

**Before a Board of Inquiry
Northern Corridor Improvements Project**

Under the Resource Management Act 1991 ('the Act')

In the matter of a Board of Inquiry appointed under section 149J of the Act to consider notices of requirement for designations and resource consent applications by the New Zealand Transport Agency for the Northern Corridor Improvements Project

Statement of evidence of Michael William Bain for the New Zealand Transport Agency (3D modelling)

Dated 20 April 2017

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STATEMENT OF EVIDENCE OF MICHAEL WILLIAM BAIN FOR THE NEW ZEALAND TRANSPORT AGENCY

1 Qualifications and experience

- 1.1 My full name is Michael William Bain. I am a Principal and the CAD Manager at Boffa Miskell Ltd (**'BML'**), a national firm of consulting planners, ecologists and landscape architects. I have been in this position since 2001.
- 1.2 I hold a NZ Certificate in Engineering from the Auckland Institute of Technology.
- 1.3 Prior to joining BML, I worked for more than 12 years in Computer Aided Design (**'CAD'**) for engine engineering companies, as a CAD consultant and trainer, and tutoring CAD part-time in the Spatial Design Degree programme at the School of Art and Design in the University of Auckland. As a consultant, I trained CAD staff, customised CAD systems and advised on CAD efficiencies for numerous companies throughout New Zealand.
- 1.4 My experience includes working with a wide array of software packages to produce working drawings, maps, visual simulations (static and animated) and 3D interactive models – 'Graphics with Intelligence'. I have worked on a variety of projects including:
- a Central Interceptor: Mapping and visual simulations for hearing and consent (2012);
 - b Drury Proposed Industrial Farm Park: visual simulations and interactive 3D model for design review, public consultation and consent (2010); and
 - c Harbour Crossing: visual simulations for design review (2009).
- 1.5 My evidence relates to notices of requirement and resource consent applications lodged by the New Zealand Transport Agency (**'Transport Agency'**) with the Environmental Protection Authority on 14 December 2016 for the Northern Corridor Improvements Project (**'Project'**).

2 Involvement with the Project

- 2.1 I have been involved with the Project since 2016. My involvement has been to support BML, and then **Mr Bray**, in the preparation of digital models for the Project. This has involved liaising with the Project Team to obtain CAD data for the Project, and the development of a 3D digital model of a short section of State Highway 18 in the vicinity of Paul Matthews Road bridge (including immediate neighbouring properties).
- 2.2 I have also assisted BML and Mr Goodwin in the taking of photographs of the Project area.

3 Code of conduct

- 3.1 I have read and am familiar with the Code of Conduct for Expert Witnesses in the current Environment Court Practice Note (2014), have complied with it, and will follow the Code when presenting this evidence. I also confirm that the matters addressed in this Statement of Evidence are within my area of expertise, except where relying on the opinion or evidence of other witnesses. I have not omitted to consider material facts known to me that might alter or detract from the opinions expressed.

4 Scope of evidence

- 4.1 This evidence addresses the 3D CAD modelling undertaken to support **Mr Bray's** assessment of visual and landscape effects.

5 3D CAD Modelling

- 5.1 The following information was supplied to me by Aurecon in 3D CAD format:
- a Ground terrain information;
 - b The existing State Highway 18 and local road information; and
 - c The Project engineering information.

- 5.2 I obtained LiDAR information from Auckland Council showing the as-built heights of all built forms, and the height of trees. This information is published as accurate to +/- 0.5m vertically, although in my experience it provides greater accuracy than this.
- 5.3 I then used the Bentley Microstation software package to combine the three data packages and produce a 3D PDF. During this process, various items such as the ground terrain, Project structures, and trees were rendered with varying colours to help demarcate different surfaces (for example, houses are coloured orange, the Project engineering is coloured white, and the existing ground planes coloured green). The model has not been rendered to a photographic quality, but simply to outline the bulk forms.
- 5.4 The 3D PDF has the ability to provide cross-sections through the model on demand by any user who opens it. This ability is a standard facility that is provided by the Adobe Acrobat software for 3D PDFs.
- 5.5 The 3D PDF was provided to **Mr Bray** in digital form. The model is technically accurate, and produced to a correct scale. However, any outputs, cross-sections and/or screen shots are not produced to a fixed scale. Therefore, the model can only be used to show the relative heights and separation distances between objects, rather than accurate measurements of distance.
- 5.6 I understand that **Mr Bray** has used the model to produce cross-sections to assist with the evaluation of effects of the Project works associated with the area immediately around Paul Matthews overbridge from the Unsworth Heights residential area. In my view, the model is fit for this purpose as it provides an accurate representation of the relativity of the Project to the neighbouring locations and heights of residential properties directly adjacent.

6 Conclusions

- 6.1 I consider that best visualisation practices were used, and the series of processes and steps taken has ensured that the model is consistent with best practice and is accurate.



Michael William Bain

20 April 2017