EDINBURGH TRAM (LINE ONE) BILL COMMITTEE

Tuesday 8 November 2005

Session 2

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EDINBURGH TRAM (LINE ONE) BILL COMMITTEE
20th Meeting 2005, Session 2

CONVENER

*Jackie Baillie (Dumbarton) (Lab)

DEPUTY CONVENER

*Phil Gallie (South of Scotland) (Con)

COMMITTEE MEMBERS

*Helen Eadie (Dunfermline East) (Lab)
*Rob Gibson (Highlands and Islands) (SNP)

*attended

THE FOLLOWING ALSO ATTENDED:

Malcolm Thomson QC (Counsel for the Promoter)

THE FOLLOWING GAVE EVIDENCE:

Andy Aitken
Mark Clarke
Ian Hewitt
Dr Andy Irwin (A W Irwin Associates)
Richard Mackenzie (RMP Acoustics)
Dr Bernadette McKell (Hamilton McGregor)
Andrew Polson
Graham Scrimgeour
Kristina Woolnough

CLERK TO THE COMMITTEE

Jane Sutherland

LOCATION

Committee Room 1

Scottish Parliament

Edinburgh Tram (Line One) Bill Committee

Tuesday 8 November 2005

[THE CONVENER *opened the meeting at 10:15*]

Edinburgh Tram (Line One) Bill: Consideration Stage

The Convener (Jackie Baillie): Good morning and welcome to the 20th meeting in 2005 of the Edinburgh Tram (Line One) Bill Committee. We are at consideration stage, which is when the committee considers the detail of the bill. Our job is to consider the arguments of the promoter and of the objectors and ultimately to decide between any competing claims. I remind everyone that oral evidence should focus on issues that are in dispute as identified by the relevant rebuttal witness statement or previous oral evidence on the issue.

All parties who are attending today are aware of the procedures for taking evidence, so I do not propose to reiterate them, but I remind everyone that the committee agreed at its meeting on 25 October that it does not wish to take any further evidence from Lord Marnoch in relation to vibration and structural damage. Members will recall that we heard oral evidence on noise and vibration from the promoter's witness, Steve Mitchell, on 3 October. We heard technical exchanges between questioners and Mr Mitchell and we agreed that we had sufficient evidence on the World Health Organisation guidance. Therefore, I do not expect the topic to be revisited today.

It might assist all who are present today if I reiterate the decisions that the committee will consider when it deliberates on objections. In considering the impact of the bill on individual objectors, the committee can reject an objection, uphold all of it or uphold part of it. In upholding all or part of an objection, the committee may consider proposing mitigation to address the issue. It will be extremely useful for the committee to have evidence that indicates what mitigation the objector would like to see to address the impact. Although the committee finds it helpful to have perceived flaws in the promoter's response to a question highlighted, such evidence might not assist the committee in considering potential mitigation. I ask everyone to consider that when they present their arguments.

Before we move on to take evidence, I record the fact that, today, we have had four requests to alter the timetable. We endeavoured to meet all those requests, but I am mindful of the disruption and delay they caused. Quite frankly, it is now unclear who is giving evidence when. Such changes are unlikely to be countenanced at future meetings.

The running order, as amended, is Bernadette McKell; Andy Aitken on noise; Mark Clarke on noise only; Andy Irwin; Andy Aitken on vibration; Ian Hewitt on noise and vibration; Graham Scrimgeour on both his statements and Mark Clarke's statements; Andrew Polson; Ms Woolnough; and Mr Mackenzie.

To allow the promoter to rearrange questioning, I suspend the meeting for 10 minutes.

10:19

Meeting suspended.

10:29

On resuming—

The Convener: We now move to evidence taking from the objector witnesses for groups 33 to 35, 43 and 45. The issue that we are considering today is noise and vibration. We begin with group 35.

DR BERNADETTE MCKELL, ANDY AITKEN, DR ANDY IRWIN *and* MARK CLARKE *took the oath*.

10:30

The Convener: I invite Mr Aitken to move to the questioners' side of the table. I ask Dr Irwin and Mark Clarke to take a seat in the public gallery for the moment. There will be a degree of shuffling backwards and forwards today; we will allow time for people to gather their thoughts and their breath.

The first witness this morning is Dr Bernadette McKell, who will address the issue of noise for group 35. I call Mr Aitken.

Andy Aitken: Dr McKell, in terms of the evidence in chief, I have several points to raise on your witness statement. Before we do that, it is perhaps helpful that we understand the background to your knowledge on the subject under discussion. Will you tell the committee how long you have been undertaking professional work on noise?

Dr Bernadette McKell (Hamilton McGregor): I have been working in a professional capacity in the field of acoustics for some 20 years. I spent some time working at Heriot-Watt University and in private consultancy, after which I worked as a

technical director for Casella Stanger—a company name with which everyone on the committee will be familiar by now. Over two and a half years ago, I started up my own company.

Andy Aitken: Thank you. You have had a wide range of clients in the past, representing both the promoters of and objectors to transport systems in Scotland.

Dr McKell: Yes. I routinely do road and rail assessments—indeed, it is on a daily basis. For the past number of years—I cannot remember how many—I have worked as an adviser for the Scottish Executive trunk road division.

The Convener: If I may, I will interrupt you at that point, Mr Aitken. I thank both of you for that introduction, but we have all that information in evidence. I ask you to focus on the issues that are in dispute, Mr Aitken.

Andy Aitken: I am sorry, I did not realise that that was recorded already.

The Convener: It is and we are capable of reading, too. We are aware of Dr McKell's background.

Andy Aitken: Okay. My first point of clarification is on the issue of noise prediction in respect of the Roseburn corridor. In section 3.10 of your witness statement, you state that there are faults in the noise calculations in the environmental statement and that the prediction calculation data and assumptions were not made available for checking by objectors. Is that still a concern?

Dr McKell: Yes, it certainly is. In order to illustrate the concern, I ask the committee to refer to table 13.6 of the environmental statement, where they will see that a natural screening figure of 5dB is given for the Garscube Terrace area. However, table 12.2 shows a natural screening figure of 10dB for the same area. The environmental statement is quite confusing in places.

Andy Aitken: Does it give you confidence that the predicted noise level for Garscube Terrace and other areas has been derived correctly?

Dr McKell: No, it does not. For the sake of the residents in that area, it is absolutely essential that they are able to validate the underlying elements that were used in the prediction of noise.

Andy Aitken: Has enough clear information been presented to allow you, in your professional capacity, to agree with Mr Mitchell when he said:

"The Garscube Terrace section does not need mitigation"?—[*Official Report*, *Edinburgh Tram (Line One) Bill Committee*, 3 October 2005; c 1144.]

Dr McKell: No, there has not been.

Andy Aitken: So more information is required?

Dr McKell: Yes. I would have expected to see the input variables that were used for the prediction of the noise from the various noise-sensitive receptors along the route either in the main ES or as an annex or appendix. The information should have been made available to the promoter so that residents could see it, but that did not happen.

Andy Aitken: So that is what you mean when you say that there is a lack of transparency in the environmental statement in terms of noise prediction levels.

Dr McKell: That is correct.

Andy Aitken: Thank you. I take it that you consider it important that I ask the committee to note that we request the prediction data.

Dr McKell: Yes.

Andy Aitken: Another issue relates to what I will call average noise levels. As Mr Mitchell is present, let me say that I appreciate that the figure is not a true average but, for the sake of simplicity, it is more helpful to refer to it as the average level.

At a previous meeting, there was much discussion about the correct selection of the average noise level. In paragraph 3.12 of your report, you state concern about the eight-hour evening average noise level that is used in the noise and vibration section of the environmental statement. After all the discussions in the previous meeting, do you still have a concern about that?

Dr McKell: Yes. Guidance such as the World Health Organisation guidelines uses a time base of eight hours for the assessment of night-time noise, but it is only common sense that not everyone sleeps for eight hours. It is unreasonable to suggest that those who sleep for only six or four hours a night should be afforded less protection.

As the eight-hour time base takes into account what we might call the dead period of the night when no trams will run, the noise effects of the trams that run between 11 o'clock—which is the start of the official night-time period—and half-past 12 is diluted because that energy is being spread over a period when no trams run. The environmental statement states clearly that the difference between the one-hour L_{Aeq} and the eight-hour L_{Aeq} is 4dB. Therefore, the impact in places has been underestimated by 4dB.

Andy Aitken: Mr Mitchell identifies that, in raising the issue in your report, you have made

"a minor but important error".

Do you agree that you made an error?

Dr McKell: I certainly did not make an error. It is important that decision makers realise that, although guidance on night-time noise generally

defines the night-time period as being between 11 o'clock at night and 7 o'clock in the morning, that is only guidance. The information that is contained in such guidance must be used in a way that is appropriate to the particular circumstances. In my view, it is inappropriate to dilute the noise impact of the tram by spreading it over the full eight-hour period when the disturbance will not occur over the full eight hours.

Andy Aitken: Do you agree that it is rather incongruous that the environmental statement uses all those one-hour figures and translates them at the end into an eight-hour figure?

Dr McKell: Yes. There is an acknowledgement of that in tables 13.5 and 13.6 of the environmental statement, which give the one-hour predicted level. The noise level is calculated over one hour, but 4dB is then subtracted from that to compare the figure with the eight-hour guidance values.

Andy Aitken: What is that one-hour figure for, for instance, Garscube Terrace?

Dr McKell: In Garscube Terrace, the unmitigated night-time noise level is given as 50dB.

Andy Aitken: And the background noise level?

Dr McKell: The background noise level is 35dB.

Andy Aitken: So there is a 15dB difference?

Dr McKell: Yes. It is important to appreciate that the background noise level is the pre-existing ambient noise level. That is measured in terms of the same parameter, which is the L_{Aeq}.

Andy Aitken: You said that there will be a 15dB difference. For a layman, does that mean that there will be a subjective increase of three times the noise that we have at the moment?

Dr McKell: Approximately, yes.

Andy Aitken: So when I am waking up or trying to get to sleep in Garscube Terrace, I can look forward to a subjective noise increase of three times what I experience at the moment.

Dr McKell: Yes, I am afraid that you can.

Andy Aitken: Will that disturb my sleep?

Dr McKell: It is very likely to disturb your sleep.

Andy Aitken: So why would I not just get out of bed and shut the window?

Dr McKell: You could close the window, but the residents of Garscube Terrace who sleep in rooms at the rear of their property have been exposed to a quiet environment for a long time—for as long as they have lived there—so they may be used to sleeping with their windows open.

It is important to note that planning advice note 56—which was often referred to in previous evidence-taking sessions—states in paragraph 59 that only in exceptional circumstances should internal levels be predicted with the windows closed. That is, people should be able to sleep with their windows open for ventilation.

If people have lived for years in a certain manner whereby, especially during the summer months, they sleep with their windows open, it is unreasonable to expect them to be required to close their windows to avoid sleep disturbance from the proposed tram system.

Andy Aitken: Because these are not particularly exceptional circumstances. PAN 56 says:

"Only in exceptional circumstances should satisfactory noise levels be achievable only with windows shut".

Dr McKell: These are not exceptional circumstances.

Andy Aitken: So, given that Mr Mitchell has PAN 56 to deal with, what would you have expected him to do with that guidance?

Dr McKell: I would have expected him to acknowledge that PAN 56 is not used in reverse. It is used to assess the suitability of sites for residential development—that is, when new residential developments are being built alongside existing transportation sources. That is what the noise exposure categories are used for. PAN 56 has a section on noisy development. However, in the environmental statement, Mr Mitchell uses the figures that are given in PAN 56 and in the noise exposure categories.

PAN 56 also acknowledges the fact that, when considering tranquil areas, a 3dB reduction can be applied to the levels used in the noise exposure categories. I cannot remember the exact paragraph number at the moment but I can give it to the committee if members would like me to do so.

The quiet nature of the Roseburn corridor, where the existing noise levels are low, means that it could be described as a tranquil area—it is almost rural in nature, with its cycle path and walkway—and that it could be considered that a 3dB reduction in the levels could be applied to take account of the nature of the area. Of course, that reduction would apply only to the Roseburn corridor; it should not apply throughout the route.

Andy Aitken: And if that 3dB reduction had been in place, would it have made any real difference to my objection in terms of the noise levels in the Roseburn corridor?

Dr McKell: The environmental statement claims that there will be no impact on Garscube Terrace. That is hard to believe in any case—if you looked

down on the Roseburn corridor from one of the upper windows in a house on Garscube Terrace, you would ask yourself how a tram running along there would have no impact—but if the 3dB reduction to the levels had been applied, the environmental statement would not have said that there would be no impact on Garscube Terrace, which would mean that it would be likely to be considered for mitigation.

Andy Aitken: This morning, the convener said that it would be useful if we are able to suggest what we are searching for. In your report, you propose a maximum level of 45dB $L_{Aeq\ 1\ hour}$ at the property façade as the averaged night-time period. Is that correct?

Dr McKell: That is correct.

Andy Aitken: Is that the lowest level that you could have chosen?

Dr McKell: It is a level that will ensure, as far as is reasonably practicable, that there is no sleep disturbance. If we have 45dB at the façade and take out 15dB to give us the level that will be heard in a room with an open window, we end up with 30dB L_{Aeq} inside, which is the World Health Organisation's level for the onset of effects.

Andy Aitken: When you wrote that in your report, were you quite clear that it is well supported in terms of being fair and sensible to adopt and that, because it is a one-hour figure, it means what it says?

Dr McKell: It certainly means what it says. It has to be considered in the context in which it has been applied. The residents in the Roseburn corridor presently experience an external noise level of 35dB L_{Aeq} at night.

Andy Aitken: In terms of the other criteria for specifying noise—that is, the maximum levels rather than the average levels—I note that, unlike the environmental statement, the noise and vibration policy includes no maximum noise level. If you were ever writing a specification for a noise and vibration policy, would you include only the averaged level or only the maximum level?

Dr McKell: I would never propose a specification for a noise and vibration policy for a system such as this that excluded maximum noise levels.

Andy Aitken: Why not?

Dr McKell: Because that is a critical factor in considering sleep disturbance.

Andy Aitken: So, given that it does not have a maximum noise level, would you describe the current noise and vibration policy as poor?

Dr McKell: Most certainly.

Andy Aitken: And you would be concerned for our benefit if the noise and vibration policy went ahead as a statutory device without adopting a suitable maximum level?

Dr McKell: I would be seriously concerned if that were adopted as legislation.

10:45

Andy Aitken: And you include a suitable maximum level in your report.

Dr McKell: Yes.

Andy Aitken: What is that based upon?

Dr McKell: It is based on the avoidance of sleep disturbance and the guidance in the WHO document "Guidelines for Community Noise".

Andy Aitken: I was not aware until now that I may not talk about the WHO document. I have a couple of small questions about it.

The Convener: You can ask them if you put them in a wide context. The committee is clear that it has heard sufficient evidence on the matter.

Andy Aitken: My question is wide. What is the scope of the WHO document?

Dr McKell: The foreword of the WHO document states that the scope is

"to provide guidance to environmental health authorities and professional trying to protect people from the harmful effects of noise in non-industrial environments."

The preface states that the guidelines are driven by

"the need for improved legislation … at the national and regional levels."

Andy Aitken: And the WHO recommendations?

Dr McKell: In the WHO recommendations—

The Convener: Can I stop you, Mr Aitken? We already know all that.

Andy Aitken: To wrap up, Dr McKell, am I correct to say that you are particularly concerned about the noise and vibration policy as a statutory document because you do not believe that it provides suitable sleep protection to residents in the Roseburn corridor?

Dr McKell: That is correct.

Andy Aitken: Thank you. That concludes my questions.

The Convener: Thank you, Mr Aitken.

Mr Thomson?

Malcolm Thomson QC (Counsel for the Promoter): Thank you, madam. Good morning, Dr McKell. First, I wonder whether you can help me with the difference between L_{eq} and L_{Aeq}. I notice

that most of the references in your report are to L_{Aeq} but the definition in your glossary refers to L_{eq}. Is there any significance in that?

Dr McKell: No. There are several ways to write L_{Aeq}, L_{eq} and dB(A). You will find variations in the guidance documents. L_{eq} is a continuous equivalent sound pressure level. The "A" simply denotes that the linear levels have been weighted to simulate the response of the ear.

Malcolm Thomson: Have you read Mr Mitchell's explanation of L_{Aeq} at page 21 of his original witness statement? His appendix 1 contains a general explanation, by him, of some of the terms.

Dr McKell: Are you referring to the environmental statement?

Malcolm Thomson: No. I refer to Mr Mitchell's witness statement.

Dr McKell: I am getting confused about the witness statements.

Malcolm Thomson: His witness statement has two appendices. One is an expanded glossary of the type that your statement contains. The other is the promoter's noise and vibration policy.

Dr McKell: Is it possible to get a copy of that so that I am sure I am referring to the right document?

The Convener: Yes.

Malcolm Thomson: I refer to the second page of appendix 1, under the heading "Measurement Parameters".

Dr McKell: Are you talking about appendix 1, which is called "What is Noise?"

Malcolm Thomson: Yes. If you turn to the second page you will see the heading "Measurement Parameters" and the subheading "L_{Aeq}".

Dr McKell: Yes, I can see that.

Malcolm Thomson: Have you read that explanation of L_{Aeq} before?

Dr McKell: Yes.

Malcolm Thomson: Do you agree with Mr Mitchell's explanation of L_{Aeq}? In particular, do you agree with his explanation of logarithmic averaging and his example of a class of schoolchildren and their teacher?

Dr McKell: Yes.

Malcolm Thomson: In simple terms, does it mean that an L_{Aeq} is not simply an arithmetic averaging but one that gives a weighting towards the louder noises?

Dr McKell: Yes, the continuous equivalent sound pressure level.

Malcolm Thomson: Does that, to some extent, reduce the difference between taking a night-time average over eight hours and taking it over four or six hours?

Dr McKell: No, because the figure still depends on the "T"—the time period. It is the continuous equivalent sound pressure level over the time period.

Malcolm Thomson: The question was, does it reduce the difference to some extent? We are using logarithmic averaging rather than arithmetic averaging.

Dr McKell: Does it reduce what difference?

Malcolm Thomson: The difference that you say exists between considering the night-time average over four or six hours and considering it over eight hours.

Dr McKell: The difference in this instance is actually stated in the environmental statement. It is given as 4dB.

Malcolm Thomson: But we can agree that the difference is not arithmetic but logarithmic.

Dr McKell: It is logarithmic, yes.

Malcolm Thomson: The eight-hour average comes from the WHO document of 1999, does it not?

Dr McKell: The eight-hour time base, yes. It is in that document and others.

Malcolm Thomson: If you are trying to compare like with like, do you not need to go for an eight-hour average?

Dr McKell: No, not when you are talking about sleep disturbance.

Malcolm Thomson: But that point is not made in table 4.1 of the WHO document, which was produced by Mr Mackenzie.

Dr McKell: I cannot remember offhand whether table 4.1 contains the guideline values.

Malcolm Thomson: It is the guideline values.

Dr McKell: And it gives the time base used.

Malcolm Thomson: Yes.

Dr McKell: And it is guideline values.

Malcolm Thomson: Yes.

Dr McKell: They are not engraved in stone.

Malcolm Thomson: But we can agree that the table says eight hours.

Dr McKell: It does—because that is taken as being the night-time period.

Malcolm Thomson: I wonder whether you would now look at paragraph 3.40 of Mr Mitchell's rebuttal of your statement. It is dated 12 August. Is paragraph 3.40 factually accurate?

Dr McKell: It does not tell the whole story.

Malcolm Thomson: But is it factually accurate?

Dr McKell: What it says is taken from the national noise incidence survey, but it does not tell the whole story. The 60dB figure in paragraph 3.40 was exceeded at all the relevant properties. The noise incidence survey considered measured noise levels at properties that fronted on to main roads. It is not appropriate to compare that with Garscube Terrace, where the rear elevations back on to the Roseburn corridor.

Malcolm Thomson: But of course it depends whether you sleep at the front or the back of the house.

Dr McKell: It does, yes.

Malcolm Thomson: Is this an example of the phenomenon that we have heard described as "habituation"—in which people become used to what is there?

Dr McKell: I am sorry but I must be missing something. I do not see how habituation comes into paragraph 3.40.

Malcolm Thomson: I thought that your proposition was that anyone who experienced a noise level outside their bedroom in excess of 60dB L_{Amax} is likely to have their sleep disturbed.

Dr McKell: The problem that I was addressing was the one that arises mainly in Garscube Terrace, where people are currently exposed to a very low level of noise and could be exposed to increased noise levels if the tram system goes ahead and there is not adequate mitigation.

The NIS looked at levels measured outside properties in which people had been living for a period of time that was not made clear in the report and which fronted on to main roads. The noise climate that is experienced by people who live beside main roads is different from that experienced by people who have lived in a quiet area for a long time.

Malcolm Thomson: Is the point not that if a tram is constructed along the Roseburn corridor, people who live in Garscube Terrace will become, like the people in the survey, people who live next to a transport corridor?

Dr McKell: No evidence is in the environmental statement and I have not heard any evidence—it may have been presented to the committee when I have not been here—on habituation and how long the effect of the sudden change will take to normalise to that of a gradual change. Do we say to people in Garscube Terrace, "After two years of having your sleep disturbed, you might get used to the noise, so it is okay"?

Malcolm Thomson: I take it that you have read the previous page of Mr Mitchell's rebuttal, where he discusses the topic of habituation.

Dr McKell: I have read the rebuttal statement.

Malcolm Thomson: Mr Mitchell points out, among other things, the differences between field studies and laboratory studies.

Dr McKell: Are you referring to the Mitchell report findings?

Malcolm Thomson: Yes. The point is that, as I understand it, if one takes someone off the street, puts them into a laboratory situation and tells them to go to sleep in the knowledge that they will hear a noise that is likely to disturb their sleep, they are more likely to wake up than someone who lives regularly next to the same noise source.

Dr McKell: If someone has lived for a reasonable period of time beside an existing noise source, we can talk about such comparisons, but we are talking about people who do not live beside an existing noise source. They are currently used to a very quiet environment, which in the ES is reported as having an ambient level of 35dB. That is very quiet.

Malcolm Thomson: In your day-to-day experience of dealing with railways, have you encountered a railway that would be within the L_{Amax} of 60dB?

Dr McKell: At what distance?

Malcolm Thomson: In relation to a proximate house.

Dr McKell: Houses can sit 20m, 30m, 40m, 50m or 60m from a railway. I do not understand what you are asking me.

Malcolm Thomson: If we assumed that a train was running down the Roseburn corridor, would that almost of necessity exceed an L_{Amax} of 60dB?

Dr McKell: Unmitigated? Yes.

Malcolm Thomson: Or mitigated.

Dr McKell: Mitigated—we are not talking about trains, we are talking about trams.

Malcolm Thomson: Yes but, as I understand it, your experience is with road schemes and trains.

Dr McKell: That is correct.

Malcolm Thomson: You have not told us of any experience with a tram.

Dr McKell: That is correct.

Malcolm Thomson: You criticise, both in your written statements and in your evidence today, the lack of workings behind some of the information that is contained in the promoter's ES. Am I right in thinking that when they are preparing to give evidence for a public inquiry where noise is an issue, it is common for noise experts, like other

experts, to get together and try to discuss where their differences lie so that they save the inquiry time?

Dr McKell: Yes.

Malcolm Thomson: Are you aware that Mr Mitchell attempted to have such discussions with you but that, for reasons that I do not criticise, those attempts failed?

Dr McKell: Mr Mitchell contacted me; I cannot remember whether it was by telephone or e-mail. I either telephoned or e-mailed him back—I think that there was some e-mail correspondence. It is obvious that I am well aware that he tried to contact me, because I tried to contact him in return. However, I was working on behalf of the residents group and spending time on dealing with the request would have incurred costs for the group, so I passed the request to it. The group decided to deal with Mr Mitchell and take up any questions with him.

11:00

Malcolm Thomson: I am in no way criticising what happened. I simply wish to reflect on what has happened so that I can now ask you whether, having regard to your day-to-day experience with road and railway schemes, you think that the predicted noise levels in the environmental statement look about right.

Dr McKell: I honestly cannot say that the levels look about right. If it was a road scheme, I would be looking for the basic input variables: traffic flows, speeds and the percentage of high-use road surface. If I was trying to assess a railway or a tram scheme, I would similarly be looking for input variables; speed was given in a table in the environmental statement, but the single event level was not given.

Malcolm Thomson: What do you mean by the single event level?

Dr McKell: The one-second L_{eq}, which is a value that is used in the prediction methodology that is referred to. I would have expected to be able to work back to ascertain whether a similar noise level would be achieved at a referenced distance. Although Mr Mitchell was not able to enter into direct dialogue with me, I made those points in my initial report, which Mr Mitchell then rebutted. Therefore, there was the opportunity for him, after having seen my report, to say, “Fair enough. I haven’t been able to meet her, but I will give the information in the rebuttal.” I would have been able to take it from there.

Malcolm Thomson: Am I right in thinking that in a situation such as this, in which the only new noise would be from the proposed tram, there would be a fairly constant relationship between the L_{Aeq} and the L_{Amax}?

Dr McKell: It would depend on the circumstances—that is, it would depend on the track that the tram runs on and its support structures and on whether the track runs over any bridges or viaducts.

Malcolm Thomson: Very well. Do you accept that appropriate noise barriers can provide attenuation?

Dr McKell: Yes.

Malcolm Thomson: Do you also accept that the order of magnitude of such attenuation ranges from 5dB to 15 or 20dB?

Dr McKell: Generally, yes.

Malcolm Thomson: Have you considered the noise barriers described in the landscape and habitat management plan, which range in height from 1.5m to 2.5m? Do you think that they are likely to be able to deliver the sort of mitigation described and required by the ES?

Dr McKell: Before we look at whether the barriers are going to work—the barrier calculations get to a point at which it does not take much tweaking or, to use a more technical word, much adjustment to go from successful mitigation to no mitigation. We need to look carefully at the horizontal and vertical alignments of the actual source; the source height; the distance between the source and the barrier; and the distance between the barrier and the receiver, which is the receiver at different floors. You will remember that Garscube Terrace has several levels. Mr Mitchell clarified that point in evidence when he said that the predictions were carried out for the top floor. I would have expected to see the differences in the barrier attenuation for each of the levels in Garscube Terrace.

Malcolm Thomson: Have you attempted that exercise, based on the description in the LHMP?

Dr McKell: I have not been able to do that, because there is not enough information. We do not have the source levels.

Malcolm Thomson: Are there any legal limits in Scotland on the noise level from new trams or new trains? Are there any such limits in England?

Dr McKell: There is no legal limit on new trains; it is to do with insulation. I can never remember the name of the legislation. It is the guided transport regulations—the equivalent of the Scottish noise insulation regulations for railways—which were made under the Land Compensation Act 1973. The regulations are not appropriate here because they were not made under the Land Compensation (Scotland) Act 1973. They give levels at which insulation should be offered for new schemes.

Malcolm Thomson: For the record, they are the Noise Insulation (Railways and Other Guided Transport Systems) Regulations 1996.

Dr McKell: That is correct.

Malcolm Thomson: They were amended in 1998 to take account of Eurostar.

Dr McKell: Yes.

Malcolm Thomson: Am I right in understanding that those regulations set levels above which compensation will be payable under the English equivalent of the Land Compensation (Scotland) Act 1973?

Dr McKell: That is correct.

Malcolm Thomson: So they are perhaps of some interest to the committee, in that they show a level above which compensation has been considered appropriate in England, although for some reason not in Scotland.

Dr McKell: But the same regulations contain a schedule for the work that is to be carried out to provide insulation. That might involve improving the glazing specification and putting in mechanical ventilation. That would mean that if the noise reached the trigger levels in the regulations that you have just mentioned, people would not be able to open their windows. Windows would be improved either by installing a very good double-glazed unit, or by adding a secondary glazed unit, which means a secondary window with an airspace of 100mm to 150mm—not aesthetically pleasing. There would also be a mechanical ventilation unit, so that it would be possible to bring about air changes in the room. That is not a route that the residents of Garscube Terrace or the surrounding area would want to go down, because it would mean that they would be unable to open their windows.

Malcolm Thomson: But you would accept that that is the level above which compensation will be payable in England.

Dr McKell: Yes.

Malcolm Thomson: There are references to those regulations in paragraphs 8 and 10 of annex 2 of PAN 56. I will not trouble you with those references at the moment, but how do those levels compare to the WHO levels?

Dr McKell: They are higher. The WHO levels talk about maintaining reasonable levels of sleep, and trying to avoid community annoyance, whereas the regulations talk about levels at which compensation is payable and people have to keep their windows closed.

Malcolm Thomson: Are those levels more than twice as high as the WHO levels?

Dr McKell: The WHO levels are 55dB during the day, so the levels in the regulations are more than twice as high.

Malcolm Thomson: Do you remember the figures in table 4.1 of the WHO 1999 guidelines, which stated that 45dB as the L_{Aeq} level for outside bedrooms with the window open over an eight-hour period was equivalent to an L_{Amax} of 60dB?

Dr McKell: Yes.

Malcolm Thomson: Is that level of 45dB not equivalent to the level that is specified in the noise and vibration policy?

Dr McKell: The noise and vibration policy specifies the L_{Aeq} levels.

Malcolm Thomson: And the same one, 45dB, at night?

Dr McKell: But the policy says that below that level no mitigation will be considered. Mitigation will be considered if the 45dB is exceeded by 3dB. It states what mitigation there will be for increases ranked in order above that level, provided that the mitigation is reasonably practicable to all concerned.

Malcolm Thomson: If the level were exceeded by 2dB, that would probably be imperceptible. There would not be much point in triggering compensation at that stage, would there?

Dr McKell: It depends on what the background level is.

Malcolm Thomson: Is that not the reason for the 3dB trigger? The difference needs to be perceptible to make it worth while.

Dr McKell: If someone is living in Garscube Terrace and has an existing noise level of 35dB, the noise and vibration policy tells them that if the predicted level is 45dB, they have had it, as they will still be below the threshold, even though there will have been an increase of 10dB.

Malcolm Thomson: In your evidence, you refer to the "Design Manual for Roads and Bridges" guidance for new roads. Could you have a look at paragraph 3.38 of Mr Mitchell's rebuttal statement?

Dr McKell: Yes.

Malcolm Thomson: In that paragraph, Mr Mitchell explains the derivation of the figures in the 1996 regulations. Do you agree with his statement?

Dr McKell: What is said in paragraph 3.38 is correct.

Malcolm Thomson: Do you accept that the L_{Aeq} levels in the 1996 regulations that we talked about a few moments ago equate to an L_{Amax} of 82dB?

Dr McKell: I would not agree that that is the case in all circumstances. Roughly, they do, but I would not like to say—

Malcolm Thomson: But subject to the same provisos that you told me about before, would you agree?

Dr McKell: Yes.

Malcolm Thomson: That concludes my questions.

The Convener: Committee members have no questions, but I have a couple.

Leaving aside the debate on the preferred noise level and whether it should be measured over one hour or eight hours—which, I am quite pleased to say, I followed—is the noise impact so significant that you would say that we should not run this tram?

Dr McKell: If the tram were to be run without suitable mitigation, I would say that it is that significant.

The Convener: So you think that the effect can be mitigated. I heard you debate noise barriers with Mr Thomson. Is there any other mitigation that you, as a professional, would want to be put in place in a situation such as this?

Dr McKell: If I were to sit down with all the input levels and consider how effective the barriers were going to be, I could tell whether the barriers would achieve the desired design target for the residents of Garscube Terrace, which is that the external level L_{max} should not exceed 60dB and L_{eq} 45dB.

A barrier does not always have to be a straightforward fence. There are other novel barriers that can give slightly better performance. Further, the track support structure is steel on steel. Are there other ways of running a tram-type system along that route in a way that would have lower noise levels? I am sure that the noise levels could be reduced so that the levels in Garscube Terrace would not exceed the design targets that we have here. However, doing that will involve considerable expense.

The Convener: Yes, but the noise can be mitigated. That is what I am driving at.

Dr McKell: It should be able to be mitigated. However, I have not been given the raw input data to work through. I would like to have that before I would be confident about saying that it would be possible to use barriers to achieve the required attenuation.

The Convener: I want to ask you a question that I hope is not cheeky. You know that the committee commissioned Casella Stanger to do a peer review of your work. Have you seen that report?

Dr McKell: I have.

11:15

The Convener: Did Casella Stanger get it wrong, or was it a reasonable assessment of the environmental statement?

Dr McKell: I was very disappointed in the peer review.

The Convener: In what way?

Dr McKell: It did not address the issues. It did not pick up on differences in the ways in which the background level had been described. It did not pick up very well on the exceptionally quiet and almost rural nature of the Roseburn corridor. It did not consider sleep disturbance adequately; it basically agreed with the environmental statement. Sleep disturbance is the main concern for the residents of Garscube Terrace and the surrounding areas.

The Convener: Rather than being asked to comment on the detail, Casella Stanger was asked to comment on whether the methodology of the environmental statement was robust enough to allow the committee to arrive at a decision. However, what you say is interesting.

Phil Gallie (South of Scotland) (Con): At one end of Garscube Terrace, a station is likely to be placed at Ravelston Dykes. That suggests that there will be a change in the pitch of noise as trains slow down coming into the station or speed up going out of it. Will that affect sleep patterns more than the standard level of noise when a tram is simply travelling along in a straight line?

Dr McKell: Yes. The change in the noise will affect sleep patterns.

Phil Gallie: That is what I had assumed. How will decibel levels be affected? Will the levels reduce as the tram slows down and increase as it speeds up? How will average levels be affected?

Dr McKell: The final predicted level is related to speed; it is considered at different segments over the length of the track. In the prediction methodology used, as the speed reduces, the noise level will reduce. However, the character of the noise will change.

There is an analogy with road traffic noise when traffic slows down at a junction. Because speeds reduce, the average dB(A) can be less at a junction, but the noise can be more annoying because its character has changed.

Phil Gallie: Thank you.

The Convener: There seem to be no further questions from committee members. Mr Aitken, do you have any follow-up questions for Dr McKell? Before you ask them, I remind you that you may

re-examine only on issues that have been raised by Mr Thomson or members of the committee.

Andy Aitken: I am pleased to say that I have no further questions.

The Convener: I did not mean to frighten you off, Mr Aitken.

There being no further questions for Dr McKell, I thank her for her evidence. We will have a brief pause while Mr Aitken and Dr McKell change places. The next witness will be Mr Aitken, who will address the issue of noise.

Malcolm Thomson: I wonder whether I might raise a minor issue. I understood that questions on the peer review were out of bounds, which is why I did not ask Mr Mitchell what he thought of it. I am slightly concerned about the fairness of your hearing Dr McKell's opinion of the peer review without giving Mr Mitchell the chance to offer his opinion.

The Convener: It was simply for my information. I would not want to deny Mr Mitchell the opportunity to offer his opinion. However, if I had felt the need to ask him, I would have done so. Asking Dr McKell was simply for my information rather than for anything else.

Malcolm Thomson: All right.

The Convener: Dr McKell will now ask questions on behalf of group 35.

Dr McKell: Mr Aitken, I have agreed to question you on the evidence that you submitted in relation to noise. In section 5.6 of your rebuttal, you raised a query over the method by which the promoter is proposing to determine whether mitigation will be applied to reduce the noise level at various properties. Is there still confusion over the method?

Andy Aitken: Yes. There is definitely confusion about the environmental statement, which somewhat contradicts the noise and vibration policy. We have a history of objecting to that without getting to the bottom of the matter. We raised it in our cross-examination of Mr Mitchell but we did not get a satisfactory answer. From studying the *Official Report* of the meeting, it is our understanding that Mr Mitchell did not interpret chapter 13.5.2 of the environmental statement correctly. I say that with reasonable confidence because three other acoustics professionals who have studied the chapter agree that our interpretation is correct. I have been unable to find anyone who agrees with Mr Mitchell's interpretation. This week, we attempted to clarify the issue off-line, but that did not happen.

Dr McKell: So you feel that you have consistently tried to get to the bottom of the matter.

Andy Aitken: Yes. It is fairly clear that chapter 13.5.2 of the environmental statement presents a much better case than is described in the noise and vibration policy.

Dr McKell: Will you explain why that is important to the residents?

Andy Aitken: Chapter 13 covers whether or not mitigation will be applied. The committee has just heard our concern about the area around Garscube Terrace and it is important for us to understand whether mitigation will be applied in our area.

Dr McKell: That is important because, obviously, you want to be confident that that the mitigation rules are set at a reasonable standard.

Andy Aitken: Yes. We want to make sure that there are no mistakes in case we find that the noise levels are too high when the tram system is installed.

Dr McKell: What is your conclusion?

Andy Aitken: Like you, I question the figures that are applied in terms of mitigation. I would be much more comfortable if I knew the background data for the prediction calculations. If we had that data, we could examine those and determine whether mitigation is necessary for Garscube Terrace.

Dr McKell: My next question is on paragraph 3.17 of your rebuttal. Why do you propose an amendment on statutory limits on noise and vibration?

Andy Aitken: Group 35 has always felt that it is important to implement statutory limits for the tram system. We did not want to get into all the arguments about noise mitigation, the design of trams and so on. We want a guarantee that we will not be subjected to large amounts of noise and vibration. Also, we want a guarantee that the tram system will be properly maintained throughout its lifetime. If there is a statutory limit, the designer, the installer, the operator and everyone else will be clear about what the target is and, later on, there can be no excuses for poor performance from the contractor or the promoter.

Dr McKell: Mr Mitchell has repeatedly referred to best practice. Why not rely on that?

Andy Aitken: During previous discussions about vibration we heard arguments about what best practice is. It is not fair to think of best practice as anything other than a variable means of ending up with a design that was not intended. The amount of money that is available is a key element, so if we rely on best practice, the system that is put in will be only as good as the money that is available. In many cases, that is not acceptable.

Also, if there are no statutory limits, there will be confusion about what the standard is. Best practice means different things to different people.

Dr McKell: So you are concerned about the noise and vibration policy's reliance on best practice.

Andy Aitken: Yes. It is fair to say that group 35 is concerned about that policy. The City of Edinburgh Council's tram design manual describes the way in which the council wants the tram system to be integrated into Edinburgh. The manual states that the council wants a quality approach at each stage of the project, including quality decision making. We believe that that will be difficult to implement with a system that relies on best practice because there is a poor initial specification that is unlikely to end up as a good system. It is key that the noise and vibration elements are properly specified.

Dr McKell: In effect, you and the residents want there to be two fixed statutory levels, for maximum and L_{eq} noise levels, as determined in the Hamilton McGregor report.

Andy Aitken: Yes.

Dr McKell: I have no further questions.

Malcolm Thomson: Mr Aitken, have you attempted to discuss the concerns that you have described directly with Mr Mitchell?

Andy Aitken: Yes.

Malcolm Thomson: When?

Andy Aitken: As soon as I said yes, I knew that you were going to ask me that. We had an e-mail dialogue just before the first session of this committee. I phoned Mr Mitchell and then we had an e-mail dialogue. I made the approach to Mr Mitchell.

Malcolm Thomson: But you have just told the committee that, during the past week, you have been straw polling various of your friends and colleagues about what they think Mr Mitchell's evidence means. Why did you not speak to him about it?

Andy Aitken: We in group 35 wrote to the private bills unit and said that we wanted the issue to be addressed before this meeting, so that we would not have to get into lots of detailed discussions. However, our suggestion was not accepted.

Malcolm Thomson: But you did not contact Mr Mitchell directly, although you had previously been in contact with him.

Andy Aitken: I had been in contact with him before the beginning of the formal procedures. Given that we had entered that period, I thought that it was appropriate that the matter be dealt with directly through the committee.

Malcolm Thomson: I suggest that it is perhaps a little unfair to invite the committee to draw adverse inferences when you did not attempt to speak to Mr Mitchell directly.

Andy Aitken: Throughout this process, we have been trying to follow a great many rules that have been laid down for us. It has been difficult to determine what we can and cannot do. It seemed fairly clear to me that that was the approach that we should take rather than going offline.

Malcolm Thomson: In your evidence, you refer to rubber wheels on tram-type vehicles. Can you give the committee any example of a rubber-wheeled tram in the United Kingdom?

Andy Aitken: No, but last week I was in the city of Brasov, in Romania, which has trams and trolley buses. The trolley buses seem to be a quiet and smooth operation compared with the trams.

Malcolm Thomson: Have you read paragraph 3.5 of Mr Mitchell's rebuttal of your evidence, where he refers to a test carried out on the Paris metro that showed little noise benefit from using rubber tyres?

Andy Aitken: Yes.

Malcolm Thomson: Are you in a position to agree or disagree with that?

Andy Aitken: I am not. I am sorry. When we referred to rubber-wheeled vehicles, we had trolley buses in mind.

Malcolm Thomson: Towards the end of paragraph 3.1 of your witness statement, you refer to the noise levels in PAN 56. Which levels are you talking about?

Andy Aitken: Which document are you talking about?

Malcolm Thomson: The witness statement by you or Mr Dennison.

Andy Aitken: The original witness statement?

Malcolm Thomson: Yes. The one that says

"ANDY AITKEN OR IAN DENNISON".

Paragraph 3.1 refers to the noise levels in PAN 56. I wondered whether you could help me by explaining what noise levels you are talking about.

11:30

Andy Aitken: I can certainly help you. They are the noise levels that have been used in the ES: 55dB L_{Aeq} daytime and 45dB L_{Aeq} night-time.

Malcolm Thomson: And those are the levels in the noise vibration policy.

Andy Aitken: The 55dB L_{Aeq} and the 45dB L_{Aeq} are in the noise vibration policy, although in the policy those levels are for eight hours and we have requested in our amendment to the bill that they be for one hour.

Malcolm Thomson: Thank you.

The Convener: Before I bring committee members in, I remind everybody—both sides have now done the same thing—that we will take questioning on rebuttal witness statements. I have allowed a degree of leeway, but I will be less flexible in future. For the record, I say that no rule prevents promoters and objectors from getting together to have discussions; in fact, the committee would positively encourage that. Having set that straight, I invite any questions from committee members.

I have one question, which I will probably ask everybody. Is the noise so significant that you would stop the operation of the tram? Is that your intention or do you believe that mitigation could be put in place?

Andy Aitken: I am sure that mitigation could be put in place.

The Convener: That is very helpful. Thank you, Mr Aitken.

Are there any other questions? No. I ask Dr McKell to come in.

Dr McKell: I have two questions. Is it Mr Aitken's understanding that noise and vibration were discussed at the west end community liaison group and that that was the opportunity to raise issues with Mr Mitchell?

The Convener: I will stop you from answering that question, Mr Aitken. I am clear that in re-examining you cannot introduce any new matters; you must re-examine on the basis of questions posed or subjects raised by Mr Thomson or committee members. Would you like to think of a different question?

Dr McKell: Okay. I will ask another question. I will re-form my thoughts for a minute, if you do not mind.

The Convener: Take your time.

Dr McKell: Mr Thomson referred to the fact that there could perhaps have been more dialogue with Mr Mitchell to try to reach an agreement on the misunderstanding with regard to the interpretation given in the ES. Was there another opportunity for you to discuss the matter with Mr Mitchell?

Andy Aitken: I have been out of the country. There probably could have been an opportunity, but we are not clear about all the procedures that must be followed. It seemed fairly clear to both Ian Dennison and me—Mr Dennison put it in writing—that we should deal with the matter formally.

Dr McKell: Finally, has there been any clarification for you of increased comfort in the proposals that have been put forward by the promoter for noise and vibration?

Andy Aitken: No. We are very concerned that the noise and vibration policy as it stands is being described as if it is a good policy. It is important to get the levels in the document correct and to ensure that they are complied with. There are a couple of examples of where noise levels on tram systems have gone badly wrong. One is in Manchester, where the noisiest house in Britain is beside the tram. In Nottingham, according to the local press, there have been complaints about noise. I am sure that the people in Nottingham and Manchester were assured that they would not be too disturbed. That is why I am concerned about getting the right levels into the noise and vibration policy.

We heard from Mr Thomson and Mr Mitchell at the previous meeting that the levels in the noise and vibration policy as it currently stands were tried and tested at two locations in Birmingham and at one location in Liverpool. To me, tried and tested means that the systems are up and running, but as far as I am aware and am able to ascertain, none of the systems is up and running. I am therefore a little concerned that the levels have not been fully demonstrated. If I was going to argue that a policy was great, I would not wait for people to complain; I would do a survey and ask people whether they were okay with the tram system. I have heard nothing like that to assure me about the levels.

Edinburgh is not Birmingham or Liverpool. To me, it is clear that we should not necessarily implement measures just because they have been implemented in other cities. This is the second tourist city in the country.

The Convener: You are not entitled to a closing statement, Mr Aitken. You are entitled to answer the question posed but you are now straying far from that.

Andy Aitken: Yes I am; I agree.

I am not comfortable with the proposals because they do not truly reflect the design manual. We have proposed comprehensive limits that we hope will be adopted. However, we are willing to work with the committee or the promoter to reach a compromise if that is required.

Dr McKell: Thank you, Mr Aitken. I have no further questions.

The Convener: Thank you, Dr McKell.

Thank you for your evidence, Mr Aitken; I am sure that the promoter was listening. I invite Mr Aitken to resume his seat on the questioners' side of the table and I invite Mark Clarke to come to the

witnesses' side of the table. Mr Clarke will address the issue of noise only. He will be questioned by Graham Scrimgeour.

Graham Scrimgeour: Mr Clarke, why do you disagree with the baseline noise survey that was undertaken in July?

Mark Clarke: The baseline noise survey is the foundation for all the comparisons that have been made between the existing ambient situation and the new situation that we are liable to experience with the trams. The readings for the survey were taken in July, when people are out in their gardens cutting grass or having parties, and children are out playing because they are on holiday. The background noise—even that of animals and birds—is higher in July than at other times of year.

If a balanced approach were being taken in the survey, I would have thought that there would be information about the noise levels in winter, when there is not much outside activity. That would give a more balanced measure of the ambient noise and I think that it would have resulted in a lower figure for ambient noise and therefore a lower starting point with which to compare the likely new noise levels.

Graham Scrimgeour: You have said that some of the promoter's noise data are either erroneous or inappropriately used. Is that still your position?

Mark Clarke: Since writing my witness statements, I have tried to research and understand the position of the promoter. The problem seems to lie in the terminology—"sound intensity" or "loudness". I have tried to get to the bottom of this and have read various papers on the subject. Sound intensity—which is the phrase that Health and Safety Executive guidelines use when talking about increases in noise—is a more scientific and objective term. Loudness is all to do with perception—how people hear things.

In its explanation, the promoter says that a 10dB(A) increase is approximately a doubling of the loudness. That is correct as long as the frequency is the same. In my research, I came across something called the rule of thumb: if you want to double the loudness of one violin, you need to use 10 violins. That is the 10dB(A) difference, but it does not apply when the frequency is different.

The ambient noise research done by the promoter covers things such as birdsong and joggers, but the tram is entirely different. A small increase in noise can double the loudness and the 10dB(A) does not apply.

Graham Scrimgeour: You also mentioned that Transport Initiatives Edinburgh Ltd's approach to noise was inappropriate.

Mark Clarke: That was about the fact that TIE's definition of noise is unwanted sound. Various publications, including those of the WHO, talk about the sounds of children playing and birds singing as being sounds that people are quite comfortable with. In fact, they need to hear such sounds to feel comfortable in their area. Unwanted sounds are made by things such as intrusive machinery and so on. Again, we are comparing oranges with apples.

Graham Scrimgeour: Why did you disagree with TIE's use of a 75dB(A) threshold for construction noise?

Mark Clarke: TIE has arrived at the base of 75dB(A) from a document to which it referred, which is the Department of the Environment advisory leaflet 72. That leaflet is out of print and it is extremely difficult to come by a copy. It was first published in 1968 and I managed to get a copy from 1976. It is therefore almost 30 years old.

The advisory leaflet says several things. First, the heading of the section that contains the 75dB(A) is

"Maximum tolerable noise levels on building sites".

Note the use of the word "tolerable".

The leaflet goes on to say:

"Noise levels, between say 07.00 and 19.00 hours, outside the nearest window of the occupied room closest to the site boundary should not exceed".

It then gives two different categories:

"70 decibels (dB(A)) in rural, suburban and urban areas away from main road traffic and industrial noise.

75 decibels (dB(A)) in urban areas near main roads in heavy industrial areas."

The Roseburn corridor is clearly not in an industrial area or near main roads. The environmental statement describes it as a quiet environment. The 75dB(A) that is used consistently in tables 13.3, 13.4 and 13.5 of the environmental statement to give a comparison for construction noise is, in my view, entirely incorrect. If one agrees with using a document that dates back to 1968, 70dB(A), not 75dB(A), should be the threshold.

Graham Scrimgeour: You have also referred to the environmental statement—

Mark Clarke: I missed something else that you commented on. Page 205 of the environmental statement relates to the 75dB(A). The very last sentence on the page says:

"It should be noted that these criteria are not aimed at providing noise limits for construction activities, but are used to determine whether significant impacts are expected to occur."

So in tables 13.3, 13.4 and 13.5, TIE uses the 75dB(A) and shows the difference in noise levels that we would suffer during the construction

activities. However, the document that TIE has taken the 75dB(A) from—advisory leaflet 72—says that 75dB(A) is a "maximum tolerable noise level".

Far from not setting noise limits, as the environmental statement claims, AL 72 states:

"These limits are for daytime working outside living rooms and offices."

The 75dB and 70dB are limits that the noise should not go above.

11:45

Graham Scrimgeour: I will miss out some questions on the WHO guidance, as we have agreed not to discuss that.

Will you explain what concerns you have in relation to page 14 of appendix I of the environmental statement?

The Convener: For the benefit of committee members, could you tell me where that is mentioned in the rebuttal statement?

Graham Scrimgeour: Can I ask Mark Clarke to say that?

The Convener: Somebody tell us where it is.

Mark Clarke: Section 5.13 of the rebuttal talks about the predicted noise impacts in the environmental statement. The question relates to that.

The Convener: Thank you.

Graham Scrimgeour: Mr Clarke, I asked you to explain the concerns that you have in relation to that part of the environmental statement.

Mark Clarke: Half way down page 14 of appendix I, the environmental statement talks about the terminology in relation to the four noise exposure categories in PAN 56. There are four gradations, from A, which is when

"Noise need not be considered"

in relation to planning permission, down to D, which is when

"Planning permission should generally be refused."

In table 13.5 in the environmental statement, various speeds of trams are given. Speed is the critical factor in the generation of noise. If the speeds are increased, the noise will be greater. We are highly dependent on the tabulated speed levels, but we have no way of verifying that the speeds will be strictly adhered to. The table states that the speed along the Roseburn corridor will be 70kph, but other documents that I have read state that it could be 80kph. If the speed increases to 80kph, the noise will increase. We have to trust that TIE will stick to the speed limits. In some areas, the speed limit is as low as 25kph, which conveniently keeps the noise below the disturbance threshold. If, by accident or some other means, the speeds were increased, we would start to climb through the thresholds. At the moment, we can proceed only on trust.

Graham Scrimgeour: Will you explain to the committee your concerns about construction noise?

Mark Clarke: I have 30 years' experience in the construction industry. Many projects, including the building that we are in now, take longer than was originally predicted. That can be for many perfectly good reasons—I am sure that this building is a perfect example of that. However, the enabling works that are referred to, such as those on bridges, stations and so on, will extend for many months.

I have extended bridges similar to the one that is beside my house. It is a six-month to nine-month project. The noise levels in the enabling works to which we are referring are over 80dB(A), which will seriously disturb people. In fact, the Health and Safety Executive provides guidelines—which are about to be changed in February—that require that ear protection be provided for those who work at a noise level of 80dB(A). Residents, who might be in their gardens, could be exposed to those noise levels for protracted periods and, in the extreme case—I emphasise that it is the extreme—their hearing could be damaged. That is recognised by the World Health Organisation and the Health and Safety Executive, and we should be concerned about the matter.

Graham Scrimgeour: You have also raised concern about the use of L_{Aeq} noise levels in the documents. Will you explain why you are concerned about that?

Mark Clarke: I will not dwell on that, because it has been covered already. My concern is to do with the periods over which the noise is measured, particularly the night-time period. The silent hours are taken into account, which is not a properly balanced way to deal with the matter.

Graham Scrimgeour: Are you concerned about sleep disturbance arising from noise at night?

Mark Clarke: There is no question about that. Again, the WHO guidelines set much lower levels than the apparent predicted levels in some of the information that we have. Therefore, it would appear that there is evidence that people will experience sleep disturbance, which will affect their health.

Graham Scrimgeour: What do you ask the committee to do as a result of those concerns?

Mark Clarke: First, I have suggested a range of amendments in my witness statements, and I ask the committee to accept them. Those

amendments cover matters such as relocating the tram away from the Roseburn corridor and, if that is unacceptable, limiting the speed, because the speed of the tram fundamentally affects the noise it creates. The other suggestion, regarding construction, is to revise the noise threshold and set a limit for noise of 55dB(A), which is the level recommended in the WHO guidelines, or, at the very worst, 70dB(A), which is the recommendation in the 1968 pamphlet.

Malcolm Thomson: Mr Clarke, we will start with the out-of-print leaflet and I will take you back to your cross-examination of Mr Mitchell on 3 October. You started by saying to Mr Mitchell:

"As I understand it, the limit of 75dB(A) was taken from a Department of the Environment publication."

His answer contained a reference to advisory leaflet 72, which he said was "rather old" and "out of print". He referred to the more recent document "Construction Site Noise: A Guide to Contractors", which the City of Edinburgh Council had produced in August 2000. He said:

"In that short one-page document, the final paragraph on noise limits states:

'Noise affecting residential premises is likely to be restricted to a maximum L_{Aeq} (12 hour) of 75 dB.'"

Your response was:

"You will understand that I am at somewhat of a disadvantage in that I have not previously seen that document, which was not quoted in the environmental statement."—[*Official Report*, *Edinburgh Tram (Line One) Bill Committee*, 3 October 2005; c 1121.]

There was then a discussion about the fact that the document had been attached to the code of construction practice, which you had not seen.

Mark Clarke: I had not seen it at that time.

Malcolm Thomson: Have you now seen that document?

Mark Clarke: I have seen the code of construction practice on the website but I could not get the attachment, if it was on the website.

Malcolm Thomson: Do you have any reason to doubt Mr Mitchell's evidence on that subject?

Mark Clarke: If that is the point that is being made, I have no dispute.

Malcolm Thomson: I do not mean any disrespect by my next question, because I know that you are extremely experienced in the construction industry, but do you have any specific expertise in noise?

Mark Clarke: The construction industry has to comply with legislation. We have to have a working knowledge of noise within the scope of legislation and, in particular, the Health and Safety Executive guidelines, so we understand the terms that are used, such as L_{Aeq} and dB(A). Also, as an engineer, I necessarily have to be able to interpret data. In order to gain more information on the subject, I have researched it.

Malcolm Thomson: Do we understand from your evidence this morning that, in order to understand the difference between loudness and intensity, you have done some research?

Mark Clarke: Yes.

Malcolm Thomson: From noise experts or from written texts?

Mark Clarke: From written texts.

Malcolm Thomson: In your construction activities, you have to be concerned with the European physical agents noise directive, to which you refer in your rebuttal. Am I right to say that the directive is concerned solely with the protection of people who are employed in the construction industry?

Mark Clarke: It is not specific to the construction industry. It is concerned with the protection of people at work, including people who work in factories and other locations.

Malcolm Thomson: So it is concerned with work sites.

Mark Clarke: Yes.

Malcolm Thomson: I return to your proposed amendments. You propose a noise limit of 55dB, but that could not apply to the construction phase.

Mark Clarke: There is no reason why it could not apply to the construction phase. It is a question of what one is prepared to spend and what one will get back. If we take the appropriate action by silencing equipment and putting up screens in work areas, we can contain noise.

Malcolm Thomson: Have you built anything with a noise level of less than 55dB? Have you ever worked in a construction environment in which that level has been achieved?

Mark Clarke: We work in hospital environments, where we have to achieve low levels of noise—probably levels below 55dB(A).

Malcolm Thomson: In a hospital?

Mark Clarke: In a hospital environment, yes.

Malcolm Thomson: Is that the only place in which you have attempted to achieve that level of noise during construction?

Mark Clarke: It is the only one that I can think of off the top of my head, but there are other silent areas. For example, if we were to carry out works in the Scottish Parliament building, there would be strict guidelines on the acceptable noise level.

Malcolm Thomson: But you would not attempt to construct such a building with a 55dB noise limit, would you?

Mark Clarke: Within the boundary of the site, no.

Malcolm Thomson: Thank you, Mr Clarke. Thank you, madam.

The Convener: Thank you, Mr Clarke. Our experience suggests otherwise; there may be limits in place, but it does not feel like that to us.

I will ask you the question that I asked everyone else. Is the noise level so significant that the trams should not run or can the noise be mitigated?

Mark Clarke: The trams should not run in the Roseburn corridor. Better alternatives are available. The trams will have much less impact if they run on roadways that already have certain noise levels. However, if they have to run along the Roseburn corridor, proper mitigation should be carried out.

The Convener: Thank you, Mr Clarke.

Phil Gallie: Which would you expect to be louder, noise levels on a work site or noise levels in domestic circumstances?

Mark Clarke: Noise levels on a work site.

Phil Gallie: Thank you.

The Convener: Are there any other questions from committee members?

Members: No.

The Convener: Mr Scrimgeour, back to you.

12:00

Graham Scrimgeour: I have one brief final question, Mr Clarke. Mr Thomson has asked about your knowledge of noise and reference has been made to a literature review that you have undertaken. Has your work experience given you a real understanding and experience of noise in the construction industry?

Mark Clarke: Specific to the activities that we carry out in the construction industry, we have to understand the issues with noise in order to be able to function properly and carry out our duties. There are specific demands that the HSE and legislation make on us.

The Convener: Thank you, Mr Scrimgeour. There being no further questions, I thank Mr Clarke for giving evidence this morning. I invite Dr Andy Irwin to the table. Mr Aitken will question Dr Irwin for group 35. Dr Irwin will address the issue of vibration.

Andy Aitken: I am not sure whether the committee is aware of Dr Irwin's background. I know that members are aware of Dr McKell's background.

The Convener: If you want to ask one introductory question, you may do so. However, I am sure that that information is contained in the witness statements that were originally submitted.

Andy Aitken: Actually, I do not think that it is. Everybody introduced themselves, but the witnesses for group 35 have never introduced themselves—at least, Dr Irwin has not.

The Convener: Let me just check that. [*Interruption.*] If you want to ask a short, introductory question to enable that information to be recorded in the *Official Report*, that would be fine.

Andy Aitken: Dr Irwin, before we launch into the evidence that has been received, it would be helpful to understand the background to your knowledge on the subject of vibration. I understand that you have been involved with vibration for the whole of your career. Is that correct?

Dr Andy Irwin (A W Irwin Associates): Yes, since about 1963.

Andy Aitken: Thank you. That is a considerable period. That included a spell as a professor at an engineering school in Canada and, later, you were the chairman of the panel that drafted BS 6472, the vibration standard.

Dr Irwin: Yes. In the early 1970s, I was a research fellow in structural dynamics at McMaster University. Later, I was a research officer in structural dynamics at the Central Electricity Research Laboratories.

Andy Aitken: I do not want to go into this in great detail, but you have worked on numerous prestigious projects at home and abroad in your capacity as a vibration adviser, including rail and transport systems.

Dr Irwin: Yes.

Andy Aitken: Thank you. Let us move on to our various statements. There are a couple of points on which I will ask for clarification. Once again, I want to talk about maximum vibration velocity. In your rebuttal statement, which is in effect a technical report, you promote the use of maximum vibration velocity as well as the averaged value for correctly assessing the effect of trams on people within buildings. Is that correct?

Dr Irwin: Yes. Do you wish me to give a reason for that?

Andy Aitken: Yes.

Dr Irwin: Basically, the vibration dose value method averages out the vibration, so it can mask

instances of much higher vibration during the period. Therefore, when I carry out an investigation, in my estimates of the situation I include both a peak particle velocity or peak acceleration for any occurrence as well as a VDV. In some instances, I do not bother about the VDV at all; I use peak particle velocities that are never to be exceeded.

Andy Aitken: Basically, you are saying that you will use the maximum value and the averaged value as the main descriptors of vibration.

Dr Irwin: Yes, those can both be used. To me, the peak value is the more important of the two.

Andy Aitken: Because?

Dr Irwin: That is the one that would trigger somebody's perception and assessment of the vibration, whereas the VDV is an averaged value. All the values could be within the parameters that are respected by the promoter and the objectors, or there could be some values that are significantly higher but that would not significantly affect the VDV.

Andy Aitken: So, if you were correcting the current noise and vibration policy, you would add a figure for maximum velocity.

Dr Irwin: Yes.

Andy Aitken: Would you consider the current noise and vibration policy, without that figure for maximum velocity, as best practice?

Dr Irwin: No. There are a couple of things that I would probably do. I would try to aim for a lower VDV as well as a peak particle velocity.

Andy Aitken: Okay. Steve Mitchell said, in oral evidence, that the VDV method that is used in the noise and vibration policy is heavily biased towards the peak or the maximum values. He therefore felt that it was not necessary to include a maximum value. Is that particularly relevant in the case of tramlines? Can you give us any examples of where it might not be?

Dr Irwin: It must be remembered that the time is to the fourth root, so that a higher value for a short time, with the time being to the fourth root in the summation, does not make a huge difference. The method is, therefore, not heavily biased towards single higher-threshold occurrences in a group of occurrences. I did a quick calculation. If we used the VDV that is demanded by the promoter for all the trams in a day and there was one tram for which the VDV was double that value—which would have a significant impact on the people who were affected by it—that would raise the overall VDV by only about 2.6 per cent.

Andy Aitken: So, if one tram in the line of vehicles going past had bad wheels or something, that could cause a higher vibration level.

Dr Irwin: Yes. It could be one tram a day. However, if that tram was going backwards and forwards several times a day, there would be several occurrences.

Andy Aitken: The vibration that was generated could have a maximum level that was double the average of all the others.

Dr Irwin: Yes.

Andy Aitken: That would be picked up only as an increase in the average vibration level of 2.5 to 3 per cent.

Dr Irwin: Yes.

Andy Aitken: That is a good example. Do you, therefore, think that the maximum figure for vibration is pretty important?

Dr Irwin: Yes, I would say so.

Andy Aitken: Our ability to make really good, detailed comment on the vibration of the works is constrained if we have no knowledge of that figure.

Dr Irwin: Yes.

Andy Aitken: Do you think that that figure would be known by now? Is it a figure that needs to be worked through, or could it be estimated now?

Dr Irwin: That depends on what stage the promoter is at. I would have expected the promoter to have calculated approximately what the vibration levels would be at certain parts of the track, in certain types of terrain and in certain areas that the tram will go through before it assessed the cost of the project, so that it would know how much money to spend on rail isolation and so on. However, I have not seen any such values.

Andy Aitken: Right. That helps to clarify that there is a need for a maximum level. Let us move on to consider the average levels, which you comment on in your witness statement. In oral evidence, Mr Mitchell advised us that none of the objectors had pointed to any better noise and vibration policies—in other words, ones with tighter criteria. However, in your rebuttal witness statement, you discuss an environmental impact assessment for a tramline that uses a VDV or averaged value of $0.2ms^{-1.75}$, which is exactly half the value that is proposed in the current noise and vibration policy.

Dr Irwin: Yes. Although that would not take us down to $0.13ms^{-1.75}$, which is the level that is aimed for at night time, it would take us to half the level that has been proposed. A value of $0.2ms^{-1.75}$ has been proposed for tramline 2.

Andy Aitken: That was what was in the original environmental impact assessment for line 2.

Dr Irwin: Yes.

Andy Aitken: Is there anything else on vibration that the EIA for line 2 covered that is conspicuous by its absence from the current noise and vibration policy?

Dr Irwin: As far as I remember, the EIA for line 2 contained a table of peak particle velocities.

Andy Aitken: Did it do anything on background vibration assessments?

Dr Irwin: Yes. Apparently, work was done that was similar to work that has been done in most other tramway projects, whereby background vibration levels are measured so that a direct comparison can be made with predicted vibration levels during the design phase and actual measured vibration levels after construction, when the system is in operation.

Andy Aitken: The point of measuring the vibration now is to understand the impact that the tram will have. Such measurement will reveal the change in vibration levels.

Dr Irwin: Yes.

Andy Aitken: Would you carry out mitigation in response to a change in vibration level as well as in response to a particular fixed level?

Dr Irwin: Yes.

Andy Aitken: Is it fairly standard practice in the industry to measure vibration before you start a project?

Dr Irwin: Yes. I have not heard of that not being done.

Andy Aitken: Apart from in the present case.

Dr Irwin: Yes.

Andy Aitken: I believe that Mr Mitchell has used the Manchester metrolink as a point of comparison for vibration levels in the Edinburgh tramline 1 system. Did the methodology that was used in Manchester involve assessment of the background levels and a comparison against predicted values?

Dr Irwin: I believe that vibration monitoring was conducted at several locations. After the trams became operational, it was possible to measure what the change was.

Andy Aitken: If we had used that methodology on the Roseburn corridor—where you have done some measurements and found that there is virtually no vibration—and discovered that, after the introduction of the tram, the level of $0.4ms^{-1.75}$ that is in the noise and vibration policy had been reached, how would that change in vibration be classified according to the methodology that was used in Manchester?

Dr Irwin: I think that that would be a major impact.

Andy Aitken: I think that the category that was used was “major” or “substantial” or something like that.

Dr Irwin: To me, such an impact would be substantial.

Andy Aitken: Is it still your belief that the figure of $0.4ms^{-1.75}$ in the noise and vibration policy is excessively high for the Roseburn corridor?

Dr Irwin: Yes.

Andy Aitken: Do you think that householders will have adverse comments to make?

Dr Irwin: Definitely.

Andy Aitken: In this case, do you think that using a figure of $0.4ms^{-1.75}$ in the N and V policy would be best practice?

12:15

Dr Irwin: No, it would not. If you were to aim at a figure that would be expected in a normal rail situation in which trains are already running, you would get the odd complaint. Also, the figure might be set relatively high, but you still might miss it. If you were to aim at a figure that is half that, it would be possible, with good design, to achieve the figure and minimise comments on vibration. You would still get some comments on vibration, but that is because there is no perceptible vibration at the moment.

Andy Aitken: So, would you say that $0.4ms^{-1.75}$ is a pretty poor standard? Is it what the tram design manual would call a “Good Enough” type of approach?

Dr Irwin: Yes. It is a bit of a rough approach.

Andy Aitken: Right. So when the tram design manual says “Good Enough is Not Enough”, it is pretty much saying that that approach should be excluded.

Dr Irwin: Yes. We can take tramline 2 as an example.

Andy Aitken: The N and V policy, which Mr Mitchell wrote, states that the promoter will ensure that the system is designed and operated to the best vibration standards that have been adopted across the industry and that it will also ensure that disturbance to residents is avoided. Is that a reasonable assertion for it to make?

Dr Irwin: No, not from the criteria that have been set down.

Andy Aitken: Could you clarify the three main points that I have heard today, one of which was on maximum velocity?

Dr Irwin: A maximum velocity figure—peak particle velocity, for example—should be included in the criteria. That is done already in the construction criteria. The VDV value should be reduced to the $0.2ms^{-1.75}$ figure that is proposed for tramline 2 and vibration should be mitigated to the greatest possible extent.

Andy Aitken: I understand that mitigation is normally done by what are called resilient rails. Will you clarify a couple of points from your statement on the subject? On 3 October, we heard—I think for the first time—that mitigation may be applied in the form of resilient rails in areas where properties are about 4m from the track. We also heard that, where properties are beyond 4m from the track, the promoter would probably not apply resilient rails. Without conducting any detailed analysis such as ground propagation measurement, is that a reasonable expectation to make?

Dr Irwin: It is very optimistic. I have the measurements in my papers, but those are in my bag. If that is what the promoter is going to do, it will have real problems with vibration along major parts of the route.

Andy Aitken: It is not the promoter but the residents who will have the problems.

Dr Irwin: Yes, unless the promoter is forced by the application of penalties to go back and address the problem—it would more or less have to tear up the rails and lay them again but with isolation measures.

Andy Aitken: Right, but we have heard that that is extremely unlikely. Mr Mitchell acknowledged that.

The promoter has given a distance of 4m from the line. What distance would you suggest if you were forced into a corner on the issue?

Dr Irwin: As a rule of thumb, I normally say a minimum distance of 15m. Quite often, the distance should be more than that—it depends on slopes, the type of soil, the saturation of the soil and so on.

Andy Aitken: Is that 15m from—

Dr Irwin: From the nearest rail.

Andy Aitken: Is that for heavy rail?

Dr Irwin: For light passenger rail.

Andy Aitken: So, you suggest 15m. Not 4m?

Dr Irwin: No.

Andy Aitken: That is a big difference.

Dr Irwin: It is a fair distance. What is more, the drop-off is not on a linear scale; the vibration at 15m is not a linear decay from what it would be at 4m. The distance is more significant than it might at first seem.

Andy Aitken: How necessary is it that the promoter is forced into carrying out good design before it starts putting the rails down? In your professional opinion, how necessary is it to have a statutory limit in order to achieve that?

Dr Irwin: It is fundamental—Mr Mitchell mentioned that. If a promoter puts into practice a certain regime of rail design—be it for noise or whatever—and that turns out to be a problem, it will try to address the problem by the best practical means, which might mean tearing up the complete track and relaying it using vibration isolation procedure. I do not think that the funds would be available to do that retrospectively.

Andy Aitken: Mr Mitchell stated that people get used to noise and vibration. Would a vibration dose value—or an averaged level—of $0.4ms^{-1.75}$ put off a potential buyer of a property if they were not used to living by a tramline?

Dr Irwin: It would put me off.

Andy Aitken: So there is likely to be an impact on property values.

Dr Irwin: I would think so. I have had experience of that.

Andy Aitken: That concludes my questions.

The Convener: Thank you, Mr Aitken. Mr Thomson?

Malcolm Thomson: Thank you, madam. Am I right in thinking that the noise and vibration policy uses the measuring unit of VDV?

Dr Irwin: Yes.

Malcolm Thomson: Am I also right that that accords with BS 6472, which was issued in 1992?

Dr Irwin: It is in an appendix to the standard.

Malcolm Thomson: But it accords with the appendix.

Dr Irwin: It accords with the appendix, but it is not technically part of the standard.

Malcolm Thomson: Am I right in thinking that paragraph 23 of PAN 56, in relation to noise from railways, refers anyone who is looking for advice on acceptable levels of vibration specifically to BS 6472?

Dr Irwin: It is one's prerogative to use the method that you mention. That is one method for averaging the vibration in a daily period, but it does not give us information about peak values.

Malcolm Thomson: In his rebuttal statement, Mr Mitchell draws attention to five recently consented light rail or tram schemes in the United

Kingdom in which the vibration limits have been set by reference to VDV. Is that right?

Dr Irwin: Yes, but they are not all in operation. We do not know whether those are the only parameters that have been used by the designers. I am often put in a position by a client—the City of Edinburgh Council, for example—in which the specified parameters are set by reference to VDV. However, as a designer, I know the importance of peak particle velocity, so I also apply that.

Malcolm Thomson: Are you aware that the council's environmental and consumer services department has endorsed the noise and vibration policy?

Dr Irwin: Yes, and my answer would be exactly the same as my previous answer.

Malcolm Thomson: Thank you, Dr Irwin. Thank you, madam.

The Convener: Thank you, Mr Thomson. Do members have questions?

Phil Gallie: This is obviously an area of expertise. There are fixed properties along the route of the tramline. Which has a more damaging effect on fixed structures, sustained average vibration or peak vibration?

Dr Irwin: Normally the damage results from the peak values. I would split the issue into two aspects, one of which is damage. The peak values are more important. A sustained, uninterrupted vibration could build up a resonance, which could also be damaging, but that would not normally happen with trains, because the time that they take to pass is short.

Phil Gallie: You refer to the $0.2ms^{-1.75}$ and $0.4ms^{-1.75}$ levels being factors in the specifications for tramlines 1 and 2. Can the lower level be attributed to the fact that tramline 2 is more or less on a roadway system, as opposed to tramline 1, with a level of $0.4ms^{-1.75}$, which applies to an area that is not currently used for transport?

Dr Irwin: If the promoter is taking the vibration from the trams, it is doing so from the trams only; it would ignore the vibration from the roadway in its summation. Therefore, we can compare the two figures directly.

Phil Gallie: I find your evidence about the difference difficult. Why should there be a difference between the two specs?

Dr Irwin: The spec for tramline 2 is much better than that for tramline 1. If the $0.2ms^{-1.75}$ figure includes road vibration and tram vibration, that means that the tram vibration figure is even lower and the design specification is even tighter. The documentation does not say whether the promoter included road vibration and tram vibration. I take it that the promoter ignored road vibration and just took tram vibration, which makes the tramline 2 figure twice as tight as that for tramline 1. If road vibration has been included, that might make the figure four times as tight.

Phil Gallie: That certainly would be the case in the Roseburn corridor, although perhaps not in other tramline 1 areas.

Dr Irwin: Yes.

The Convener: I would like to clarify that point. There is a Chinese wall between us and tramline 2, so I am just interested in tramline 1. Does the $0.4ms^{-1.75}$ figure include any consideration of road vibration?

Dr Irwin: Not in relation to the Roseburn corridor, because there is no road vibration at the moment along the stretch that impinges on the housing.

The Convener: Does the figure include road vibration elsewhere on the route?

Dr Irwin: The documentation does not say. I think that the figure applies only to the trams. The promoter would need to clarify that.

The Convener: But you are not sure, so the committee can clarify that.

Dr Irwin: I take it that the figure is only for trams.

The Convener: In your view, whatever the level of vibration, it can be mitigated. Is it your view that the tram scheme should still run and that mitigation can be put in place?

Dr Irwin: I do not want to comment on whether I want the scheme or not, because I am independent. It can definitely be mitigated, attenuated or damped—whatever you like to call it—but that can be expensive.

The Convener: There are no more questions from committee members. Mr Aitken, do you have any follow-up questions for Dr Irwin?

Andy Aitken: No, I do not.

The Convener: Dr Irwin, on the basis that there are no further questions, I thank you for giving evidence.

It is now 12.28 pm. I propose to take a break of approximately one hour. The committee will resume at 1.30 pm to take evidence from Mr Aitken, who will also address vibration.

12:29

Meeting suspended.

13:38

On resuming—

The Convener: Welcome back to the meeting. When we suspended, we were about to hear from Andy Aitken on vibration—I see Mr Aitken in front

of me, so I have got that right. Dr Irwin is questioning for group 35.

Dr Irwin: I have a couple of preliminary questions. On the environmental impact statement, are you aware that the VDV for tramline 1 is higher than that for tramline 2?

Andy Aitken: Yes. That is clear. The figure for line 1 is double that for line 2.

Dr Irwin: BS 6472 has various appendices concerning VDV. Are you aware that the VDV depends on how one rates the time period over which the averaging is done?

Andy Aitken: I am aware of that. However, I have not been able to find a note in the noise and vibration policy or the environmental statement about what the period is. That means that the figure in the environmental statement and the noise and vibration policy of $0.4ms^{-1.75}$ can mean different things to different people, unless one is specific about the exact period.

Dr Irwin: I have some general questions. How long have you lived in your house?

Andy Aitken: I have lived there for about seven years.

Dr Irwin: What is the location of your house relative to the nearest rail?

Andy Aitken: I am not sure exactly how many metres away it is, but I live in Garscube Terrace.

Dr Irwin: So your house backs on to the proposed tramline.

Andy Aitken: Yes.

Dr Irwin: How often have you experienced traffic-generated vibration in your house?

Andy Aitken: Very rarely. It might happen if an articulated lorry goes down Garscube Terrace, but that is almost unheard of.

Dr Irwin: That is not an everyday occurrence.

Andy Aitken: No.

Dr Irwin: It certainly does not occur every 15 minutes.

Andy Aitken: Oh, no.

Dr Irwin: Was one of the reasons why you purchased the property that—

The Convener: Dr Irwin, is that issue mentioned in the rebuttal statement? If not, you should not question Mr Aitken on it. You need to refer to the rebuttal statement.

Andy Aitken: We mention a "tranquil area".

Dr Irwin: Yes—that is in section 3 of group 35's statement.

The Convener: We are focusing on the rebuttal statements, not the witness statements. We want to hear about the issues that are in dispute and nobody disputes where Mr Aitken lives. If we could focus on the issues in dispute, that would be fine. If you could get to the point, that would be even better.

Dr Irwin: I just wanted to get the general picture that the area is a nice environment in which to live.

The Convener: We have been there.

Dr Irwin: I have not been there often.

A point that was raised in one of the statements was that the promoters of quarries, opencast mines and other industrial developments often state that a fair comparison can be made between the vibration that such developments generate and the vibration that is generated in houses from slamming doors or children running on the stairs. Is that a fair comparison?

Andy Aitken: Vibration is unlike noise in that it cannot be turned off. A person can shut their window or whatever, but they cannot turn vibration off. People can tell their children to stop slamming the door or to turn down their music, but we cannot turn off the trams; therefore, we will be subjected to the vibration but with no recourse.

Dr Irwin: So—you feel that you are in control of vibration that is generated within the house, but that vibration that is generated by outside sources, such as trams, is outside your control.

Andy Aitken: Yes.

Dr Irwin: Would vibration generated by trams passing your house reduce amenity and affect your enjoyment of your property?

Andy Aitken: Yes. We have a quiet back garden that is totally vibration free at the moment.

Dr Irwin: On a slightly different tack, has the promoter guaranteed to implement vibration isolation of the rails for the whole of the Roseburn and Ravelston corridor?

Andy Aitken: Not as I understand it. The promoter mentions the possibility of installing resilient rails where houses are within 4m of the tramline, which would obviously not apply all the way down the corridor. I am slightly concerned about your earlier comment that, if you had been in charge of the project, you would have used a distance of 15m, which is hugely different to the figure in the environmental statement.

Dr Irwin: Should the promoter specify resilient rails for the whole section?

Andy Aitken: The promoter should certainly reach an agreement on the specification. I am not interested in whether there are resilient rails; I am

interested in a specification that the promoter is obliged to meet. If resilient rails have to be installed as part of that, that is fine. If not, that is fine, too. I am interested only in what I feel in the property.

Dr Irwin: Would it be wise of the promoter to plan to specify resilient rails?

Andy Aitken: Definitely. As we have heard, once the tramline is installed, it will not be ripped up at the commissioning stage in order to put in different rails. Therefore, if it is discovered that a mistake has been made, that will just be too bad. It would be better to be cautious at the beginning, particularly in the light of your earlier evidence.

Dr Irwin: You may have answered my next question, which is whether the promoter has given a guarantee that the proposed vibration limits will never be exceeded.

13:45

Andy Aitken: No. There have been some promises that they might comply with best practice, but that does not give any guarantees.

Dr Irwin: You said that you do not know of any means whereby vibration from trams could be damped at your property.

Andy Aitken: That is right. Nothing can be done about it.

Dr Irwin: Has the promoter provided information on the location of permanent vibration monitoring stations?

Andy Aitken: The promoter has not done so yet and it is probably fair to say that it is not yet able to define the worst cases. If we have a residents' liaison group, I hope that we will be able to ensure that the vibration monitoring equipment is placed at the points where vibration is likely to be worst. There is no point in placing it anywhere else. We want to ensure that the worst case is covered.

Dr Irwin: Do you know whether the promoter plans to implement the permanent and additional temporary vibration monitoring stations prior to commencement of the tramway construction, should funding for the scheme be received?

Andy Aitken: I do not know.

Dr Irwin: Should the promoter do that?

Andy Aitken: From what you have said, Dr Irwin, monitoring is always implemented before implementation of the process that will cause vibration, so it sounds to me as if the promoter probably should do so.

Dr Irwin: If the monitoring stations are not up and running before construction starts, there could be a delay, and damage and disturbance could happen before the monitoring stations are put in.

Andy Aitken: I suppose that is true.

Dr Irwin: Are you aware that noise and vibration cues often combine to influence the perception, response and comfort of those who are subject to noise and vibration combined?

Andy Aitken: I have not read anything about that in any of the reports, but it would not surprise me if there was a relationship between what someone feels in their body from vibration and what they hear.

Dr Irwin: Do you know whether the promoter has considered such combined influences?

Andy Aitken: I have not read anything about that in the promoter's literature.

Dr Irwin: At what speed would trams pass through the Roseburn and Ravelston area?

Andy Aitken: I think that they would travel at about 70kph.

Dr Irwin: That is about 45mph.

Andy Aitken: It would be something like that.

Dr Irwin: Is that speed excessive?

Andy Aitken: Yes.

Dr Irwin: Do you know whether increased speed has any effect on the vibration that will be generated?

Andy Aitken: Yes. From talking to you, Dr Irwin, I understand that one way to reduce vibration is to reduce speed.

Dr Irwin: Has the promoter given any assurances that such speeds would be reduced if that was required for reasons of safety, noise or vibration generation, or in order to meet acceptable standards, the limits that the promoter has proposed, or any lower limits that might be imposed?

Andy Aitken: I am not sure. I am not that familiar with all the discussions that have taken place. I think that the promoter should give that assurance, but I am not sure whether it has done so.

Dr Irwin: How many houses in the Roseburn and Ravelston area are within, say, 30m of the proposed track?

Andy Aitken: I think that there are many, but I am not sure how many.

Dr Irwin: Is it 20 or more?

Andy Aitken: I think that there are more than 20, but I am not sure.

Dr Irwin: Are there 100?

Andy Aitken: I am not sure, but I am certain that there are more than 20.

Dr Irwin: So the tramway could have a big financial impact.

Andy Aitken: If the rails are placed within 15m or 20m of properties, it could.

Dr Irwin: At how many properties have the promoters measured current ambient vibration?

Andy Aitken: The promoter has done that at no properties, as far as I am aware.

Dr Irwin: Do you consider that vibration that has been measured on other tramways in different conditions is a good yardstick to determine conditions for the Roseburn and Ravelston area?

Andy Aitken: As a layman, I know that water-table levels, rock conditions and soil conditions have a big effect on propagation through the ground. From what I have read, I believe that vibrations from other trams can be measured and translated to a new situation, provided that all the ground conditions at the new site can be measured and the figures correctly transposed.

Dr Irwin: So the promoter would need to do a borehole study, a soil study, a stratigraphic study and a gradient study.

Andy Aitken: Yes.

Dr Irwin: Do you think that it is reasonable to use methods that were developed to rate the minimum acceptable conditions for vibration alongside railways—which have been in continuous use for many years—to provide ratings for a new tramway in a tranquil environment?

Andy Aitken: No. That does not seem sensible to me. For one thing, I would not have bought my property if I had known about that. People who choose to move into environments that are subject to vibration or noise do so deliberately and they accept that. Other people, who may be more sensitive to vibration or noise, choose not to live in such places. However, to impose noise and vibration on people is a different matter.

Dr Irwin: Are you aware that the study that Dr Griffin and his team at the University of Southampton did for VDV assessed existing railways and not new railways?

Andy Aitken: Yes.

Dr Irwin: Are you concerned about the development partly because people who live in Roseburn and Ravelston purchased properties there because they wanted to live in a tranquil area where transport noise and vibration are not issues?

Andy Aitken: Yes.

The Convener: I point out again that we know the area. The purpose of the meeting is to talk not about property values but about noise and vibration.

Dr Irwin: I have finished.

Andy Aitken: There are a couple more questions.

The Convener: Apparently you have not finished, Dr Irwin. [*Laughter.*] Perhaps Mr Aitken should abandon the questions and tell us what he wants to tell us.

Dr Irwin: I have one more question.

Mr Aitken, in your rebuttal statement to Mr Mitchell you state that you do not believe that the noise and vibration policy will give the residents a good level of protection. Have you heard anything to make you change your mind?

Andy Aitken: I have not heard anything this morning that makes me change my mind. I am still concerned about the omission of a velocity value in the noise and vibration policy, especially as a tram that is out of maintenance cannot be seen in the average level but is seen in the velocity value. I am concerned that the noise and vibration policy relies heavily on best practicable means. We understand from previous evidence that it might not be practical to apply retrospective litigation; the results could be found to be poor, but the promoter is not going to rip up the rails and put down vibration-resilient rails.

I heard you say that you would apply mitigation where houses are within 15m of the tram. I am concerned that that is vastly different from the 4m that is proposed in the environmental statement. I also realise that it is difficult for the people around the table to understand all the issues. I am not sure where we are in the process or whether this is the end of the road for us, but group 35 is prepared to offer on-going involvement in setting and agreeing suitable vibration levels for statutory policy. The levels that we propose in our amendments, which are based on Dr Irwin's report, would produce no noticeable vibration in properties in Coltbridge Terrace and Garscube Terrace. It may be that a compromise can be reached between the two positions. By all accounts, the levels in the noise and vibration policy appear to be excessive.

Dr Irwin: Thank you. I have definitely finished this time.

The Convener: Are you sure that you have definitely finished, Mr Aitken?

Andy Aitken: Yes.

The Convener: Excellent. I am pleased to hear it. Mr Thomson?

Malcolm Thomson: Thank you, madam.

Mr Aitken, are you an expert on vibration?

Andy Aitken: No, but I am a degree-qualified mechanical engineer.

Malcolm Thomson: Does much of your knowledge of vibration come from what you have been told by Dr Irwin?

Andy Aitken: Dr Irwin's time is quite expensive, so my knowledge comes from a combination of research on the internet, reading and consulting Dr Irwin.

Malcolm Thomson: Is a certain amount of the evidence that you gave this afternoon in answer to questions from Dr Irwin essentially information that you learned from him?

Andy Aitken: Some of it is, but not all of it.

Malcolm Thomson: I take it that you have read Mr Mitchell's witness statement.

Andy Aitken: Yes.

Malcolm Thomson: I think that you rebutted it.

Very briefly, attached to it as the second appendix is the promoter's noise and vibration policy, which is entitled "The Edinburgh Tram Lines One and Two Noise and Vibration Policy".

Andy Aitken: Yes. I have it.

Malcolm Thomson: The title suggests that the policy applies to tramlines 1 and 2.

Andy Aitken: Yes.

Malcolm Thomson: From your reading of Mr Mitchell's witness statement, you may remember that he says in paragraph 5.15 that the tracks will be embedded in a resilient sleeve.

Andy Aitken: That may be the case. I am sorry, was that in his witness statement?

Malcolm Thomson: Are you questioning the promoter's intention to construct a tramline using rails that are encased in a resilient sleeve?

Andy Aitken: No. I have said that I do not really care whether a resilient sleeve is used. What I am interested in ensuring is that a specification level is reached by whatever means the contractor and promoter intend to use, whether it is resilient rail or some other means.

Malcolm Thomson: I asked the question because you told the committee in earlier evidence today that it is the promoter's intention to use resilient material in some locations but not all.

Andy Aitken: I think that I may have read that somewhere in the documentation.

Malcolm Thomson: But you are not prepared to question Mr Mitchell's evidence on the subject, as found in paragraph 5.15.

Andy Aitken: If I did not raise an objection to that—which witness statement is it?

Malcolm Thomson: Mr Steve Mitchell's witness statement.

Andy Aitken: His first one or his—

Malcolm Thomson: His first one.

Andy Aitken: If I may, I will try to find the statement.

I have it now. I believe that I found somewhere in the documentation a statement that the promoter gives no guarantee that resilient rails will be fitted throughout the whole track.

Malcolm Thomson: Perhaps I can help you out, Mr Aitken. Two different types of resilience are involved in the provision of rail: one is a coating that all modern tram rails have and the other is the additional provision of a resilient material underneath the rail when it is laid. It may well be that the promoter would want to resort to the latter in some cases. According to Mr Mitchell, the promoter proposes to use resilient-type rails at all locations.

Andy Aitken: I see. So, there are different types of resilient rail. That is why I may have hesitated slightly; I was sure that I had not read that resilient rail was being applied to the whole track. You are saying that a form of resilient rail will be applied to the whole track but that, in some cases, a heavy-duty type of resilient rail will be applied.

Malcolm Thomson: I am saying that, if the right type of rail is bought, the rail itself is inherently resilient. According to Mr Mitchell, that is what is being proposed for all the rail. Additional resilient material can also be put underneath the rail where it is considered necessary.

Andy Aitken: Right. In that case, throughout the group 35 evidence, in talking about resilient rail, we have generally meant the latter type.

Malcolm Thomson: Thank you, Mr Aitken.

The Convener: Thank you, Mr Thomson. Do committee members have any questions?

14:00

Phil Gallie: Would it be fair to say that, irrespective of whether resilient rail is fitted, you would be satisfied if the spec stated that tramline 1 will have $0.2ms^{-1.75}$ rather than $0.4ms^{-1.75}$?

Andy Aitken: I would be a lot happier if I saw that.

Phil Gallie: Thank you.

The Convener: Do committee members have any more questions?

Before I allow Dr Irwin to ask more questions, I will just make an observation. I note that the objector has made a clear offer to talk to the promoter; I hope that the promoter has also noted that. Of course, the committee cannot be involved in a negotiation between the two parties—we will

make up our minds on the basis of the oral and written evidence that has been placed before us—but if the promoter or the objector wish to report to us that a resolution has been found, we will of course encourage that.

Dr Irwin: I have just a couple of points of clarification.

In your undergraduate degree and your practice as a mechanic—

The Convener: Dr Irwin, I remind you that you can re-examine the witness only on issues that have been raised by either Mr Thomson or committee members.

Dr Irwin: In those situations, have you or do you ever come across vibration problems or design against vibration? The situations to which I refer are your undergraduate degree and your experience as a practising mechanical engineer.

Andy Aitken: I have not practised mechanical engineering. I became an electrical engineer—it is far more interesting—so, in all honesty, I cannot really answer that question.

Dr Irwin: Did you do any vibration work in your undergraduate degree?

Andy Aitken: I probably did. However, if I did, I have forgotten it.

Dr Irwin: It was a long time ago.

Are you aware that there is a range of resilient-type mountings for rails? I think that you must be, given this afternoon's discussion.

Andy Aitken: Yes. I have just been reminded of that by Mr Thomson.

Dr Irwin: Are you aware that some resilient rails are more effective than others?

Andy Aitken: Yes. That is obviously the case. By resilient rail, we have meant heavy-duty rails.

Dr Irwin: So we are not talking about a simple, thin coating.

Andy Aitken: That is right.

The Convener: Thank you, Dr Irwin. On the basis that there are no further questions for Mr Aitken, I thank Mr Aitken very much for giving evidence this afternoon.

The next witness was to have been John Barkess, but Mr Barkess is unable to attend for medical reasons. My understanding is that the promoter may wish to say something in relation to Mr Barkess's statements.

Malcolm Thomson: The only point that I draw to the committee's attention is Mr Barkess's reference to particular noise levels of the tramway in Manchester. I remind the committee that the Manchester tramway was built on an old railway line with fish-plates and gaps between the rails. Such tramways are generally expected to be far noisier than a modern tram rail.

The Convener: On that basis, we will move on to the next evidence-taking session. I invite Ian Hewitt and Graham Scrimgeour to take their places at the table.

IAN HEWITT *made a solemn affirmation.*

GRAHAM SCRIMGEOUR *took the oath.*

The Convener: Mr Hewitt is here to address the issue of noise and vibration for group 33. As he does not have a questioner, he may make brief opening and closing statements.

Ian Hewitt: I hope not to detain the committee long. I am not an expert on vibration or noise, unlike those from whom you heard this morning, but I am a resident who experiences considerable noise and vibration. I have lived in Groathill Avenue for 23 years. I represent most of the residents of Groathill Avenue and certainly those who have objected to the bill. The majority of the people I represent are elderly people who have lived in their houses for many years. Some have lived there since the houses were built, when a train line was in operation at the bottom of their gardens. I am happy to provide the committee with details of their experience of vibration and noise.

When I and other residents moved to Groathill Avenue, it was a quiet road and remained so for many years, until eight or nine years ago, when Craigleith retail park was built. In considering the planning permission for the retail park, the council decided that no heavy traffic would enter from Groathill Avenue, as it would all enter from Queensferry Road. That condition has been totally ignored and the council has not enforced it. With anything that the council is supposed to police, I worry that it will not do so. The noise and vibration levels on Groathill Avenue have become almost intolerable for many residents. Many of them are elderly people of pension age who, like me, live in their houses during the day. Almost all the residents have had to install double glazing and many have reroofed their houses—if they have not done so, they need to. I reroofed my house six years ago, but slates still fall off almost weekly because of the vibration from traffic.

The situation will get worse, as building work is being carried out to extend the retail park. I do not have a decibel meter, but I can assure members that the construction noise that we have experienced is well over 75dB, particularly when the workers are pile-driving into the ground. The noise starts at half past 6 in the morning. Technically, lorries are not allowed in until 7 o'clock, but they start queuing at half past 6, which

disturbs residents. People in Groathill Avenue are well aware of sleep deprivation.

In one of its statements, the promoter acknowledges that ground vibration may be discernible up to 20m from the tramline, which puts the vibration in my living room, or possibly my bedroom. All the stuff that we heard this morning about 4m was a load of nonsense. In my statement, I ask for compulsory noise mitigation measures and it appears that TIE has gone some way towards that. From statements that I received a couple of days ago, which the committee requested, it seems that TIE has agreed to include the noise and vibration policy and the landscape and habitat management plan in the bill.

In the landscape and habitat management plan—

The Convener: You are straying considerably from the issues that are in dispute. We are talking not about the LHMP, but about noise and vibration. I would be grateful if you focused on that.

Ian Hewitt: I may have the wrong plan in that case. The committee asked about the noise and vibration policy and the landscape and habitat management plan. The LHMP states that noise barriers may be erected at Groathill Avenue. My residents are concerned to ensure that if the scheme goes ahead, those measures are compulsory under the bill. There is far too much laxity in what the promoter suggests. It states in its rebuttal statement that the measures will be put in, but in the plan it states that they may be put in. Which is it—"may be" or "will be"?

The rebuttal that I referred to in my witness statement when I spoke about vibration was quite funny. I raised an objection on the ground of vibration because we have vibration at the front of our house already, and now we will have it at the back, too. There will be a cumulative effect on what will become, in effect, a little island of houses. When I received the rebuttal, I almost fell about laughing, because it states:

"Given that the effects of the tram are predicted to be insignificant and the road and rail traffic will be well separated and will be incident on opposite ends of any particular building, I do not expect … cumulative effects."

What separates the two is us and our houses. Our houses will be attacked on both sides, with the occupiers being thoroughly shaken and stirred. That is not acceptable.

Malcolm Thomson: Have you read Mr Steve Mitchell's rebuttal of your witness statement?

Ian Hewitt: Yes.

Malcolm Thomson: In paragraph 3.3, he deals with your concerns about the effect of the cutting, and explains that he thinks that it will have an attenuating effect, because the nature of the soil is such that it is likely to reduce noise, rather than spread it.

Ian Hewitt: He said that but, from listening to this morning's evidence, it appears that no ground testing has been done to establish that as a fact.

Malcolm Thomson: Are you in a position to question what he states in paragraphs 3.3 and 3.4?

Ian Hewitt: I am not in a position to say that he is wrong, but neither is he in a position to say that he is right, because no testing has been done.

Malcolm Thomson: On your concern about the use of "may" in the noise policy, the policy sets a level then sets out that it may be complied with by means of an acoustic barrier. Do you accept that if the promoter finds a whisper-quiet tram that is far quieter than the type that has been modelled, it would be pointless to build an acoustic barrier when there is no noise to attenuate?

Ian Hewitt: That is total hypothesis. You are assuming that the promoter can find such a thing.

Malcolm Thomson: My point is that it might explain to your satisfaction the use of the word "may" rather than "shall".

Ian Hewitt: No, it certainly does not. In my opinion, the bill must state that suitable protections for people who live along the corridor will be built in. If they prove to be superfluous, wonderful—we will have extra protection. However, you cannot say, "Maybe if we get a tram that's quieter—or maybe this or maybe that—we don't need to do it." If one says that, protections almost certainly will not be built in at all.

Malcolm Thomson: Do you really think that that would be a prudent way of spending public money?

Ian Hewitt: If you are going to build this thing in the first place—which I do not consider a prudent use of public money, because I cannot see how it is in the nation's economic interest to do so—the answer is yes.

Malcolm Thomson: Have you seen the noise and vibration policy?

Ian Hewitt: I have a copy of it in front of me.

Malcolm Thomson: And you have read it.

Ian Hewitt: I have.

Malcolm Thomson: In his rebuttal, Mr Mitchell also drew attention to the passages in the environmental statement that were concerned with vibration. Have you had a chance to read those?

Ian Hewitt: I have.

Malcolm Thomson: Thank you. I have no further questions.

The Convener: Before I bring in other committee members, I will pose the same question to Mr Hewitt as I have posed to everybody else, but I will shape it slightly differently.

Am I right in saying that in response to Mr Thomson you said that you would be opposed to the Edinburgh Tram (Line One) Bill in any case, irrespective of mitigation measures?

14:15

Ian Hewitt: Irrespective of mitigation measures, I am opposed to the tram, because, as I said—

The Convener: That is fine. I do not need you to repeat that; I just wanted to be absolutely clear that that is what you said.

Do you think that there are mitigation measures that can resolve some of the vibration issues that you have raised?

Ian Hewitt: There is potential for that, yes.

The Convener: Thank you. Do committee members have any questions?

Phil Gallie: I have a question about the soil checks. Mr Hewitt, would you be satisfied if TIE could produce evidence that soil samples have been taken?

Ian Hewitt: It would show that TIE has actually done some work, which might make a change.

The Convener: Thank you. As there are no other questions from the committee, you have the opportunity to make a brief closing statement, Mr Hewitt.

Ian Hewitt: I do not think that I have anything further to add. Clearly the work has not been done properly. I am also very concerned about the two statements to which I have referred being incorporated into the bill because the scheme will then be policed by the council, which, in effect, will be policing itself if anything goes wrong. I have always been concerned that no supervision by an outside body of the work once it is in place has been built into the bill.

The Convener: There being no further questions, I thank Mr Hewitt for giving evidence this afternoon.

We turn now to Mr Scrimgeour, who will address the issue of operation noise for group 34. Before we start, I would like to ascertain that you are adopting Mark Clarke's statement on operation and construction vibration.

Graham Scrimgeour: Yes, but I am to be questioned on my own statement first. Is that correct?

The Convener: Indeed, but I am just checking that you have adopted Mr Clarke's statement for the purpose of allowing it to be discussed.

Graham Scrimgeour: Yes.

The Convener: Excellent. Ms Woolnough will ask questions for group 34.

Kristina Woolnough: Mr Scrimgeour, for the sake of clarity, is it correct that you or Mr Clarke, or a representative of group 34, have attended several community liaison group meetings and discussed noise and vibration at considerable length with Mr Mitchell?

Graham Scrimgeour: Either Mark Clarke or I—or both of us—have been at almost all the community liaison group meetings. I feel that we have had a good dialogue with Mr Mitchell. He produced the "What is Noise?" paper in response to questions raised at those meetings and we find that helpful. Mr Mitchell will probably agree that I and other members of the group have worked hard to make the community liaison group work through useful discussion of mitigation at different points along the route. I do not think that we could have done any more than we have done to try to liaise with the promoter through the group.

Kristina Woolnough: Is it correct that we, as a group, have taken the view that the community liaison group is the proper forum for discussion of noise and vibration, of general concerns and of some specific property concerns?

Graham Scrimgeour: I understand that that is why I was invited to attend the community liaison group meetings.

Kristina Woolnough: Whom do you represent? Who is in group 34?

Graham Scrimgeour: Group 34 is made up of people who live between Ravelston Dykes and Groathill. It consists of 59 objectors, which is 30 per cent of all objectors to the bill. Of those 59 objectors, 54 raised the issue of noise as a concern in their objection.

Kristina Woolnough: Is it also the case that the noise and vibration experience will be different for every property along the Roseburn corridor and in the area that you have described? That is partly because some properties are flats and some are houses and because some are closer to the tramline and some are further away. The Roseburn corridor profile also shows pinch-points, embankments and cuttings. A general policy ought to be considered for each different type of property.

Graham Scrimgeour: There is a lot of variation and different points will require consideration.

Kristina Woolnough: Why is group 34 concerned about noise?

Graham Scrimgeour: The existing situation is that the area is very quiet. It is used for recreation in gardens and on the walkway. The current background noise level is about 45dB, falling to 35dB at night. With the introduction of the tram, up to 32 vehicles an hour—eight trams in each direction with two vehicles on each tram—will pass along the corridor, which will raise the noise level by something like 17dB. My figures are taken from the environmental statement.

The noise level will be between three and four times the existing noise level. The environmental statement states that the peak noise level at a distance of 6m will be 86dB, which Mr Mitchell's paper "What is Noise?" describes as akin to the noise from a lawnmower at a distance of about 1m. The information that has been provided shows that the trams will generate a significant amount of noise and that conversation will be drowned out, so we think that there will be a significant change to the existing circumstances.

Kristina Woolnough: We heard a lot of talk this morning about the semi-rural context of the Roseburn corridor. Is it the case that many of the properties of the people we represent have bedrooms that are adjacent to the Roseburn corridor?

Graham Scrimgeour: Yes. Where there is an embankment, the tram will be on the same level as—or in some cases above—the bedroom windows.

Kristina Woolnough: Is it our contention that residents had no advance notice of the tram proposal? Because it was not contained in the central Edinburgh local plan, residents could not have anticipated the increases in noise and vibration that the tram will bring to our semi-rural location?

Graham Scrimgeour: Yes. The first announcement of the council's proposal was made about three years ago. Before that, there was no information in the plan.

Kristina Woolnough: So people had no expectation that they were buying into—

The Convener: I gently remind you to stick to the rebuttal witness statement. This is tenuous at best.

Kristina Woolnough: What are your specific concerns about sudden noise, for example from bells and horns?

Graham Scrimgeour: Our concern is that, particularly at night, such noises can be very intrusive. One of the papers that we submitted in support of our statement is an article that indicates severe problems in Nottingham. Its headline is "The bell is hell", referring to the use of bells on the Nottingham tram system.

The promoter says that such noises are essential safety features and we agree with that. The question is whether the bell and the horn will have to be used or whether there are ways of achieving safety that minimise use of the bell and the horn. If they are used frequently, particularly late in the evening, they will have a significant effect, because they will disturb people's sleep, including children's sleep. We suggest that the operator should be required to arrange operations in a way that avoids the need to use the bell or the horn.

Kristina Woolnough: So you recognise the importance of safety, but you think that other safety measures would work more quietly than bells and horns.

Graham Scrimgeour: Yes. For example, trams could operate at a reduced speed at night.

Kristina Woolnough: And that is our group's preference, is it not?

Graham Scrimgeour: Yes.

Kristina Woolnough: Is it our understanding that bells and horns will be used at crossing points, perhaps at approaches to stations and wherever there is a possible obstruction or a risk to a person or animal? We heard about the line of sight argument yesterday.

Graham Scrimgeour: My understanding is that the position is not clear. If the driver has no other option and is unable to stop, he will have to give a warning to get somebody to safety, out of the way of the tram. We are relying on assurances that the wish is that bells and horns will not be used, but we would like the scheme to control their use more formally.

Kristina Woolnough: What are group 34's concerns in relation to users of the walkway?

Graham Scrimgeour: Our concern is that the effect of noise on people's use of the walkway has not been assessed. Mr Mitchell describes users as transient and says that the tram will not prevent them from using the walkway, but it has been accepted in this room in the past couple of weeks that the amenity value of the corridor is likely to diminish due to the noise and disturbance that will be caused by trams passing by. Mr Mitchell appears to have admitted that the walkway will be less pleasant and less relaxing than it is at present.

Kristina Woolnough: Is it fair to say that many residents who live adjacent to the corridor are also users of the amenity? Do you agree that they use the walkway for amenity and recreational purposes, so they have a dual concern?

Graham Scrimgeour: Yes. People use the local spaces that are close to where they live.

Kristina Woolnough: A sense seems to be emerging about noise and vibration and about mitigation being a kind of option. Is our group's preference that the tram be routed elsewhere to avoid the whole issue of mitigation?

Graham Scrimgeour: Part of group 34's submission to the committee was a proposal for an alternative route. That is our preference. We are also prepared to engage in discussion about mitigation. The committee will choose exactly what will happen; we are presenting our preferences in either scenario.

Kristina Woolnough: And there was no option but to present our preferences in either scenario, was there?

Graham Scrimgeour: No.

Kristina Woolnough: Is it the case that, in arguing for robust noise and vibration mitigation, we in no way wish to prejudice our case for an alternative alignment? I ask you to reinforce the point.

Graham Scrimgeour: Our primary preference is for an alternative alignment. Failing that, we would argue for mitigation.

Kristina Woolnough: What would group 34 like the committee to do?

Graham Scrimgeour: As I said, our first preference is for an alternative alignment. Failing that, we would like to see target mitigated noise levels that relate to the existing low levels of noise. The promoter has chosen a threshold level that is considerably in excess of the current noise level. The threshold level is the level above which mitigation will be determined. We would like to see the setting of a lower threshold level that relates more closely to the existing low level of noise. We have suggested figures of 40dB within houses and 50dB in gardens.

We would like to see the bill being amended to ensure the robust enforcement of the required levels of noise mitigation. There should be an independent monitoring mechanism; our suggestion is for a body that has the authority to require the operator to achieve the stipulated maximum noise levels. The noise assessment should also take account of operational noise including the use of the bell and horn. We want that to be built into the assessment, so that the use of the bell and horn is monitored. If it is found that significant use is being made of those warning devices, particularly after the initial three-month commissioning period, we think that the bill should include a requirement for a review of the way in which the tram is operated.

We would also like to see a restriction on the hours of operation of the tram and a reduction in the speed at which the tram can operate in the evening, as that would further reduce noise in the night time. We want to prevent the operation of the tram outwith the current proposed operating hours, so that the so-called dead time that has been referred to this morning would be guaranteed. The assumption in the current noise assessment is that there will be no operation in the dead time. We would like to see that fixed in the bill, so that the situation cannot change once the bill is passed. The hours of maintenance should be restricted so that no significant maintenance noise occurs between—let us say—7 pm and 7 am. Those are the things that we respectfully ask the committee to consider.

Kristina Woolnough: So, a summary of the discussion on noise and vibration is that context is all. The residents have described the area as a pleasant, semi-rural environment, therefore the ambient noise levels are likely to be pleasant. The noise and vibration impacts of the tram are not likely to be pleasant. It is important to group 34 that the quiet place that is the Roseburn corridor is considered only in the context of noise measurement and mitigation or an alternative alignment. Is that the case?

Graham Scrimgeour: Yes. We are seeking to preserve what exists in the area. We want that to be taken into account in assessing both current noise and any noise that may be generated in future.

Kristina Woolnough: Thank you.

The Convener: Thank you, Ms Woolnough. I call Mr Thomson.

Malcolm Thomson: Ms Woolnough used the expression "semi-rural" in one of her questions to you, Mr Scrimgeour. Which part of Craigleith, Groathill, Murrayfield, Ravelston, Roseburn, Wester Coates or Coatbridge do you regard as being semi-rural?

Graham Scrimgeour: The Roseburn wildlife corridor.

Malcolm Thomson: You regard just the corridor as having that description.

Graham Scrimgeour: And the gardens of the adjacent properties. Each individual proprietor will have their own view of how they would describe their garden.

Malcolm Thomson: I turn to the point about bells and whistles, which was an issue that you raised in cross-examination of Mr Mitchell a few days ago. In answer to your questions, Mr Mitchell explained the position and drew attention to the part of the policy that provides that

"The operator will establish a policy on the appropriate use of vehicle horns in accordance with safe working practices."

You will remember that evidence. He went on to say:

"All I can say is that if you examine other similar systems, you will become more comfortable that there will be infrequent use of the bell. That is my experience; I see nothing fundamentally different about the scheme that we are discussing."—[*Official Report*, *Edinburgh Tram (Line One) Bill Committee*, 3 October 2005; c 1194.]

Have you made any further investigations into the matter since hearing that evidence?

14:30

Graham Scrimgeour: I am not really in a position to do that, as I do not have direct access to other tram operators. I welcome what Mr Mitchell said. If the bell is used infrequently, that would be wonderful. We simply wish to formalise that commitment. All that we have asked is that that commitment is guaranteed. It sounds as though we are agreeing on the matter, broadly.

Malcolm Thomson: Are you in a position to doubt the sincerity of Mr Mitchell's evidence on the subject?

Graham Scrimgeour: In community liaison group discussions, we have told a number of the promoter's representatives that we trust them and accept what they say. However, it is proposed that the tram will operate for 30 to 40 years, at least, and Mr Mitchell will not be around to monitor and control its operation throughout its lifetime. I hope that, one day, he will enjoy a happy retirement doing something else. We would like Mr Mitchell's commitment to be maintained throughout the operational lifetime of the tram. As I say, I think that we are broadly in agreement; it is simply that we want that commitment to be enshrined in the bill.

Malcolm Thomson: Can you imagine the practical difficulties of creating a rule—however it was enshrined—that said that a tram driver could sound their horn only three times a week, or something to that effect? The horn might have been sounded three times already and an emergency could arise that meant that it was necessary to sound it again.

Graham Scrimgeour: I am sure that it would be possible to come up with a form of words in the policy and, backing the policy up, in the bill—if it is enacted—that would restrict the use of the horn and require monitoring and review if its use became excessive, which would be workable but would still achieve the objective of controlling the noise that was made.

Malcolm Thomson: Have you applied your mind to the question of who might carry out the monitoring?

Graham Scrimgeour: We are concerned that the monitoring should be independent of the operator. The operator will be an agent of the council, and we feel that the monitoring mechanism should be independent of the council.

Malcolm Thomson: Even if the operator was, ultimately, a commercial operator, would you still have no confidence in the environmental services department of the council acting as monitor?

Graham Scrimgeour: I would not go so far as to say that I have no confidence in the council's environmental services team. It is simply that, if the operating organisation carries out the monitoring, there could be conflicts between the responsibilities of that organisation.

Malcolm Thomson: On a completely different topic, I want to ask about the arithmetical exercise that is picked up in paragraph 3.5 of Mr Mitchell's rebuttal statement. Mr Mitchell is commenting on your evidence about a 3dB or 10dB noise appearing twice as loud and your idea that an increase of 17dB will appear nearly four times as loud, or 32 times as loud, according to HSE information.

Graham Scrimgeour: This is a point that has been rehearsed with Mr Clarke in cross-examination. He was the originator of the comment in my witness statement. My understanding is that 10dB is the apparent level that one would hear as doubling and that 3dB is the intensity measured scientifically, but that when one adds sounds together, it is whether the source is of a different nature that leads to an increase in sound.

Malcolm Thomson: Can I phrase it this way: the only reason that you have to doubt Mr Mitchell's rebuttal is Mr Clarke's evidence?

Graham Scrimgeour: Mr Clarke referred me to information from the Health and Safety Executive.

Malcolm Thomson: That is the source of the doubling notion in relation to intensity.

Graham Scrimgeour: We have already discussed that point. We have accepted that two different issues are being discussed.

Malcolm Thomson: I am just trying to find out your position. Can you bring any fresh information, thought or expertise to the issue other than what we heard from Mr Clarke?

Graham Scrimgeour: Going through statements, I have a better understanding of the issues now than I did six months ago. The key issue here is the 17dB increase, which, according to Mr Mitchell's information, triples the level of noise.

Malcolm Thomson: The question was: do you have any evidence to offer the committee other than and in addition to what we have already heard from Mr Clarke?

Graham Scrimgeour: On this subject, no.

Malcolm Thomson: Thank you. I have no further questions, madam. Thank you, Mr Scrimgeour.

The Convener: Thank you, Mr Thomson. Do members have any questions? Phil Gallie is smiling, so he must want to ask a question.

Phil Gallie: Mr Scrimgeour, you referred to maintenance being carried out only between 7 am and 7 pm, plump and plain. Is it your intention simply to stop the whole of tramline 1? What would happen if we applied your proposal to the Roseburn corridor and the whole way round the line? Such a limitation would make operating a tram system totally ineffective.

Graham Scrimgeour: We have discussed that question in cross-examination of the promoter's witnesses.

Phil Gallie: During your evidence.

Graham Scrimgeour: Yes; we will relate it to some of the answers that we had before. The suggestion was that such maintenance should not have to happen too frequently. In discussions, the promoter admitted that if one closed one of the two tracks along a short section to work on it and then moved round the route, one could probably maintain the operation of the tram without too much disruption. In previous discussions, the promoter indicated that although the restriction would have an impact, it would not be significant. That is what I understand from what I was told.

Phil Gallie: That is not quite my recollection, but I will ensure that I check on the matter.

The Convener: Do members have any other questions? Ms Woolnough, do you have further questions for Mr Scrimgeour?

Kristina Woolnough: I want to pick up on some of the points made by Mr Thomson.

Mr Scrimgeour, is it our group's concern that no matter what broad policies and criteria might be used, the character of the Roseburn corridor as a quiet place will be gone for ever?

Graham Scrimgeour: Mr Mitchell has admitted that the corridor's character cannot possibly be retained with the tram.

Kristina Woolnough: You bring me neatly on to my next question—you have read my mind. Mr Mitchell has acknowledged that the character of the Roseburn corridor will be changed significantly for ever. He, of all the witnesses with whom we have had to deal, has apologised for that, which was helpful. He said that he can reduce the impact. Is it our sense in this discussion of mitigation that the impact will be reduced but not removed?

Graham Scrimgeour: That is right. The mitigation brings us down from the peak but does not bring us down to the base level.

Kristina Woolnough: Our group's desire is for an independent monitoring body. Would not such a body give the council the opportunity to ensure clarity and public confidence rather than be an implied criticism of the council, as Mr Thomson suggested? It would be an opportunity for robust, independent scrutiny and would encourage public confidence, would it not?

Graham Scrimgeour: I am used to the concept of independent scrutiny, so I think that that is reasonable.

Kristina Woolnough: As you know, I have never got to grips with all the decibels and what not. We have acted as lay persons, by and large. We have done the best that we can with the facts, figures and context and have tried to keep a broad perspective, which we felt might bring another dimension to the discussion, have we not?

Graham Scrimgeour: Yes. I am not a noise expert. We have just said that, given the figures in the environmental statement, there will be a significant impact, which we would seek to ensure is mitigated to the lowest possible level.

Kristina Woolnough: Thank you.

The Convener: Thank you, Ms Woolnough. We now move on and we will take two subjects as one, if people are agreed: operation and construction vibration. The statement is in Mr Clarke's name. I assume that Ms Woolnough is questioning on that, but perhaps she is not.

Graham Scrimgeour: If she is, it is a simple question.

Kristina Woolnough: Yes.

The Convener: I love it when the questioner is reminded by the witness what question they have to ask.

I take it that there is no objection to our considering together operation and construction vibration. Are you comfortable with that, Mr Thomson?

Malcolm Thomson: Very.

The Convener: I am delighted to hear it. Is Ms Woolnough comfortable with that?

Kristina Woolnough: Yes, and I apologise. I knew that Mark Clarke was here and had not quite completed his business. It is my recollection that is at fault, as usual. Do you have anything to add to the statements, Mr Scrimgeour?

Graham Scrimgeour: Speaking as Mark Clarke, I have nothing to add to the original statements.

The Convener: Thank you, Mr Scrimgeour. Thank you, Ms Woolnough. Mr Thomson, do you have any questions?

Malcolm Thomson: Thank you. I have no questions on the basis that all the matters are covered to my satisfaction in Mr Mitchell's rebuttals.

The Convener: Excellent. Do committee members have questions?

Members: No.

The Convener: My goodness—you got off lightly, Mr Scrimgeour. Ms Woolnough, I take it that there is no cross-examination, seeing as nobody had any questions.

Kristina Woolnough: I just want to confirm that we stand by what was said in the original statements.

The Convener: I am sure that, technically, that is not allowed, but given that it was a simple response, I will allow it. On that basis, I thank Mr Scrimgeour very much for his evidence today. We will not require you to give further evidence, but you will need to move over to ask questions.

We are now going to hear from Andrew Polson, whom I invite to take a place at the table. I will then invite him either to take the oath or to make a solemn affirmation. We will suspend the meeting for two minutes.

14:42

Meeting suspended.

14:46

On resuming—

The Convener: As members will have noticed, I have invited Richard Mackenzie to join Andrew Polson at the table. I can swear you both in now in order to save time later.

ANDREW POLSON *and* RICHARD MACKENZIE *took the oath.*

The Convener: I invite you to return to the public gallery just now, Mr Mackenzie. We will call you back to the table in due course.

Mr Polson will address issues of construction vibration for group 34.

Graham Scrimgeour: Mr Polson, can you tell the committee why the members of group 34 are concerned about vibration during construction?

Andrew Polson: The concerns fall into two main areas. First, there is the question of potential landslip, which is connected with the history of the various cuttings and embankments along the corridor. When the corridor was operated as a railway route, there was a tendency for slippage and mudslides to occur, presumably because there was no binding from root structures. When the train stopped operating and trees and vegetation grew up, that problem seemed to reduce. The concern is that if all the existing vegetation is removed, the soil-binding elements will be removed and there might therefore be a return to land slippage.

The other element is a concern about vibration from the works causing damage to ancillary structures, although not necessarily to houses themselves. I refer to structures within the grounds of properties, including garden huts, greenhouses, decking and garden plants.

Graham Scrimgeour: Do you consider that the promoter has provided sufficient evidence on the potential effects on adjacent owners and on the extent of vibration during construction?

Andrew Polson: No, not really. As far as I can tell, there is no assessment in the environmental statement of the likely effects of the removal of soil-binding elements, nor are there details of any proposed mitigation measures to deal with that. Furthermore, there are no specific limits to the vibration that will be produced by plant during construction. An inventory of the anticipated construction plant is included at paragraph I3.4 in appendix I of the environmental statement. However, that does not refer to vibration; it refers simply to sound.

Graham Scrimgeour: In that context, what is group 34 asking the committee for?

Andrew Polson: To start with the basics, that the tram should not be in the Roseburn corridor, but should be elsewhere. Failing that, we would like targeted, mitigated vibration levels to be set, which would ensure that damage does not occur to anything on the adjacent properties. We would also like the system to be independently monitored. A previous witness expressed concern about a circular system of approval, and we are also concerned about that, particularly if something has to be done about a breach that has occurred. How will something be done quickly? We are concerned about the corporation being involved in everything and that there will be no independence, which we would look for.

Graham Scrimgeour: Those are my only questions at this stage.

The Convener: Thank you, Mr Scrimgeour. I invite Mr Thomson to ask questions.

Malcolm Thomson: Mr Polson, have you had a chance to look at the code of construction practice?

Andrew Polson: I have had a look at the relevant section of it.

Malcolm Thomson: Does it give you any comfort with respect to the concerns that you have previously expressed?

Andrew Polson: The code gives some comfort with respect to the minimum requirements and the standards that will be set, although I cannot say whether those are the correct standards. However, it does nothing to address our concerns about the circularity relating to the qualified practitioner who will be appointed. Who will appoint him? What system will there be to ensure that we can be certain that the correct decisions will be taken, as they would be by an independent authority?

Malcolm Thomson: Does the noise and vibration policy give you any comfort?

Andrew Polson: No, not really.

Malcolm Thomson: So you have read the policy.

Andrew Polson: Yes.

Malcolm Thomson: Thank you, Mr Polson.

The Convener: Thank you very much, Mr Thomson. As committee members have no questions, I invite Mr Scrimgeour to ask Mr Polson follow-up questions.

Graham Scrimgeour: Thank you, but I do not have any.

The Convener: In that case, we will address the issue of operation vibration for group 34, although I suspect that we have covered part of it. I invite Mr Scrimgeour to ask questions.

Graham Scrimgeour: Mr Polson, why is group 34 concerned about vibration during operation?

Andrew Polson: I have slightly more than two concerns this time, although members have already heard my first two concerns. Obviously, there are concerns about vibration from the trams and land slippage causing damage to ancillary structures.

The third concern is that the frequency of trams and the vibration that they cause will affect the enjoyment of gardens and outside areas by people with adjacent properties and people who use the walkway. The fourth concern is that the promoter's proposals for monitoring apply only to sensitive receptor buildings and that no consideration appears to have been given to the potentially harmful effects or nuisance effects on people who are using their gardens. Those are the main concerns.

Graham Scrimgeour: Has the promoter provided sufficient information on potential effects on owners of adjacent properties and the extent of vibration?

Andrew Polson: No. I see nothing in the environmental statement that shows the maximum allowed vibration during operation and no consideration has been given as far as I can see to the effects of vibration in the grounds of gardens.

Graham Scrimgeour: Are the promoter's monitoring proposals adequate?

Andrew Polson: No. Again, there is talk purely about sensitive receptor buildings. We would contend that monitoring should not necessarily be done at such buildings and that it should be done at any point in a garden. Measurements should be taken where there are problems with using gardens or with structures in them. That is exceedingly important.

We also think that monitoring should continue over the tram's lifetime—obviously, we would like that to be enshrined in the bill. The same circularity problem arises in that context.

The other worry is that if there is no independence when the trams are running—what I am saying applies more then than it does during construction—any request for work to be done later and for mitigation will obviously be cost controlled. The operator, in whatever guise—whether the local authority or the operator itself—will be most interested in controlling its costs, because that is its bottom line. That is our concern: there is no independence.

Graham Scrimgeour: Finally, what would you ask the committee to do in relation to those issues?

Andrew Polson: Move it. If the line is to run in the corridor, we would wish to see in the bill mitigated and appropriate vibration levels with regard to the specific nature of the corridor and not just references to street-running sections in Manchester. Those should apply at the boundary between the tramway and the adjacent properties. We would like to see those measures enshrined in the bill. We would like any monitoring systems to be enshrined in the bill and to be independent.

Graham Scrimgeour: Thank you.

The Convener: Mr Thomson, do you have questions?

Malcolm Thomson: I have no questions.

Phil Gallie: I have a couple of observations to make. Mr Polson, I think that you are the first person to have come to the committee who has experience of the Roseburn corridor when trains ran there. Is that correct?

Andrew Polson: No. The only knowledge that I have is from the statement from Seonaid Mackay, who was a resident at the time.

Phil Gallie: I have a little bit of sympathy with the idea of lifetime monitoring, but I would not like

there to be a cost on the taxpayer of Edinburgh for ever if it were not thought necessary. Surely after the line has come into operation—if it ever does—householders along the line would be able to determine changes in levels of vibration. Would it satisfy you if monitoring could be carried out on request during the lifetime of the tramline?

Andrew Polson: That would depend whether we were dealing with an independent authority.

The Convener: I want to clarify one thing with you. I understood the "Move it" bit, but do you think the vibration is going to be so bad that the tram should not run at all?

Andrew Polson: I honestly do not know. I am not a specialist in that field.

The Convener: So, in essence, you are talking about mitigation.

Andrew Polson: Indeed.

The Convener: Thank you. There being no further questions from the committee, I invite Mr Scrimgeour back in to re-examine Mr Polson.

Graham Scrimgeour: I will pick up briefly on the question that Mr Gallie asked. Obviously, it would not be good value for the council taxpayer for there to be monitoring every week for the next 40 years. Perhaps a system whereby after commissioning and initial testing has been done, monitoring is done every five years thereafter to establish whether there has been deterioration in the system would be a suitable compromise in the monitoring regime.

Andrew Polson: I believe that it would be.

The Convener: Thank you, Mr Scrimgeour. There being no further questions for Mr Polson, I thank him for giving evidence this afternoon.

We will now take a short break to enable Tina Woolnough to come to the table. I invite Richard Mackenzie to the table too, although he will be taken after Tina Woolnough.

14:59

Meeting suspended.

15:01

On resuming—

The Convener: I remind Ms Woolnough that the oath that she has taken is still binding for her evidence this afternoon.

Ms Woolnough will address her rebuttal witness statement on the issue of noise and vibration for groups 34 and 45. As there is no questioner, she has the opportunity to make a brief opening statement and an equally brief closing statement.

Kristina Woolnough: I speak on behalf of group 45, which represents the users and the friends of the Roseburn urban wildlife corridor. That is a broad group of people, some of whom are resident in the area and some of whom are not.

Just to pre-empt the convener's question on the matter, I should make clear our view that, for users of and wildlife on the Roseburn corridor, the noise and vibration impacts will be so bad that the tram should go elsewhere. The policies and codes of conduct that have been issued have, by and large, not taken into account the impacts of noise and vibration on users of the corridor and on wildlife, because one cannot mitigate such impacts for people who are immediately adjacent to the tram or for wildlife that live and move around and about the tramline.

The tram should not run along the Roseburn corridor but should run along the road, where its noise and vibration impacts would be less intrusive and, indeed, might improve the current road traffic situation. Although we might debate with the promoter whether the Roseburn corridor is a linear park, it is certainly an open and accessible recreational space and it is not usually common practice to put 50mph vehicles with all their associated noise and vibration impacts into such contexts. The promoter suggests that the area is a play park or playground, but it is not. It is an open space of public ground that is used for recreational purposes.

In his statement, which I have rebutted, Mr Mitchell says that this construction project is necessary. However, we do not think that it is necessary to construct it along the Roseburn corridor.

Because no assessment has been made of the likely impact of noise and vibration on the usage of the Roseburn corridor by pedestrians, cyclists and wildlife, the detrimental environmental impacts of fewer people walking or cycling along the corridor and the displacement of wildlife have not been factored into the project. As a result, we feel strongly that the consequences of noise and vibration on users have not been taken into account.

That is it.

The Convener: For groups 34 and 45?

Kristina Woolnough: I was speaking on behalf of group 45. Mr Scrimgeour was speaking for group 34.

The Convener: Excellent. I thought that you were speaking for both groups, but that is my error. I stand corrected.

Kristina Woolnough: I can go on, if you like.

The Convener: I know you can, but I am very grateful for your concise statement. It allows us to grasp it all the better.

Mr Thomson, do you have any questions?

Malcolm Thomson: No, convener.

The Convener: In that case, I will kick off my questions by saying that I was not going to ask you whether you would prefer another route. Given the previous evidence, I am quite clear about your views in that regard. Instead, I would like to know whether you think that the noise and vibration will be so bad that the tram should not run at all.

Kristina Woolnough: The impacts will be that bad for users. However, because they have not been measured, estimated or even guessed at, we have no evidence that every user will definitely be discouraged or that every bit of wildlife will disappear. These are all guesstimates. As a cyclist, as a pedestrian and as someone with children, I think that the impacts will be so bad that I will no longer wish to use the corridor. Indeed, the view of group 45 is that the corridor's current usage is of paramount importance.

The Convener: I know that it is difficult to answer this question in the absence of those data, but do you think that any form of mitigation would dampen the effects of the noise and vibration for users of the corridor?

Kristina Woolnough: Because of the tram's close proximity to the cycleway and walkway, some mitigation measures might help with the impacts of vibration. However, anyone in the embankment—or in the cutting, I am not quite sure which it is—will be in an enclosed environment that is right up close to the trams. That cannot be a pleasant experience. Other than not running the trams through the corridor, I cannot think of any mitigation that would improve the situation.

The Convener: As members have no further questions, I ask Ms Woolnough to make her closing statement.

Kristina Woolnough: I have nothing further to add other than to say that the noise and vibration impacts on users will be very bad. Moreover, the project will have the negative environmental consequence of discouraging walking and cycling. Yesterday, we heard about the impact on user groups such as the elderly, the frail, people who do not feel very secure next to moving traffic and people who have children or own animals. Nothing will mitigate the impact of removing the current usage of the corridor. Our survey indicated that more than 70 per cent of users felt that their usage of the corridor would be affected. However, because it was a speculative question, we did not ask whether their usage would be affected so badly that they would not go on the corridor. We can only suck it and see, but by then it will be a bit too late.

The Convener: As there are no further questions, I thank Ms Woolnough for giving evidence today.

Before we move to our next section, I am aware that the questioner for group 43 has not arrived. I intend to take a 15-minute break to establish his whereabouts and whether he is able to attend the meeting. If he cannot, I will invite Mr Mackenzie to make an opening and closing statement.

15:07

Meeting suspended.

15:25

On resuming—

The Convener: We have made attempts to speak to Lord Marnoch. He is still in court and we understand from his clerk that it is unlikely that the court will conclude before 4 o'clock today, so he will not be available to question for group 43. However, Mr Mackenzie has had some time to consider what will be in his opening and closing statements, so I intend to move straight to his opening statement.

Richard Mackenzie (RMP Acoustics): My principal concern with the environmental noise impact assessment and the noise and vibration policy is that the criteria that have been adopted are not appropriate. The mitigation measures that are based on those criteria are therefore not appropriate. My first concern about the criteria is that they have been derived from the noise exposure categories in planning advice note 56. As we heard when Mr Mitchell gave evidence, it is quite clear from that document that the noise exposure categories should not be used in the "reverse situation". I shall quote a short paragraph from PAN 56. Paragraph 52 states:

> "It is important to note that the Noise Exposure Categories apply only where consideration is being given to introducing new housing development into an area with an existing transport noise source and not in the reverse situation … The differing attitude and sensitivity towards noise between those who choose to live in a relatively noisy environment and those who are subjected to new noise sources also prohibits the use of the NEC method in reverse."

Given that one should not use the criteria in PAN 56, I would have expected the environmental statement at least to make reference to the WHO document and to BS 8223, both of which promote reasonable noise levels for residential properties. I note that neither of those documents is referenced in the environmental impact assessment.

My second concern is that, although maximum levels as trains pass during the night were predicted in the environmental impact assessment, the criterion that was adopted was the 82dB maximum criterion given in PAN 56. That is not an appropriate criterion to adopt for sleep disturbance. It is used in PAN 56 as the absolute level at which new housing may not be given planning permission because the standard of new windows may not provide sufficient insulation. It is not the minimum level at which sleep disturbance will occur. Again, I would have expected the environmental impact assessment to make reference to the World Health Organisation or to the BS 8223 guidance levels for internal and external maximums. That is a significant omission.

I agree with Mr Mitchell's point that the WHO guidelines do not set standards for individual countries and were never meant to. They were meant to act as guidance in setting British standards and local standards, and both BS 8223 and City of Edinburgh Council have looked towards those documents in adopting their appropriate standards.

It seems strange that if a house were to be built next to the tramline once it had been developed, the City of Edinburgh Council would insist that the internal level of 45dB—as set out in the WHO guidelines—was not exceeded. I do not see why existing residential properties should not be protected to the same standard.

15:30

In response to cross-examination by Mr Thomson, Mr Mitchell suggested that a pragmatic approach needs to be taken. However, a pragmatic approach appears to allow maximum levels of between 75dB and 80dB outside existing properties. I do not agree that that is pragmatic: in my opinion, those levels are too high and mitigation levels of 60dB L_{Amax} should be considered. I have supplied a potential amendment about noise insulation to the noise and vibration policy in my rebuttal statement.

In his rebuttal statement, Mr Mitchell referred to a field study of aircraft noise, which suggested that higher maximum noise levels are acceptable. I have looked at the document, which states clearly in paragraph 3.6 that the study did not consider shoulder hours at the start and end of the night—precisely the times when the tram will run. The research examined times when people were in deep sleep in the middle of the night, when the trams would not be running.

Mr Mitchell also referred in paragraph 3.30 of his rebuttal statement to the national noise incidence survey from 2000. He suggested that all the properties in the survey were exposed to L_{Amax} levels of more than 60dB, which is not appropriate for the tram development. However, it says clearly in paragraph 3.30 that the assessment was carried out at the front of the properties, whereas we are dealing with a tram that would be at the rear of the properties where the existing noise level is low.

Under cross-examination, Mr Mitchell suggested that residents would become acclimatised to the noise. I refer people to paragraph 3.22 of Mr Mitchell's rebuttal statement in which he quotes the WHO expert group:

> "A certain degree of habituation to noise does exist. If the noise load is not in excess, subjective habituation can occur in a few days or weeks."

I argue that the proposed increase of at least 10dB over the existing level is "in excess" and that the residents would not be able to get used to that quickly.

In his evidence, Mr Mitchell referred to other tram developments that had used the same criteria and had encountered no problems. He referred particularly to the Wednesbury to Brierly Hill scheme that is run by the midland metro. I have looked at the environmental impact assessment for that scheme and there is a clear difference between the scheme there and the proposal here. Mr Mitchell took measurements on that scheme at some 47 locations, and the existing environment at all those positions was substantially higher than the environment that we are dealing with here. Moreover, the tram scheme there begins at six o'clock in the morning, whereas we are dealing with trams that will start at 5 o'clock in the morning.

The fact that the criteria that were adopted for that development are the same as for tramline 1 is not surprising, given that Mr Mitchell proposed the criteria there, too. There did not appear to be any acoustic consultant representing the objectors on that scheme, so it is not surprising that there was no great challenge to the use of those criteria on the scheme. Finally, the tramline has not actually been built yet, so its final impact is not known.

Malcolm Thomson: When you reviewed the environmental statement—you have indicated that you did—you considered the noise predictions for the tram. Did they seem to you to be broadly reasonable?

Richard Mackenzie: The method of prediction appeared to be reasonable. However, I am not necessarily in agreement with the actual levels and the method of assessment.

Malcolm Thomson: Is it how the noise is received rather than what the noise was to start with that concerns you?

Richard Mackenzie: I have no disagreement with the predictions on the noise levels. Rather, I

take issue with the interpretation of the predictions and the criteria that were used in interpreting the impact of the predictions.

Malcolm Thomson: Would you look at your rebuttal statement, which is part of a larger document, starting at paragraph 17.12? You recommend that an additional trigger value should be inserted:

"L_{Amax} 23.00 hrs - 07.00 hrs 70dB at one meter from the façade; and

Noise levels must be at least L_{Amax} 5dB above typical prevailing noise levels."

Richard Mackenzie: I should make it clear that that was a suggestion for a trigger level for noise insulation and not for the point at which one should start to consider mitigation measures. There is a fundamental difference between the point at which noise becomes so bad that one should put in double glazing and the point at which it becomes so loud that one should consider barriers or some other form of mitigation.

Malcolm Thomson: You are saying that mitigation measures in the form of protective measures to the house itself should kick in at 75dB.

Richard Mackenzie: No, my statement says 70dB.

Malcolm Thomson: Plus 5dB.

Richard Mackenzie: No. There are two separate clauses. One says that the noise level must be above 70dB; the other says that it must be 5dB above the prevailing high. That is, it must be at least 65dB or below. I put that in because the noise impact of trams running on streets is way less than the impact in the Roseburn corridor. That would prevent everybody on a street claiming that there was a new maximum level, when there probably was not. Cars will already be creating the maximum level.

Malcolm Thomson: You derived that figure, as you explain in paragraph 17.13, by adding the closed window insulation to the World Health Organisation figure of 45dB.

Richard Mackenzie: Yes. As you are aware, unlike new properties that may be built along the tramline and which could meet the 45dB level by using high-performance glazing, the existing properties do not benefit from high-performance glazing; they have standard Edinburgh sash and case windows. Therefore, I used the figure of 25dB and the World Health Organisation criteria of 45dB to derive the point at which insulation would be appropriate.

Malcolm Thomson: In your witness statement you make no reference to the insulation scheme. However, towards the bottom of page 4, in the second-last paragraph, which is the last full paragraph, you address—

Richard Mackenzie: I might be looking at a different printout. How does that paragraph start?

Malcolm Thomson: It starts:

"I would consider it essential".

Richard Mackenzie: I see it.

The Convener: Does this relate to the rebuttal witness statement?

Malcolm Thomson: Oh yes, madam.

The Convener: Oh good.

Richard Mackenzie: I am being asked about my main witness statement.

The Convener: If Mr Thomson relates it to the rebuttal witness statement, then the question is in.

Malcolm Thomson: The paragraph says:

"A revised noise mitigation scheme should be proposed in order that the maximum noise levels as trams pass the residential properties will be below 60dBA."

Richard Mackenzie: Yes—that is what it says.

Malcolm Thomson: How does that square with your evidence at paragraph 17.12 of the rebuttal that the threshold for the insulation scheme should be 70dB?

Richard Mackenzie: It squares exactly. As I have just described, and as you can see from paragraph 17.14, mitigation measures should be considered at 60dB and above. Insulation to the houses, which is the last form of mitigation measure that we would want to consider, as Steve Mitchell has said, should be considered at 70dB and above.

Malcolm Thomson: So you are trying to mitigate noise at source so that it would stay below 60dB.

Richard Mackenzie: In an ideal world, yes.

Malcolm Thomson: In your experience, is there any prospect of that happening in relation to trams?

Richard Mackenzie: It should certainly be possible to get reasonably near 60dB using a good acoustic barrier. Perhaps a level of 65dB or thereabouts could be achieved.

Malcolm Thomson: Do you have experience of that maximum level being imposed on any existing tram scheme in the United Kingdom?

Richard Mackenzie: Not for a tram scheme. However, it is imposed—or the internal version of it is imposed—on all new developments in Edinburgh. That internal level of 45dB is derived from the level of 60dB minus 15dB.

Malcolm Thomson: That relates to building new houses, does it not?

Richard Mackenzie: Yes.

Malcolm Thomson: Insulation can be built into new houses to modern standards, so that it is possible to live with an existing noise source. That is what paragraph 52 of PAN 56 addresses.

Richard Mackenzie: Yes.

Malcolm Thomson: We are looking at the matter the other way round, however. We are trying to build a transport corridor in an existing urban environment.

Richard Mackenzie: I am advocating that all reasonable measures should be put in place to make the maximum level as low as possible—ideally below 60dB but, if not, as near to 60dB as possible. If it cannot be reduced to below 70dB, I suggest that insulation should be provided. I disagree with Mr Mitchell's suggestion that levels up to 80dB outside would be acceptable. I do not feel that that would be at all acceptable, given the existing noise environment.

Malcolm Thomson: Let us take this one step at a time, please. Are you able to give the committee an example of a tram scheme in the United Kingdom in which a maximum noise level of 60dB has been imposed and met?

Richard Mackenzie: I cannot give such an example for properties that are at a similar distance to the tramline that we are discussing—that level probably has not been met. Mitigations will certainly have been suggested for other tram schemes that would achieve a maximum level of below 60dB. However, that would apply to properties that are probably further away from the tramline than in this scheme. I have not looked at any other tram scheme in great detail.

Malcolm Thomson: Is not the problem that if you are trying to build a new tram scheme in an existing urban environment, you are likely to be quite close to existing dwelling houses, whether on the road or in a corridor?

15:45

Richard Mackenzie: That is the case, but you have to consider the overall impact on the existing noise environment. The chances are that most other tram schemes have been running primarily on-street, or in areas where there are existing high maximum levels. In this area, we have no existing high maximum level. A completely new source is being introduced, which is completely out of character with the area. That is why it is important to minimise the impact.

Malcolm Thomson: Have you any first-hand experience of working on, or in respect of, tram schemes in the UK?

Richard Mackenzie: No. I have worked on railways and road assessments.

Malcolm Thomson: In respect of the measurement of noise levels for rail schemes, is it common to use the L_{Aeq} level, rather than the L_{Amax} level?

Richard Mackenzie: I would normally expect L_{Aeq} to be used for measurements during the day, but I would expect a combination of L_{Aeq} and L_{Amax} to be used for measurements during the night. If you want, I will quote you a few paragraphs from the WHO, which recommended that L_{Amax} be used for trains. Because a train takes only 30 seconds to pass, only the noise level during that period could cause sleep disturbance. We should be considering the noise as the train passes as the maximum noise it creates, because that is what causes sleep disturbance.

Malcolm Thomson: Is there a constant relationship between the L_{Aeq} and the L_{Amax} in respect of train or tram noises, say at midnight?

Richard Mackenzie: No. The L_{Aeq} would be based on the number of trams that pass during the time period under consideration. The L_{Amax} is set by each individual tram as it passes. There is no correlation that says that one L_{Aeq} figure is equal to one L_{Amax} figure. They are completely different parameters.

Malcolm Thomson: If you know that eight trams pass an hour, you can then work out the L_{Aeq} for that hour.

Richard Mackenzie: You cannot do so from the L_{Amax}.

Malcolm Thomson: No, but if you know the noise that is generated by the tram and you know that there are eight trams an hour you can work out the L_{Aeq}.

Richard Mackenzie: Absolutely.

Malcolm Thomson: You can also measure the L_{Amax}.

Richard Mackenzie: Yes.

Malcolm Thomson: You will then get a relationship between the two figures.

Richard Mackenzie: You could establish the difference between the two figures for one train. As each train goes past it sets an L_{Amax}. They will all be different, depending on the speed of the train and whether the wheel creaks as it goes past. Every train has its own L_{Amax} and they are always different.

Malcolm Thomson: Can we agree that the L_{Aeq} is biased towards the higher levels of noise? In other words, it is a logarithmic calculation, not an arithmetical one.

Richard Mackenzie: It is a logarithmic average. It is biased towards the highest level of the different measured L_{Aeqs}, but you cannot suggest that they are representative of the highest levels. That is what the L_{Amax} parameter is for.

Malcolm Thomson: Have you read Mr Mitchell's appendix 1 explanation of L_{Aeqs} and of the logarithmic averaging, with the example of children in a class, the age of the children and the age of the teacher?

Richard Mackenzie: He is quite correct about the way that the L_{Aeq} averages tend towards the upper part of an average of the individual levels. However, it does not represent a short-term noise level as the tram passes.

Malcolm Thomson: Are there regulations in Scotland governing the maximum acceptable noise level for a tram or a train?

Richard Mackenzie: No.

Malcolm Thomson: Are you aware of the English regulations made under the Land Compensation Act 1973, which provide threshold compensation values for tram and train noise in England?

Richard Mackenzie: Yes. I am aware that that legislation provides guidance for compensation levels, as a last form of mitigation. It does not suggest the level at which disturbance will occur.

Malcolm Thomson: No. Should the committee pay any attention to those figures in relation to the threshold that you suggest in paragraph 17.12?

Richard Mackenzie: No. I believe that the figures that I have suggested are appropriate specifically for this area, because it has such a low existing noise level.

Malcolm Thomson: When Lord Marnoch was asking questions of Mr Mitchell the other day, Mr Mitchell suggested in one of his answers that you had changed your mind about the appropriate maximum noise level between your first statement and your rebuttal statement. This relates to the difference between 60dB and 70dB that we have just been discussing. Lord Marnoch said:

"I inform you that that is a typographical error and should be read as 60dB."—[*Official Report, Edinburgh Tram (Line One) Bill Committee*, 3 October 2005; c 1168.]

I think that he was referring to the figure of 70dB.

Richard Mackenzie: That is right. He was referring to the 70dB in paragraph 17.14, but there was never a change of mind. It was a typographical error, which we made quite clear at the time. In paragraph 17.14, the L_{Amax} figure that read 70dB should have read 60dB. That is consistent with what I have said in all my other documents. At 60dB, one should be considering mitigation measures. At 70dB, one should be considering noise insulation measures.

Malcolm Thomson: So paragraph 17.14 should be corrected to show 60dB.

Richard Mackenzie: That is what we confirmed the last time we were here.

Malcolm Thomson: And paragraphs 17.12 and 17.13 are as they stand?

Richard Mackenzie: Absolutely.

Malcolm Thomson: Mr Mitchell gave evidence on 3 October to the effect that it would be impracticable to build a tram if the maximum level of 60dB was to be achieved. He said that one would have to put it in a tunnel to achieve that. Are you in a position to disagree with that proposition?

Richard Mackenzie: From memory, Mr Mitchell has been predicting levels in certain areas of the Roseburn corridor around Wester Coates Terrace of not much more than 70dB, without a barrier. If a properly designed barrier, perhaps with an absorbent face towards the tram, was installed, the figure might get quite near 60dB. Mr Mitchell has certainly made no attempt at any point to contact me to discuss the figures or the possible options.

Malcolm Thomson: Have you considered paragraph 3.33 of Mr Mitchell's rebuttal statement? Do you have that to hand? In particular, do you agree with the last sentence of paragraph 3.33?

Richard Mackenzie: Are you asking whether I agree with what he is proposing?

Malcolm Thomson: Mr Mitchell says:

"Mitigating noise levels to be no higher than $L_{Aeq,\ 8\ hr}$ 45 dB would ensure that L_{Amax} noise levels are no higher than 75dB at the closest properties, and lower at more distanced properties."

Do you agree with that statement of fact?

Richard Mackenzie: It is a statement of fact, but I consider that the maximum level that Mr Mitchell is proposing is some 20dB above the World Health Organisation recommendation. By any measure, that is severe.

Malcolm Thomson: Where do you get the 20dB from?

Richard Mackenzie: Steve Mitchell has predicted a level of 75dB. However, that 75dB is a slow-weighted free-field level. The level from the WHO is a fast-weighted façade level. To correct a free-field level to the level at a house, we have to add on 3dB. To correct his slow-weighted level to a fast-weighted level, which should have been used, we have to add on another 2dB. Therefore, Steve Mitchell's 75dB, in the WHO definition and the BS 8223 definition, is 80dB outside the

house—20dB higher than the 60dB that is recommended in the WHO document.

Malcolm Thomson: The 45dB level is the WHO level, is it not?

Richard Mackenzie: No. The WHO promotes a 45dB internal level, which equates to a 60dB external level.

Malcolm Thomson: Do you think that Steve Mitchell is talking about an internal 45dB level?

Richard Mackenzie: Are you referring to the 45dB in the rebuttal statement?

Malcolm Thomson: Yes.

Richard Mackenzie: That is an L_{Aeq}. I have been speaking solely about L_{Amax} figures. I am not particularly interested in the L_{Aeq} during the night-time period, because it is not particularly relevant. The L_{Amax} is what causes sleep disturbance. If you look through my information, you will see that at no point have I been talking about night-time L_{Aeq} figures. It is the L_{Amax} that is important.

Malcolm Thomson: It is important to you, because the L_{Aeq} figure meets the WHO guidelines. It is only your view of the maximum figure that does not.

Richard Mackenzie: I have never raised the issue of the night-time L_{Aeq} figures, because they are not particularly relevant as there is a large period of the night during which there are no trams. Therefore, when the impact of trams that pass during the night is averaged over a whole eight-hour period, it looks as if there is no significant impact, but there is. If you want, I can take you through an example of how the figures are misleading.

I refer to the environmental statement. In table 13.6, Mr Mitchell predicts a change in the $L_{Aeq\ 1\ hour}$ level. In paragraph 3.38 of his rebuttal statement, he says that he has assessed the noise level over a one-hour period to avoid underestimating the impact as raised by me. However, in the table he has assessed the night-time change in level as 20.6dB at Wester Coates Terrace, which is a 20.6dB increase over the existing noise level.

Mr Mitchell's rating of increases of above 10dB is "severe". I would say that an increase of 20dB is very severe. However, the significance of impact column in table 13.6 rates the increase as only "substantial", not "severe". How has that occurred? It has occurred because in the significance of impact column, Mr Mitchell has gone back to the eight-hour figure, which hides the impact, which is shown as only "substantial", not "severe". That is why I am not particularly interested in the night-time L_{Aeq} figures. It is the L_{Amax} figures that are important.

Malcolm Thomson: The tram would be operating for three of the eight night-time hours, would it not?

Richard Mackenzie: That is correct. It will operate during the periods that people are trying to get to sleep and when people are waking up, which are the periods when it is most likely to cause sleep disturbance. That is why we are pushing for mitigation measures to mitigate to a level that will not cause sleep disturbance.

Malcolm Thomson: And we have agreed that, because of the logarithmic calculation, the L_{Aeq} is weighted towards the higher noise levels.

Richard Mackenzie: I agree that an L_{Aeq} is higher than an arithmetic average. However, we should not confuse the matter. It is nowhere near the L_{Amax} parameter.

16:00

Malcolm Thomson: In comparing an L_{Aeq} with table 4.1 of the WHO document or with figures elsewhere in that guidance, we should bear in mind that its L_{Aeq} is based on eight hours. So, to compare like with like, would we not have to use an eight-hour L_{Aeq}?

Richard Mackenzie: That is correct.

Malcolm Thomson: However, you say that because that does not produce an answer that is consistent with the noise and vibration policy, we have to consider the maximum figure instead.

Richard Mackenzie: I am not the one who is saying that. The WHO criteria table refers to all noise sources. However, paragraph 2.1.5 of the 1999 guidelines, on the choice of noise measurements, makes it very clear that for "aircraft and railway noise" L_{Amax} measurements should be considered in addition to the L_{Aeq}.

Malcolm Thomson: Well, does the matter not depend on the number of maxes in an hour?

Richard Mackenzie: The number of maxes has an impact on sleep disturbance.

Malcolm Thomson: But surely the question whether we need to have regard to an L_{Amax} instead an L_{Aeq} is influenced by the number of noise peaks within the period that we are looking at.

Richard Mackenzie: It certainly influences our consideration of the matter. However, an environmental impact assessment that does not mention the L_{Amax} criteria or does not assess the project against them does not fully represent the true impact of the source. The L_{Amax} levels in the environmental impact assessment were only mentioned; there was no discussion or any further comment on their impact. Indeed, that very point

was highlighted in the Casella Stanger peer review.

Malcolm Thomson: Thank you, Mr Mackenzie.

The Convener: Do members have any questions?

Phil Gallie: I need to get my mind around this issue.

You suggest that the figures used to back up the environmental impact assessment are based on PAN 56, which you claim is not relevant. Instead, you believe that the figures should have been based on BS 8223.

Richard Mackenzie: That is correct.

Phil Gallie: Given that the committee can also consider amendments, do you think that an amendment could be formulated and lodged to stipulate that in this respect the figures should conform to BS 8223?

Richard Mackenzie: Yes. There should be more emphasis on targeting mitigation measures at achieving the levels set out in BS 8223 at which sleep disturbance should not occur. A hierarchy of such measures could be implemented from the basic step of moving trams out of the Roseburn corridor to insulating the windows of properties. In any case, the ultimate target should be noise levels that do not disturb the sleep of residents, who at the moment can sleep with their windows open without fear of being disturbed.

Phil Gallie: If we were to lodge such an amendment, would that deal with most of your arguments?

Richard Mackenzie: Yes, I feel that it would.

Phil Gallie: Thank you.

The Convener: In paragraphs 17.16 and 17.17 of your rebuttal statement, you propose particular mitigation measures such as relocating the tram stop and imposing a speed limit. I realise that we have not touched on the latter proposal. Would such measures be preferable as a way of decreasing the overall L_{Amax} level at the property façade that you refer to in paragraph 17.14?

Richard Mackenzie: Relocating the station would certainly improve the situation. Indeed, Steve Mitchell has agreed that a barrier should be erected at its rear.

That said, a speed limit would probably provide more of a benefit. I have suggested a 50mph speed limit, although I think that the current proposal is 70mph. For example, speed could be restricted to 50mph from 5 am to 7 am and likewise at night. All those options could be discussed.

Other options that could be considered include moving the track further away; implementing certain engineering solutions; selecting quieter tram vehicles; and using different types of barriers. For example, certain barriers have faces that absorb rather than reflect noise; after all, the noise might be reflected back at the tram and then bounce back over the barrier. Many mitigation measures should be considered before the glazing option is chosen. Indeed, the ultimate option would be to find an on-street route for the tram, because that will have less impact on properties than this alignment.

The Convener: Would a combination of such mitigation measures have the desired effect of reducing the impact of noise?

Richard Mackenzie: Yes. That is what we are advocating.

The Convener: Excellent.

As committee members have no further questions, I ask Richard Mackenzie to make his closing statement.

At this point, I should put on record the fact that Lord Marnoch has now joined us. We made attempts to contact him earlier, but he was still in court and unavailable, so I gave Mr Mackenzie time to prepare opening and closing statements. We will now hear that closing statement. When Mr Mackenzie has finished, the meeting will be over.

Richard Mackenzie: I reiterate the points that I have already made. We have selected the criteria that we have been discussing on the basis of the very low ambient noise levels that the properties in question already benefit from. Residents can sleep with their windows open and enjoy those very low noise levels. However, without appropriate mitigation measures, the tram noise levels will have a severe impact. As a result, if the tram runs along the proposed route, it is imperative that appropriate mitigation—and, if necessary, insulation—measures are written into the noise and vibration policy.

The Convener: Thank you very much.

That concludes this item on our agenda. We now move to item 2, which is our discussion in private of the oral evidence that we have heard today. As members will recall, we agreed to meet in private at the end of each oral evidence-taking meeting to enable us to consider the evidence that we heard. The discussions will assist us greatly in drafting our report at the end of phase 1 of the consideration stage. I thank the witnesses, the objectors and the promoter for their evidence and invite them to leave the room as quickly as possible.

16:08

Meeting continued in private until 16:30.

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