Mt Coot-tha Quarry Affected Residents

Using Statistical Interpolation to determine unmeasured internal home blast vibration strength at Mt Coot-tha - August 2018

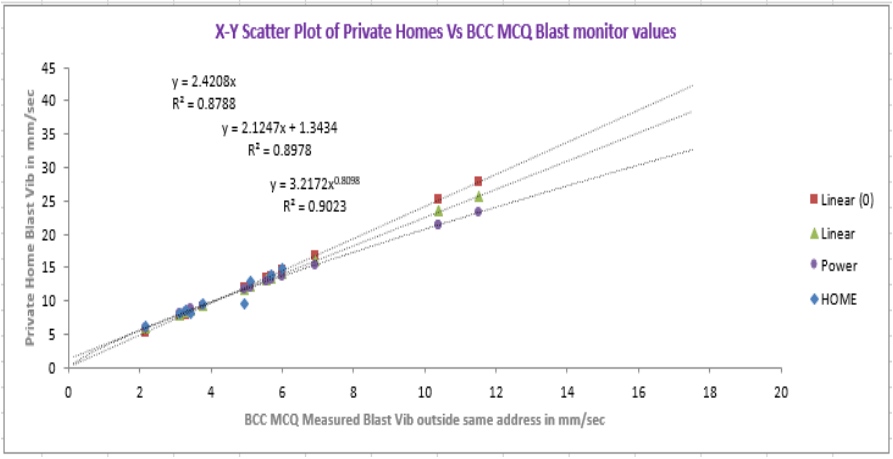
Further to my initial April 2018 report, which focussed on the difference in results caused by reporting data from a more remote monitoring location.

We now consider the differences related to internal and external home monitoring at the same quarry affected address.

Date	BCC	HOME	Home/BCC	Linear (0)	Linear	Power				
22-Nov-11	12			28	26	23				
05-Jun-14	10			25	23	21				
03-Aug-16	10			25	23	21				
07-Dec-17	5	10		12	12	12		5.9	5.3	4.8
09-Feb-18	3	8	2.60	8	8	8		0.3	0.0	0.0
02-Mar-18	2	6	2.90	5	6	6		1.1	0.1	0.1
23-Mar-18	3	8	2.36	8	9	9		0.0	0.3	0.4
19-Apr-18	5	13	2.55	12	12	12		0.4	0.6	0.9
03-May-18	6	15	2.46	15	14	14		0.1	0.5	1.1
17-May-18	7			17	16	15				
31-May-18	3	9	2.62	8	8	8		0.4	0.1	0.0
14-Jun-18	4	10	2.54	9	9	9		0.2	0.0	0.0
21-Jun-18	6	14	2.43	14	13	13		0.0	0.1	0.4
06-Aug-18	6			13	13	13				
mean	4.2	10.2	2.6	10.1	10.2	10.2				
median	3.77	9.56	2.54	5.79			RMSD	0.97	0.89	0.93
upsize		2.54								
st dev	1.31	2.94					NRMSD	0.10	0.087	0.091
max	6.01	14.79								
max-st dev	4.70	11.85								
var			0.03							
var %			1.08%							

In an attempt to account for the periods where home monitoring did not occur, we use some interpolating functions to estimate the value of the home monitoring results as a function of the BCC monitoring values.
We can see from the periods which had both sets of monitoring results, that there is correlation between the measurements from BCC and home monitoring. See columns BCC and HOME.

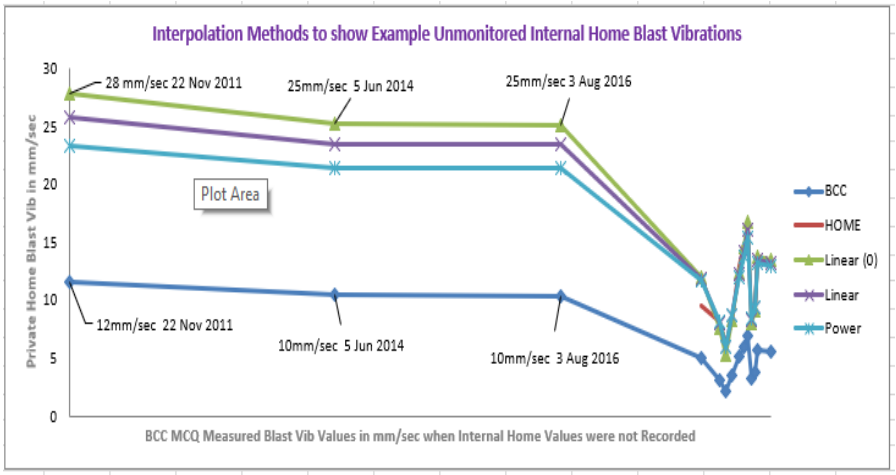
These are also seen in the blue diamonds on the X-Y scatter plot, where the x axis is the BCC measurements and the y axis is the HOME monitoring results.



Interpolation methods considered:
We use a selection of interpolation methods and select the most satisfactory method to interpolate the missing points.
In this case we have chosen the linear interpolation method with a y intercept. The linear interpolating function with 0 intercept could have also been chosen as they both produce similar interpolation results.
In the case of the Power interpolation function we are cautious to make interpolations given the deviations away from the mean lines outside of the domain of the actual data.

It is well known in statistical practice that curved interpolating lines of higher orders are very unstable outside of the domain of the actual data used to determine the interpolation function.

So, we would err on the side of caution and avoid placing too much stock in the power function interpolation. It is retained here for comparative purposes.



Interpolation Summary:

In summary, we provide some expected values for the missing periods and suggest the Linear model with intercept is the closest to actual given the small amount of data available using local residents' funds.

It is worth mentioning that there is likely to be more variation than is able to be captured in the data at hand and that these are by no means conclusive estimates.

Plus, the variance of this small-sample Private Home/BCC 2.54x value, is indeed reasonably low at 0.03 or 1.08% (when ignoring the 07-Dec-2017 scope-test recording).

But all in all, this should be reflective of the average possible readings had they been taken.

Additionally:

In comparison to the conclusions from the April 2018 study of blast vibration footprint misrepresentation by only reporting those monitor readings from more remote locations:

1. We saw a difference in reading that was a 2.6x to 3.6x higher median reading, whereas in this case we see an approximately 2.54x higher median reading.
2. We also confirm in the above data that when using the statistical parametric and non-parametric tests, there is a significant difference in the medians between the BCC and the internal home vibration monitoring of approximately 5.79mm/sec with confidence interval between 3.7mm/sec and 8.7mm/sec based on the parametric test.

Conclusion:

1. It is clear that there is indeed a consistently higher reading expected at all periods at the internal home reading location when compared to those recorded outside and reported by the BCC. This is supported by both the data contained herein and the analysis in the April 2018 report.
2. We now have two distinct data sets, each with a specific upsize factor for which the causes are totally different.
    - Hence a larger compound upsize factor can be created, by adding the remotely misrepresented distant monitoring error factor to the amplification actually occurring inside the private homes located closest to the blast zone.
    - We note that for the strongest known MCQ blast (which was measured as 10.11mm/sec at Sussex St on the 15/10/2002), that the Local Residents data analysis has assigned the internal home value of that blast to be almost 40mm/second.
        - This is indeed realistic and the true value on that date may well have been much higher.

3. These conclusions are based on the data provided to me Clancy Birrell by Philip Best as the representative for the Mt Coot-tha Local Residents.
    - We are also advised that the original measurement data can be seen on the Mt Coot-tha Local Residents website www.BanTheBlasting.org/BlastMeasurement.htm .

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