

**BEFORE THE PORIRUA CITY COUNCIL  
AND GREATER WELLINGTON REGIONAL COUNCIL**

<b>IN THE MATTER</b>	of the Resource Management Act 1991
<b>AND</b>	applications for resource consent under Part 6
<b>BETWEEN</b>	WELLINGTON REGIONAL COUNCIL <b>Local Authority</b>
<b>AND</b>	PORIRUA CITY COUNCIL <b>Local Authority</b>
<b>AND</b>	JAGGER NZ LIMITED <b>Applicant</b>

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**STATEMENT OF EVIDENCE OF RAYMOND BRIAN O'CALLAGHAN  
ON BEHALF OF THE APPLICANT**

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## INTRODUCTION AND BACKGROUND

1. My name is Ray O'Callaghan.
2. Up until late February 2016, I was a Senior Principal Engineer at Cardno NZ Limited, a consultancy practice of approximately 90 staff in New Zealand that provides civil, wastewater and water supply treatment, hydraulic and coastal engineering services and land surveying and resource management services to private and local authority clients. I have lived and worked in Wellington for 40 years, of which I was a Director of Cardno (and formally Truebridge Callender Beach Limited) for the last 25 years and the NZ manager of the company for 15 years up until 2014. I am now working as a sole practitioner providing civil engineering services to a range of clients and maintain a close working relationship with Cardno.
3. I have been in practice as a Registered Engineer and Chartered Professional Engineer (CPEng) for 33 years. I hold a Bachelor of Engineering (Civil) degree and a post-graduate Diploma of Hydraulics and Coastal Engineering (Hons) from Delft, The Netherlands.
4. I am a Fellow of the Institute of Professional Engineers NZ. I am also a certified independent RMA commissioner to Chairperson level.
5. Over the past 36 years I have been involved in the field of civil and coastal engineering. I have worked predominantly in the field of engineering infrastructure services, dealing mainly with earthworks, roading, stormwater collection and disposal, wastewater treatment and disposal, water supply and coastal engineering and dealing with RMA issues associated with these elements of projects. These services have been to both local authority and commercial clients.
6. As the most senior practising engineer in Cardno, I was responsible for over-viewing a range of projects and managing and delivering the larger projects to key clients. I still provide this project management and over-view to several Cardno projects.
7. I have been involved, at a detailed level in both the design and the management of construction, in a number of land development schemes over the last 26 years under Cardno. These have included major residential developments such as Whitby, Woodridge, Churton Park, Kotuku Park and other developments in Kapiti, developments on the Western Hills of Hutt Valley, developments in Wainuiomata and other large residential and industrial land development projects in Nelson, Taupo, Hawkes Bay, Christchurch. I am also currently working on large land development projects in Hamilton, Warkworth and Queenstown.
8. I have investigated, designed and/or managed the construction of several hundred projects involving several hundred kilometres of sewer, water and stormwater reticulation, numerous pump stations, well over a dozen wastewater treatment plants and associated treated effluent disposal systems to water and to land. I have managed the construction and certified the construction of in excess of ten million cubic metres of earthworks in the Wellington area over the last 26 years.
9. I was the primary author of Section E1 of the New Zealand Building Code, which was first issued in 1991, and which deals with Surface Water. I continue to advise the Department of Building and Housing on updates and amendments to that section of the Building Code and I have been engaged to provide Determinations in cases of dispute.

10. I have been involved in the investigation, design and construction of several coastal engineering projects which have included coastal outfalls, coastal erosion, breakwaters, revetments, sea walls, sand replenishment, jetties and dredging.
11. I have been involved with the development of virtually all of Whitby for 26 years. Cardno has been the exclusive design consultant for all of Whitby over this period. My engineering work at Whitby over this period has involved the over-view of all engineering design for the entire Whitby development since 1989, the modelling and concept design of the entire water supply network of Whitby, review and approval of design for all water supply, stormwater, wastewater and earthworks solutions at Whitby. I have been the construction manager and the Engineer to the Contract for almost all of the construction of Whitby over this period.
12. In 2001, I began investigating the possibility of developing residential use on the former golf course at Whitby for the former owner, Whitby Coastal Estates. Engineers working under my direction carried out preliminary flood modelling investigations and we slowly progressed engineering solutions for various potential concept subdivision schemes over a number of years. These solutions all required finding a balance between providing the necessary flood flow corridor and the minimum height necessary for appropriate protection from flooding. This work led to the approval of the Comprehensive Development Plan (CDP) in 2011.
13. I prepared the engineering reports that supported the application for the CDP and reviewed and signed off the flood modelling report, the bulk services report and dealt with earthworks matters.
14. I have been the engineering design leader, construction manager and overall project manager for the development on the Duck Creek South site, known as The Banks. I have been in this role since late 2012 and continue to manage this project. As design manager and construction manager, I have led the work on the realignment of almost 1km of stream within The Banks, designed and implemented all of the erosion protection work and have worked very closely with the Cardno staff and the contractors on all construction matters, especially earthworks and the related management of erosion and sediment control procedures. I was also heavily involved in the design and implementation of the stormwater treatment solutions incorporated into the development of The Banks.
15. Cardno was engaged in early 2015 by the Applicant to provide engineering services to assist the Applicant develop engineering solutions for their proposed land development project on what was formally known as The Duck Creek North site. I have been responsible for the development of the solutions for bulk infrastructure, roading, bridges, earthworks and associated land development advice. The specific flood modelling for this site has been carried out under the management of Kyle Christensen and he will deal with matters relating to flooding levels and stream works.
16. In preparing my evidence I have –
  - Visited the application site;
  - Supervised and reviewed the design of the subdivision, the proposed levels of the land to ensure housing areas are above the 100 year predicted flood levels including allowance for a high climate change scenario, assessed roading and bridge solutions, over-viewed the solutions for stormwater treatment and disposal and assessed the solutions for earthworks management, control of sediment runoff from the earthworks

areas and provided advice on stream erosion protection solutions, based on the success of the solutions used in The Banks development;

- Assisted with the preparation of the report provided in the application documents – Bulk Services Report and Environmental Management Plan for Construction - Duck Creek North, Whitby, Porirua (Cardno NZ, 2015);
- Received and responded to queries raised in the 1<sup>st</sup> Minute of the Commissioners' as well as additional comments from WWL and GWRC and the peer reviewer
- Participated in a meeting on 2 March 2016 with Greater Wellington Regional Council (GWRC), Wellington Water Limited (WWL) and Porirua City Council (PCC) to discuss the updated information provided on stormwater treatment devices as well as the extent of erosion protection works;
- Reviewed the officers S42A reports from GWRC and PCC; and
- Reviewed the submissions that reference civil engineering matters.

17. I have read and agree to comply with the Code of conduct for expert witnesses outlined in the Environment Court Practice Note 2014. I understand that, according to the current Code of conduct:

(a) an expert witness has an overriding duty to assist the Court impartially on relevant matters within the expert's area of expertise;

(b) an expert witness is not an advocate for the party who engages the witness.

18. I confirm that the statements made in this evidence are within my area of expertise (unless I state otherwise) and I also confirm that I have not omitted to consider material facts which might alter the opinions stated in this evidence.

### **Scope of Evidence**

19. This evidence covers civil engineering matters including bulk infrastructure and earthworks matters.

### **General Bulk Infrastructure Issues**

20. The engineering solutions for water supply reticulation and wastewater reticulation are described in the Bulk Services report. These solutions are conventional solutions complying with Council's Code of Practice for Urban Subdivision and Wellington Water's Regional Code of Practice. These matters are appropriately dealt with by way of the proposed conditions of consent set out in the Officer's Report.

21. The development requires the construction of three bridges. I have been involved in previous geotechnical investigations on the site, I have prepared the concept design solutions for the bridges and I have recently managed the tender process for the first bridge that accesses the site.

22. The tender responses were all consistent with the concept design submitted for the resource consents for the construction of the bridges and they did not raise any matters that went beyond the engineering information submitted for the bridges.

23. I have managed the construction of both bridges and the large triple culvert in The Banks development and my knowledge of the design and construction of those structures,

combined with my knowledge of the underlying soils and construction matters influencing the design and construction of the three bridges for this development leads me to conclude that, in my opinion, the construction of the proposed bridges will not create any noticeable adverse effects on Duck Creek, excluding matters relating to instream ecology, which is outside my area of expertise.

### **Wastewater Pump Station**

24. The wastewater from this development will drain to the existing Duck Creek wastewater pump station. This pump station is a large pump station servicing almost the entire Whitby area.
25. The pump station is located adjacent to the intersection of Roads 1 & 2 and Lots 7 & 10.
26. Potential issues relating to wet weather storage capacity, odour nuisance and adverse noise effects on the proposed properties adjacent to the pump station are discussed in paragraphs 6.196 – 6.199 of PCC's Section 42A Report.
27. In paragraph 6.196 the Report Officer refers to a comment from Ms Barker that additional wet weather storage capacity could be achieved as part of the detailed design of the new sewer mains. Whilst I agree with Ms Barker that additional storage could be achieved with the use of larger sewers, it is also possible (and probably more likely given the volume required) that it would be provided by a specific storage tank. This matter should not be managed through the proposed condition 53 set out in the Reporting Officer's Report as this introduces uncertainty for the Applicant in terms of cost sharing. In my view, additional storage is a matter for PCC and Wellington Water to progress. If it transpires that their preferred solution can be achieved in conjunction with the consent holder, then that discussion can happen outside the resource consent process.
28. I agree with the comment from Wellington Water's officer, Mr Winstanley, that the previous absence of houses close to the pump station has meant that odour nuisance from the pump station has not been a problem in the past but the creation of lots relatively close to the pump station could trigger odour nuisance issues if steps were not taken at the pump station to improve odour and noise management at the pump station.
29. Through the CDP process, PCC had committed to deal with these matters appropriately and in conjunction with the progressive development of this site. The CDP shows a relatively similar layout of lots to the pump station as the current scheme plan, other than the alignment of Road 2 has been refined in the scheme plan and Lot 7 & 10 is marginally closer to the pump station site than that indicated by the CDP. This change is really just a result of refinement once detailed work is carried out on a scheme plan compared to the work put into an early development plan (which is more conceptual).
30. The scheme plan still uses of the roads to create a suitable buffer between the pump station and the lots as much as is reasonably practical to do so. The buffers provided and the distance from the actual pump station building to the nearest houses are sufficient to avoid nuisance from odour and noise, provided PCC implement the upgrade solutions that they have previously committed to do so.
31. The former owner of the site (Whitby Coastal Estates) sold the land surrounding the pump station building to PCC for the appropriate management of odour and noise and PCC dictated the size and shape of their parcel of land for those purposes.

32. The PCC Reporting Officer states in paragraph 6.198:

I consider the upgrade works to the Duck Creek Pumping Station are required to be completed by Wellington Water before titles are issued to houses in Stage 1 due to adverse noise and odour effects from the existing pump station, as detailed by Mr Paul Winstanley Team Leader of Utilities at Wellington Water<sup>18</sup> below;

33. I fully agree with his paragraph 6.198.

34. However, in paragraph 6.200 he goes on to recommend that a consent notice be placed on the titles of the new lots within a distance of 100m of the pump station to protect PCC from possible complaints of noise and odour in the event that PCC do not carry out any upgrade work.

35. I do not agree with this approach. The potential adverse effects of the pump station on the proposed allotments within a 100m radius from the pump station are eminently manageable by PCC simply implementing the upgrade works that they committed to when purchasing the land from the former developer. The development contributions paid by the Applicant can be allocated towards these works (this is the intent of development contributions) and, given that it will be late 2017 before any residents will be present on the site, PCC has more than sufficient time to implement those relatively minor upgrade works. This would avoid the need for any consent notice.

#### **Stormwater Treatment and Disposal**

36. The scheme plan and engineering solutions submitted with the application did not show specific stormwater treatment solutions. The Section 92 request sought additional information on this matter and I became involved in detailed discussions with PCC staff and I progressed a solution based on the use of a single large stormwater treatment dry pond adjacent to Road 1, about opposite the wastewater pump station.

37. The Commissioners raised concern, in their minute dated 3<sup>rd</sup> February 2016, that additional information would be helpful in the assessment of potential adverse effects from stormwater discharges on aquatic matters. In addition, as part of the Officer's completing their Reports and assessing input from their colleagues, the need for further additional information on stormwater treatment solutions became apparent.

38. Discussions with the Officers led to myself, and other Cardno engineers who assisted me, to complete a much more detailed assessment of stormwater disposal for this site. We met with PCC and GWRC staff on 2<sup>nd</sup> March to go through those solutions and discuss how the new proposed solutions would deal with stormwater disposal appropriately.

39. The proposed solutions were also set out in a Cardno letter to Land Matters, dated 29<sup>th</sup> February 2016, which I assume has been circulated to the Commissioners.

40. In summary, the revised solutions now incorporate a number of elements and these have been selected and sized on the basis of splitting the site into 7 separate sub-catchment areas as shown on attached Cardno drawings NZ0115065-PL-SK511-517. Each sub-catchment has a specific pre-treatment solution.

41. The proposed solutions include the discharge of roof water from the sites adjacent to the stream to the grassed areas on the stream banks. The flow then trickles through the vegetated areas before reaching the stream flow. We have used this method for several of the sites in The Banks development further upstream.

42. Some of the smaller sub-catchments will discharge to swales and rain gardens, via which they soak into the ground in normal rainfall events and overflow to the stream in the very large events.
43. There is still a large dry pond with a pre-settlement fore-bay to deal with two of the larger catchments.
44. These elements have been designed (to preliminary design level) in accordance to Auckland Council's Technical Publication 10 and will ensure that there is appropriate pre-treatment of stormwater prior to discharge to Duck Creek.
45. I have incorporated similar solutions into The Banks development further upstream. These have been in place for almost 3 years and have performed well.
46. Through the discussions on 2<sup>nd</sup> March it was accepted by all that there is some concern within our industry about the poor performance of stormwater treatment ponds and/or high maintenance requirements triggered by sediment discharge to the ponds during the house construction phase of a project on some sites. The background to this issue is that although there are very highly controlled processes implemented to control sediment discharges during the earthworks phase, there are often much less stringent controls on sediment runoff from house excavation sites during the house building phase and sediment runoff to the stormwater treatment devices during the house building phase can reduce the effectiveness of those devices.
47. I have been involved in projects where we have managed the "second phase" risk by keeping the operation of the treatment devices in the hands of the developer for a sufficient period to ensure that the developer takes some responsibility for managing the activities of the house builders and keeping sufficient erosion and sediment control devices in place to avoid the discharge of sediment to the ponds and rain gardens. This has, in some cases, been for a period of up to approximately 3 years.
48. This development has the added advantage that the developer is proposing to construct all of the houses and so management and control of house construction activities will be entirely within their control.
49. The Commissioners may wish to consider including a condition of consent that requires the consent holder to maintain the stormwater treatment devices for a minimum period before they are handed over to Council.
50. In summary, I consider that the revised solutions for stormwater treatment will provide the appropriate level of protection to Duck creek and the receiving waters further downstream.

#### **Earthworks Matters**

51. As set out in the Application, the creation of the residential lots will involve approximately 143,000m<sup>3</sup> of earthworks. This is because a large part of the site has to be raised to a level that is above the predicted flood levels for a year 2090 design event with inclusion of a climate change high scenario.
52. The existing cut material on the site is about 43,000m<sup>3</sup>. Therefore, approximately 100,000m<sup>3</sup> of fill material has to be imported from off-site, placed and compacted to form the required finished surface level.
53. The total earthworks volume required for this development is just under 1,000m<sup>3</sup> per lot. This is low to modest in Wellington terms. It is not uncommon for land development in

Wellington to require up to 2,000m<sup>3</sup> per lot. To put the scale of the earthworks for this development into perspective, the development at The Banks has required an average of about 1,400m<sup>3</sup> of cut to fill per lot over the last 4 years.

54. As outlined in the Application and commented on in both the PCC and GWRC Section 42A officer's Reports, the proposed earthworks will be carried out under a management regime controlled by several Management Plans. These include a comprehensive Erosion and Sediment Control Plan, Flocculation Management Plan, Earthworks Management Plan and an over-arching Environmental Construction Management Plan.
55. The most important of these, in terms of minimising the risk of sediment laden water reaching Duck Creek from earthworks activities is the Erosion and Sediment Control Plan. A detailed draft plan was prepared for the Application.
56. I was involved in the preparation of this Plan and I can confirm that it incorporates all of the latest techniques that we are using on other Wellington sites, especially the solutions used on the current earthworks in The Banks development.
57. The Management Plans are also a fundamental part of the construction contract documentation with contractors so that there is total alignment between the GWRC Guidelines for the management of erosion and sediment control, through the detailed Plans and onto the contractors.
58. I manage all construction activities at The Banks development, including the erosion and sediment control procedures on that site (with assistance from other Cardno staff) and I consider that the successful minimisation of sediment discharges from that site can also be achieved on this site.
59. I have read the sections of the Officer's Reports that deal with earthworks matters and agree with their assessment that the proposed management and mitigation will adequately ensure that there are not significant adverse effects from the discharge of sediment laden water from earthworks activities.
60. I note the concern expressed in some submitters that sediment runoff from earthworks operations could lead to significant adverse effects on the receiving environment. I agree that, if large volumes of sediment were released, then such an outcome could occur. However, we now carry out earthworks operations in an entirely different manner than was the case even ten years ago.
61. As described in the supporting information attached to the Application and indicated above and in the Officer's Reports, earthworks are now carried out under a very tightly managed manner. There are weekly checks, inspections prior to any impending rain, checks during rainfall events, water quality monitoring both during and after trigger rainfall events, constant review of performance and trails to achieve even improved outcomes and a very structured reporting process.
62. These processes and detailed construction methods have added approximately 15% to the cost of earthworks. The effort and cost is therefore significant. I fully support and have been an advocate for these new methods and it is very satisfying to see a complete "but-in" from all parties involved, including the individual contractor personnel. Current management of erosion and sediment control issues is achieving a high degree of sediment run-off

minimisation and has significantly reduced the risk of adverse effects on receiving waters from earthworks activities.

63. I note the discussion in the PCC Officer's Report (paragraphs 6.59 – 6.65) on matters concerning the placement of fill material over the boundary onto neighbouring land. The design incorporated the placement of fill along this section of the site as a pragmatic way of dealing with the shape/level of the land immediately at the boundary interface.
64. The solution is obviously dependent upon the approval of each individual neighbour and it has always been our intention to modify the draft design to contain all earthworks within the applicant's site in the event that a neighbour did not agree to the fill material being placed on their property.
65. I note in paragraph 6.62 of the Officer's Report that he is suggesting that there could be a condition of consent that required, in the event of a neighbour not agreeing to fill on their property, then the modified detailed design should be re-submitted to PCC for approval prior to earthworks being carried out in that area. I agree with this suggestion and consider it to be an appropriate way of managing this issues.

### **Conclusions**

66. The proposed development involves relatively large scale earthworks, modification of the existing ground levels, changes in stormwater runoff and the construction of infrastructure and roads and bridges. These construction activities create a risk of adverse effects on the receiving waters from excess sediment runoff and subsequent stormwater runoff from the developed residential area.
67. The Application and subsequent additional information sets out a raft of sound engineering solutions that will manage these activities and these risks and ensure that significant adverse effects do not occur.
68. I consider that the proposed draft conditions of consent, set out in the Reporting Officer's Reports, provide an appropriate means of ensuring that the activities on the site can be carried out in a manner that avoids and/or minimises potential adverse effects to an extent that they can be considered to be less than minor.

*R. B. O'Connell*

DATED THIS 18 DAY OF MARCH 2016

