaking 42° air temperature. It is pretty much a rule of thumb that 1.5 times the air temperature is your rail temperature.

Modern materials and modern construction is resilient. It is the older materials that we can plan around, and move forward to removing. Just as a nice little stat that you might enjoy, by 2050 we estimate that—through the normal operation of renewals that we would undertake because of, as I mentioned, the life-expired track, at the end of its useful life—the 11% jointed track we currently have will have reduced to around 5%. It will probably be less than that if we decide to focus on some areas to remove it.

Q360 Mr Goodwill: Is the catenary—the overhead lines—affected by temperature?

John Edgley: Absolutely. We have two broad types of design—I believe this is in the written evidence. If I can paint a picture for you, we have auto-tensioned overhead wires. In effect, through types of mechanism, that is kept at a certain tension through a kind of big spring mechanism, if you like.

Q361 Mr Goodwill: Weights hanging on things?

John Edgley: Exactly. That is one of the designs—it's lovely. We also have fixed tension, which is the older design, before the pendulum-type arrangement that you have just described. There is a better, more modern version of that, which is a bit like just a spring that sits neatly away, so we should not see the pendulums out and about, moving forward.

Those fixed tension areas are set to allow for expansion and contraction, but in periods of extreme weather, where problems are anticipated, work can be planned to adjust those. However, as we renew the asset those fixed tension systems will be removed and eliminated.

Mr Goodwill: Thank you very much.

Q362 Chair: Can I just quickly go back to you, Mr Wilson, on Highways England and this issue about resilience and the welfare of people? It is particular



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live in my mind because of what happened on the M62. You have no requirement or statutory obligation under the Civil Contingencies Act 2004 to plan for and respond to customer welfare needs during emergencies. Do you think you should have?

Mike Wilson: Under the Civil Contingencies Act 2004 we are what is known as a category 2 responder. As such, we are obliged to work with category 1 responders such as the police, the emergency services, local authorities and health authorities, which you were talking to earlier. The answer to your question is no, I don't think we should.

Q363 **Chair:** When did you decide to provide welfare for those people who were stuck on the M62? I know we are off heatwaves, but who made that decision and at what time?

Mike Wilson: We work through the local resilience forums. There are well-established protocols within local areas to provide bottles of water and the welfare that is necessary. We work with those local resilience forums. We do exercising and planning with them. We have traffic officers operating in regional control centres across the country. There will be an incident commander who will be working 24/7, responsible for taking that into consideration. We will be working with local resilience forums to provide that welfare if we think it is necessary.

Chair: Thank you both very much indeed—we are about to go and have a Division.