

IN THE MATTER

of the Resource Management Act
1991

AND

Notices of Requirement by
AUCKLAND TRANSPORT
pursuant to section 168 of the Act
to the Auckland Council relating
to the proposed City Rail Link in
Auckland

**EVIDENCE OF ROGER RANDLE ON BEHALF OF MEDIAWORKS NZ
LIMITED AND TVWORKS LIMITED**

Dated: 23 July 2013

Introduction

1. My full name is **Roger Neil Randle** and I am the Director of Technology at MediaWorks NZ Limited (in receivership).
2. I have worked for more than 20 years in the broadcast and I.T. industries and joined MediaWorks in 2001. I am responsible for overseeing all the technology requirements of the organisation across radio, television and interactive divisions. I have the qualification of HND (Hons) in Electrical and Electronic engineering from the University of Kingston, London.
3. I am authorised to give this evidence on behalf of MediaWorks NZ Limited and TVWorks Limited (collectively referred to as “MediaWorks”) in relation to the City Rail Link Project (“the Project”).
4. In this statement I will discuss the technological aspects of the activities at MediaWorks’ Flower Street site (“**the Site**”) and the implications for those operations of the Auckland Transport proposal to construct and operate the City Rail Link tunnel beneath the Site.

The Flower Street Site

5. The MediaWorks Flower Street TV Broadcasting facility is a multi-level building built into a hill. Peter Crossan (the Group CFO) has discussed the overall layout of the Site and the facilities within it. My evidence focuses on the technological requirements for operations within the facility and the equipment that is located on the various levels of the main MediaWorks building.

Equipment and Operations on Level 1

6. Level 1 is in the basement of the facility but, because of the topography around the Site, has vehicle access directly off Korari Street.
7. Level 1 holds three television studios being:

- a. The main studio which can be used for a variety of programmes but is most regularly used for the TV3 news programmes throughout the day.
 - b. Studio 2 is a local production and sport studio and is used to film live shows and pre-recorded segments for our Saturday and Sunday motor sport shows and other major sporting events. It is also used by local production units as an on air studio.
 - c. Studio 3 is used as a local production studio for pre-recorded shows that are edited in house overnight for on air the following night.
8. The most important of the studios, in terms of operational use and the required quality of environment and performance is the main studio. Level 1 is a double height area incorporating the main studio which provides the necessary stud height to accommodate the lighting grid requirements for the main studio. The main studio itself is large enough in area (just) to accommodate the required news sets which are moveable to enable flexible use of the studio.
9. This studio environment was located, designed and constructed with reference to industry published acoustic characteristics recommended for live event recording activities (ie: ideally no more than 25 DBA LAeq background levels of noise). The location of the studios in the basement of the building, which itself is dug into the hillside, isolates them from any potential impact from vehicle traffic and other outside noise sources and has proven to be an effective approach. While measures were taken to minimise or avoid altogether noise from exterior sources, no steps were considered necessary to isolate the studio from vibration or regenerated noise from below. The studios therefore simply “sit” on concrete floors. That is one reason why the Auckland Transport proposal to tunnel and operate trains beneath the building is problematic.

10. Level 1 also houses a production control room containing a sound suite and production area that again was designed to observe the published acoustic recommendations for television production. The production control room receives server based clips, studio feeds and external contribution feeds, compiles them into a single programme stream, overlays graphical elements and delivers this to presentation on Level 4 for insertion into pre-scheduled programming events, including commercial breaks. Due to the fluid nature of the news bulletins, these interstitial events change in both timing and duration therefore communications between the news production area (on Level 1) and presentation (on Level 4) is key.
11. Level 1 of the facility also houses the following technologies required for studio production.

Studio

- Broadcast studio cameras
- Moveable camera pedestals
- Floor Microphones for talent and guests.
- Lighting grid fixed to the studio roof with engineered fixtures and fastenings.
- Studio lights
- On set electronics including Barco Projectors for set background, 103" Panasonic plasma screen, studio floor video and audio monitoring.

Production control room

- Production vision switcher
- Production automation system
- Video display wall processors
- Communication equipment
- Audio control room consisting of acoustically treated floor ceiling and walls, audio mixing console and A/V monitoring.

12. All of the above have components with varying degrees of vibration sensitivity. A practical example of this technology is the studio cameras

which contain sensing elements comprised of an array of sub mm light sensors. The SD (standard definition) cameras contain 1088 pixels horizontally and 594 vertically in a device approximately 18mm diagonally across. This means that there are approx. 650,000 in the array and 36,000 per mm. My understanding is that vibration levels in the studio during and after construction could be at levels that will have a noticeable effect on the image definition.

13. Consumer demand for Higher Definition content has driven the need for the business to migrate to HD studio cameras which have a far greater level of movement sensitivity by virtue of the higher density of the image sensors. The next Generation of super high definition technologies (4K) are available in the market now and will eventually become the market norm. In essence, low levels of studio vibration are increasingly relevant to the business.
14. The nature of production studios require a high level of acoustic isolation and, as demonstrated by the existing facility's infrastructure, a great deal of effort has been undertaken to minimise sound and vibration inundation into sensitive areas, not only in order comply with the published requirements but, importantly, to create an operational environment that satisfies one of the business' core competencies, the making of studio based television.

Equipment and Operations on Level 2

15. Level 2 of the facility is dedicated to News. It is a partial floor (ie: site above the Nikau Street façade of Level 1 but alongside the double height area occupied by the Level 1 studios) and has direct views into the main studio. This proximity to the studio was chosen due to the immediacy that is inherent in live news production environments.
16. There are several critical communication linkages required for studio productions, with news production being more critical than most. The journalists, producers, directors, technology support staff and studio crew are all required to be in the immediate vicinity of the studio to cater for the time critical nature of the production.

17. Level 2 of the facility houses the following technologies required for studio / news production.
 - a. Editing suits, which have acoustically treated walls and contain PC's running the news room computer system, routing panels, communications equipment, microphones and visual displays.
 - b. GAR (Graphics Apparatus Room) containing IT network switches with fibre optic links, graphics production equipment and editing workstations / PC's. The GAR is a temperature and humidity controlled server room with IT type racks that physically house the equipment required to be in direct proximity to the newsroom operational areas. i.e. editing. Media exchange (MX), editing etc.
 - c. The 'Media exchange' (MX) which is a control room providing the functional transfer of camera footage from the cameras to the news editing system, and recording of live incoming news contribution content relayed from the MCR on Level 4. MX is also responsible for content feeds between the news bureaus in Wellington and Christchurch. MX houses a mixture of Standard IT and proprietary broadcasting technologies most of which is based on IT server architecture. MX also contains AV displays for monitoring purposes.

Equipment and Operations on Level 4

18. The next technology rich area of the building is on Level 4 – Level 3 is largely occupied by our sales and integration teams – a reasonably typical office type environment.
19. Level 4 houses the majority of the broadcast operations staff and the technology central apparatus room (CAR).
20. The CAR is a temperature and humidity controlled environment that holds the bulk of the facility's technology including:

- a. A robotic archive, housing the program inventory; and
- b. 49 IT type server racks containing a mixture of proprietary broadcast technologies and standard IT industry equipment.

The technologies in this area have components with varying degrees of vibration sensitivity some of which are detailed in the manufacturer's specifications and listed in Appendix 1.

21. Part of the Level 4 infrastructure is the presentation area whose primary function is to monitor and switch the outgoing "On Air" programme content; consisting of a blend of automated server originated programme material and manually switched live event feeds from the News Studios and 'Production Control Room' on level one of the facility and incoming live event feeds.
22. Level 4 also houses the MCR (Master Control Room) which receives and quality controls all incoming feeds used by the level 1 PCR (News Production Control Room) and presentation as contribution material for News, Sports and special event programming. These feeds are received by Satellite dishes, hill top microwave linking and in ground fibre optic cable.
23. Level 4 also houses the broadcast media exchange stations whose primary function is the digitisation of programme content into the operating format of the facility.
24. Level 4 also houses the FOUR Live Studio which is used to produce youth programming live to air between 4 – 6pm Monday to Friday, There is a Presentation Suite linked to this Studio and the Studio is also used for pre-recorded interviews and other segments. An Audio Suite which is used every day and has been acoustically fitted to mitigate any external interference.

Sensitivity of On-site Equipment to Vibration

25. Much of the equipment that I have discussed is only guaranteed by the manufacturers to operate satisfactorily provided it is not subject to vibration levels in excess of specified limits.
26. There are in the order of thousands of electronic devices and items of equipment in the MediaWorks building that are potentially susceptible to operational failure or damage in circumstances where vibration levels exceed the recommended levels. The equipment is of varied ages and we do not attempt to maintain a register of all items.
27. Appendix 1 contains details of the performance parameters recommended in respect of a number of key items of equipment. MediaWorks' consultants will comment on the prospect of the Auckland Transport proposal adversely affecting the operation of that equipment.
28. In the event that equipment fails entirely (or operates below the required level) we have limited ability to "back up" from a technical perspective. Business continuity due to technology failure is a real risk and many measures are put in place to mitigate these as much as possible. Listed below are some of these measures.
 - a. Redundant power supplies in key technology.
 - b. UPS uninterruptable power supplies.
 - c. Backup generator.
 - d. Duplication of system elements for the newsroom automation system, broadcast automation system, transmission servers, transmission encoding (head end) , station router, ACR audio mixer, news and production editing core technologies and communications matrix.
 - e. The newsroom computer system has mirrored servers.

- f. Sales and traffic systems are mirrored.
 - g. Many of the critical computer based systems have dual hard drives and power supplies.
29. This only lists some elements of redundancy levels that are considered when designing our broadcast systems. Although many failure scenarios have been addressed, failure due to vibration levels beyond the acceptable levels as outlined in the manufacturer's specification was not considered and would, in any event, be difficult to address due to the availability of such technologies suited for broadcast and practicality of implementing.

Current and Past Experience of Vibration and Noise

30. To the best of my knowledge the current acoustic properties of the studios are fit for purpose. I have not been made aware of any issues with vibration in the studios during broadcast periods and had there been any unacceptable levels it would, very quickly, have been brought to my attention.
31. If monitoring has detected vibration levels beyond that considered best practice, my conclusion would be they are likely to have been related to the mechanical movement of sets and doors etc. I consider that significant vibration would be a cause of considerable concern during broadcast operation. We would require our own monitoring before accepting vibration was present to any extent during our current broadcast operations.
32. To the best of my knowledge there has never been any previous issue with vibration or regenerated noise caused by works in the vicinity of our building. Where such works have been carried out it is my recollection that such work was done to a managed timeframe around the studio on air times. However, we are now busier in the studios than at the time previously and certainly at the time of the trenching in Nikau Street for the installation of a new pipe as referred to in the Watercare evidence.

Need for Relocation of the Studios

33. For the reasons set out in the evidence of John Heilig, Mark Simpson and Nevil Hegley, I consider that the continued operation of the studio and related activities on the Site will not be compatible with the tunnel construction of the eventual operation of the City Rail Loop. The Auckland Transport evidence has mentioned the possibility of relocating sensitive activities at least for the duration of the relevant construction activities. Leaving aside the prospect of incompatibility between the studios and the actual operation of the City Rail Loop, I need to emphasise that even temporary relocation of the MediaWorks activities would be a very complex exercise.

34. First, the duration of the construction effects is too long to manage on a makeshift basis:
 - a. I understand that the most disruptive phase of the construction around the Site is likely to take at least 20 weeks and possibly much longer. That is not a time period that can feasibly be addressed on a makeshift basis, due to the levels of technology redundancy required to mitigate risk in a satisfactory manner. This would require a major replication of the technology housed at the Flower street facility.

 - b. Whilst outside broadcasts can be undertaken with the use of an OB vehicle housing production equipment and crew, they tend not to have the required levels of redundancy for long periods and form only a small part of the systems required for a broadcast facility. Thus a breakdown in an off-site broadcast is covered in the studio but in the absence of that capability the quality and continuity of service is at risk.

35. Secondly, it is not feasible to simply shift the studio itself and leave the balance of the functions at Flower Street:

- a. The relocation of the studio only does not address the risk to the remaining technology at the Flower St facility due the vibration levels expected during the construction phase outlined in John Heilig report. The only way to mitigate this would be to replicate the infrastructure elsewhere and be commissioned before CRL construction is undertaken.
 - b. Broadcasting facilities, by virtue of the continuous nature of the services they provide, need a very high level of technology availability.
 - c. MediaWorks' experience is that co-location of its technological functions at the site has been beneficial. The close grouping of technology in a broadcast facility reduces the risks associated with remote linking failure, and best caters for expedient fault resolution and efficient serviceability. MediaWorks is a communications business and there is a heavy reliance on technology for day to day functions. MediaWorks engineering staff are multi skilled; they provide hands on operational functions when required in addition to supporting operational systems and core technologies. The collaboration of a number engineers when resolving problems has proven in the past to be invaluable considering the time critical nature of our business.
 - d. In essence, the requirement to avoid business jeopardy situations pertaining to 'Off Air' incidences and risk to quality of service by not replicating the Flower street facility in its entirety, render partial relocation as a scenario entirely impractical.
36. Thirdly, the scale and interoperability of the technologies and operational staff who maintain the workflows and systems for content aggregation, dissemination and creation are best served by a centralised facility. The argument for centralisation is greater in broadcasters where news is a daily requirement, in part due the increased pressure on communications, the desirability of journalists being located alongside the studios and the time critical reliance on

technology. It is not feasible or reasonable for Auckland Transport to effectively require MediaWorks to run its technical operations from disparate locations for a period of many weeks or months.

37. Fourthly, if the broadcasting facilities are to be relocated then maintaining the standard, quality and quantity of service, whilst guaranteeing continuity, would require virtually complete replication of the facility's infrastructure in the new facility prior to the shift. It is not feasible to simply relocate infrastructure either at once or over an extended period due to the risk, time and massive logistical undertaking required to relocating infrastructure in its entirety.
38. The process of selecting a suitable location / site for a broadcasting facility has many considerations some of which are.
 - a. The location needs to have good transport communications for news crews and staff.
 - b. Site elevation is important for line of sight connectivity to transmitters; communications towers and unobstructed aperture for satellite receiver dishes (some of these are very large).
 - c. Fibre optic cable trunks need to be close by for cost effective contribution and distribution of content and business networks.
 - d. The surrounding business activities and proximity to heavy vehicle and rail networks are a major consideration to the studios. In that regard, while MediaWorks has been able to manage with the 150 - 200 metre gap between its premises and the North Auckland Line, it has turned down locations in Christchurch for the relocation of our Radio studios and News bureau due to rail proximity. Those locations were further away than the planned City Rail Loop but closer than the existing North Auckland Line.

- e. Finding existing structures that meet the criteria for broadcast facilities has proven challenging and therefore purpose built buildings are preferred. With this comes the planning, design and consenting processes which take time due to the complexity and specialised nature of the business.
 - f. The technical design and fit out of a broadcast facility is a major logistical project requiring many months of planning.
 - g. As noted above, the relocation and de-commissioning / re-commissioning of existing technologies into a new facility is impractical due to the level of systems availability required for business continuity. Therefore a replication of the facility is required (even if the move is to be “temporary”). A piece by piece relocation of the technology infrastructure is not feasible due to business risks and logistics.
39. We consider that a three year time frame for the re-establishment of the MediaWorks Flower Street facility on another site is a fair assumption given the scale and logistical undertaking involved. A replication of the technology infrastructure is required due to the ‘real time’ nature of the media business and the need to appropriately manage the associated business risks. Any such replication would need to incorporate appropriate levels of fault resilience in the infrastructure given its scale and the reliance the business has upon it.

Roger Randle

24 July 2013

Appendix 1

Published Vibration limits of core technologies by device type.

Hard disc drives (Seagate manufacturer)

These primarily hold all out day to day working files, video, graphics and office documents and exist in many of the facilities 'On Air' technologies

Operating vibration

The maximum vibration levels that the drive may experience while meeting the performance standards specified in this document are specified below.

2Hz to 22Hz	0.25 Gs (Limited displacement)
22Hz to 350Hz	0.50 Gs
350Hz to 500Hz	0.25 Gs

All vibration specifications assume that the drive is mounted securely with the input vibration applied at the drive mounting screws. Vibration may be applied in the X, Y or Z axis. Throughput may vary if improperly mounted.

Silkworm Fibre Switches

The Fiber switches form the fabric for the Operations 'content management system' this system manages the movement and archive of the video assets for TV. If this system fails a significant jeopardy situation could arise.

Operating: 0.5 g sine, 0.4 g rms random, 5 to 500 Hz

Oracle and other HBAs

Host Bus Adapters installed in servers to provide connectivity to Fiber switches or other external devices.

Operating: 0.20G in all axes, 5-500 Hz sine

Servers

There are a number of servers carrying out various tasks. Some are extremely critical. Those that are critical include:

- Avid Interplay – All programming and News video edited and compiled in Avid
- Masstech – All MediaWorks Video Assets are managed by this system
- Grass Valley K2 – Video play out servers and storage for 3, Four, 3+1 and C4
- Harris ADC-100 servers – Presentation Automation control servers for all TV Brands
- Telestream Agility – Transcoding farm for 99% of Videos on all the MediaWorks websites (TV and Radio), also used for the delivery of syndicated news clips from AP and Reuters.

HP

Operating Random (5-500Hz) Approx. 0.21 G rms
Sinusoidal Sweep Survival (5-500Hz) 0.5 G (0 peak)

Random survival (5-500Hz) Approx. 2.09 G rms

Intel Servers

Vibration, unpackaged 5 Hz to 500 Hz, 2.20 g RMS random

K2 Shared Storage

Operating maximum vibration: 0.25G