

Melbourne Metro Rail EES
Inquiry and Advisory Committee hearing

The University of Melbourne

Professor Jim McCluskey
Witness Statement

12 August 2016

Background and expertise

1. **Name and professional address**

James McCluskey FAA FAHMS
Chancellery (Research)
The University of Melbourne
Parkville, Victoria 3050

2. **Qualifications and experience**

James McCluskey has held senior research positions at the University of Melbourne for just under 20 years. These include Head and Deputy Head of the Department of Microbiology and Immunology (1997-2009); Associate Dean of Research in the Faculty of Medicine, Dentistry and Health Sciences (2006-09); Pro Vice-Chancellor (Research Partnerships) (2009-2011) and Deputy Vice-Chancellor (Research) (2011-present).

He has published more than 300 scientific articles and is trained as a physician (MBBS, FRACP), pathologist (FRCPA) and researcher (BMed Sci, MD). In 2010 he was elected to the Faculty of Science of the Royal College of Pathologists Australasia. He is also a Fellow of the Australian Academy of Science; Fellow of the Australian Academy of Health and Medical Sciences; Fellow of the Royal Australian College of Physicians; and Fellow of Royal College of Pathologists of Australasia.

He has served as a director of the Walter & Eliza Hall Medical Research Institute; Bionics Institute; Burnet Institute; Florey Institute of Neuroscience and Mental Health; Victorian Comprehensive Cancer Centre; the Cooperative Research Centre for Vaccine Technology; and the Cooperative Research Centre for Inflammatory Diseases.

3. **Scope of statement**

This statement addresses the significance of the research undertaken at the University, highlighting the critical enabling role of specialised equipment and

facilities, and the potential implications of disruption from the Melbourne Metro Rail Project.

4. Significant contributors to statement

This report has been prepared with the assistance of Sach Jayasinghe, a senior advisor of the University with domain expertise in research infrastructure. In addition there was input from University senior executives and key academic staff from the faculties most likely to be affected by the Project.

The importance of research to the University

1. The University of Melbourne has a tradition of research excellence and impact on society. Its esteemed academics include Nobel Laureate Professor Peter Doherty and pioneers such as Professor Graeme Clark, the innovator of the Cochlear Implant. The University's global reputation as a research intensive institution attracts the brightest researchers and students.
2. The University's near \$1 billion annual expenditure on research is testimony to the scale of its research programs, attracting close to 15% of the available nationally competitive Category 1 funding. Its consistent performance in attracting funding drives cutting-edge research where the measurable outputs directly contribute to the University's international rankings, which in turn attract talented overseas students from across the globe.
3. International students are vital to the research enterprise and comprise 35% of all PhD students. Current national policy settings are not configured to fund the full costs of research, and much of the higher education sector addresses the 'gap' through income derived from international students. Therefore, there exists a finely balanced cycle of cost recovery for research through international fee income. Any disrupting force that breaks this cycle will have grave impact on the University, partners and the State.¹
4. The University's research partners, including Parkville-based independent Medical Research Institutes and hospital networks, are an integral part of the University's research mission. The formalisation of these partnerships takes many forms, including embedding the University's clinical departments within the hospitals and the Parkville Medical Research Institutes having formal University of Melbourne department status.
5. This facilitates graduate students being hosted by our neighbouring partners, and granting of honorary status to Institute researchers (often with joint academic appointments), thus creating a physical precinct with common goals of health, education and research involving close to 10,000 researchers and clinicians in the immediate vicinity of the proposed Metro Rail link. Ultimately the research output from the partners contributes to the overall research

¹ For example, consider the indirect service industries supporting the international student market.

reputation and global competitiveness of the University, reflected in its international rankings.

Potential impacts on recruitment

6. The employer-employee relationship in the research-intensive higher-education sector has some peculiarities. Unlike the corporate world, many researchers who are employed in the University attract their salaries independently through winning nationally competitive fellowships via various schemes. These fellowships are only funded for 3-5 years before researchers must compete again for their salary renewal based on research performance. The same principle applies to research grant funding which is generally 3-5 years in duration and renewal is a fierce competitive process (success rates of 15-20%). It is therefore imperative that researchers are consistently productive (i.e. publish or perish). This means that any risk of disruption, even for a matter of months, could be considered career threatening.
7. Researchers look for the right environment in which they can thrive and have access to cutting-edge research infrastructure and facilities, the brightest students and collaborations with hospitals, Medical Research Institutes and industry. This is the ecosystem of the Melbourne Biomedical Precinct. Any disruption to this world-renowned ecosystem may lead to researchers exiting the State and diminish the University's ability to recruit the next cohort of talent.

Specialist equipment & research activities at Parkville campus

8. Contemporary research, especially in life sciences, medicine and engineering, is underpinned by a myriad of enabling technologies and specialised facilities, including those facilities that accommodate research use of bio-resources.
9. A large proportion of the University's research infrastructure is organised into discreet Platform Technologies, managed professionally by dedicated specialist staff. These Platform Technologies not only enable academic scholarship, but are critical to the University's industry partners who use them on a regular basis.
10. The Helium Ion Microscope is a specialised instrument housed in the Centre for Neural Engineering at the Parkville campus. The Microscope is able to examine samples at the nano-scale and is critical to meeting the objectives of the Centre. Akin to other scanning microscopes, it is particularly sensitive to

vibrations as evidenced by the Microscope's response to trams on Swanston Street. At present, the Helium Ion Microscope is isolated from vibrations through a sophisticated active cancellation mechanism and fit-for-purpose foundation. There are no solutions to the direct current electromagnetic interference from the trams. However, the frequency of the interference is currently just manageable but the issue will be compounded several fold if frequent trains are also contributing to the level of interference.

11. Any impact on this enabling technology puts at risk a multi-million dollar research program. Given the highly collaborative nature of the Centre, this impact would be felt not only by the University but also by its partners such as the Florey Institute of Neuroscience and Mental Health and Cochlear Ltd.
12. The Helium Ion Microscope is only one example of the highly specialised research equipment assets in place at the Parkville campus. The University has more than \$100 million dollars of such assets, many of them utilising laser and/or electrical field-based technologies to obtain precise measurements. Alignment of lasers and optics and maintenance of stable electrical fields in such systems are crucial for their accuracy and optimal performance. The importance of isolating this equipment from vibrations and electromagnetic interference cannot be overstated.
13. Part of the University's core mandate is to acquire the latest equipment. Through competitive schemes and internal strategic investments, the University procures new equipment on an annual basis. In fields such as genomics and proteomics, the turn-over of technology can be as short as 3 - 4 years.
14. This means that any strategies to mitigate the potential adverse effects of Metro Rail (during both construction and operation) must not only consider the sensitivities of equipment currently in place at the campus but also assets not yet acquired. It is possible that future assets (particularly those with ability to image and characterise at the atomic level) will be even more sensitive to vibrations and electromagnetic interference than existing equipment.
15. The proposed new National Centre for Proton Beam Therapy in Parkville will house highly sensitive equipment which could easily be compromised by

excessive vibration from the operation of Metro Rail.² It would be a dire outcome for the Precinct if mitigation strategies did not involve consideration of future placement of equipment and assets for facilities such as this.

16. Bio-resource based research is a critical component of the research activities undertaken in the Melbourne Biomedical Precinct. The University alone has an annual operational expenditure of approximately \$10 million to maintain this enabling research infrastructure.
17. Two of the most significant bio-resource research facilities in the Parkville Precinct, both in terms of scale and impact on end-user researchers, are housed at the Parkville campus in close proximity to the Metro Rail construction site.
18. The University has certain statutory obligations and licensing requirements it must meet in relation to the management of bio-resources used the conduct of research. Any disruption from noise and vibration could potentially jeopardise hundreds of millions of dollars' worth of research programs within the University. Given the highly collaborative nature of this type of research, these impacts would also be felt by partners of the University.

Difficulties associated with mitigation

19. Disruption from the construction or operation of the Metro Rail Project is a particular risk for STEM (science, technology, engineering and mathematics) and medicine disciplines, which involve complex research activities and utilize specialised equipment and facilities which are not easily duplicated or relocated.
20. Often research is conducted within laboratory spaces that are certified Physical Containment Level 2 or higher, where purpose-built infrastructure is required to comply with the requirements of the Office of the Gene Technology Regulator. Accordingly, there is both considerable time and cost associated with establishing the requisite laboratory space at alternate locations. Securing suitable alternate locations is particularly difficult in the constrained environment of the Parkville campus.

² The Victorian government announced in 2015 it would invest \$2 million in planning and developing the National Centre for Proton Beam Therapy to treat difficult cancer, as part of the Victorian Comprehensive Cancer Centre.

21. The Helium Ion Microscope not only involved an initial procurement investment of approximately \$2 million, but cost more than \$500,000 in building works to design and construct a suitable space. The University is now in the process of acquiring a Cryo-Electron Microscope which, in addition to the substantial procurement costs, will require a \$2 million refurbishment to accommodate the instrument. In some cases, the sheer cost of designing spaces to house highly specialised equipment means relocation of that equipment is not feasible.
22. Accordingly, if mitigation measures are needed to ensure noise, vibration or electromagnetic interference from the Metro Rail Project do not threaten the University's assets and operations, these measures should focus primarily on the source rather than rely on relocation of sensitive receivers. This is especially so, given the extensive distribution and future placement of equipment within the campus and the broader Melbourne Biomedical Precinct.
23. Relocating bio-resources can also be fraught with difficulty and the process must generally be undertaken over a significant period of time and at substantial cost.
24. The recent relocation of a medical research organisation to a new building involved relocating bio-resources – this was an 18 month project with direct costs of \$1 million. Similarly there was an approximate cost of \$250,000 to re-derive bio-resources for a single University department in the course of relocating to another site. The University's relocation of research facilities to facilitate the redevelopment of the campus is likely to be of similar or greater magnitude to that of the medical research organisation.
25. Given the acute space shortage and unsuitability of many other facilities, available options for decanting specialised functions elsewhere within the campus are very limited. Where there is scope to relocate research activity, the University will plan and action proactively. However, relocation will always come at a cost to the efficiency and effectiveness of the research. It is difficult to quantify the impact of disruption and often the true impact will only become apparent after several years.
26. In order to ensure that adverse impacts on research activities are avoided, the University must be given detailed information about, and opportunities for input into, design and mitigation measures and the Project must be subject to clear requirements that noise, vibration and EMI from construction and operation do not exceed agreed limits.

27. If relocation is the only feasible option, it is essential that:
 - a. sufficient time is allowed for the necessary preparations to be made; and
 - b. opportunities for co-ordination with the University's program of redevelopment are exploited so that any disruption is minimised.

Conclusion

28. Research is a fundamental component of the work undertaken at the University. The national and international standing of the University is due, in large part, to the long-standing success and prominence of its research work.
29. The research activities undertaken at the Parkville campus are highly sensitive to disruption. The losses (both financial and otherwise) which may result from disruption associated with the Metro Rail Project are difficult to quantify but should not be underestimated.
30. Where possible, mitigation measures should address noise, vibration and electromagnetic interference at their source. This will ensure protections are in place not only for existing equipment but equipment the University may acquire in future.
31. The nature of most research activities is such that temporary relocation is unlikely to be a viable mitigation strategy. Where permanent relocation of facilities and equipment is necessary, careful and detailed planning and meaningful cooperation with the University will be key to minimising cost and risk to the integrity of research projects.

Professor Jim McCluskey