

NEWSLETTER No 8/2008



Railway Technical Society of Australasia
SA Chapter
Engineering House, Bagot Street
NORTH ADELAIDE SA 5006

August 2008

NEXT MEETING

Next Meeting – **WEDNESDAY 3rd September 2008**

The next meeting of the RTSA SA Chapter will be held on **Wednesday 3rd September 2008**. The meeting will be held at the:

**Gil Langley Room – Adelaide Oval Function Centre,
Memorial Drive, North Adelaide**
commencing at 5.30pm.

The topic of the meeting will be:

INTEGRATED LAND USE AND TRANSPORT PLANNING – A SUCCESS STORY

and will be delivered by the 2008 RTSA Eminent Speaker

Andrew McCusker
Operations Director – MTR Corporation Hong Kong

Land scarcity and high population density in Hong Kong has shaped the requirements for effective land use and capital resources through integrated land use and transport planning. MTR adopts a Rail-Property model by undertaking residential and commercial developments along the railway lines, and creates the required integration. The model is successful and creates a number of socio-economic benefits. Intensified development density around railway stations provides floor space to support higher intensity of urban activities. People enjoy working, living and shopping in properties located directly above or adjacent to the railway stations which offer convenient added value and efficiency. Walking is promoted through safe and weather-free pedestrian links into the stations. The model also enables financial sustainability of the railway development and operation without subsidy.

The merger between the MTR Corporation and the Kowloon-Canton Corporation took place on 2 December 2007. The original MTR network comprised five commuter lines, an Airport Express and a Disneyland Resort Line, with daily patronage of 2.5 million. After the merger, the expanded network covers a total route length of 211 km, and daily patronage of 4 million.

Besides the metro, MTR now operates suburban railway services, distributor services e.g. light rail and feeder buses, intercity services of through-trains to China and a number of important public transport interchanges. Apart from plans for new line extensions within Hong Kong, there is also a plan for constructing a regional express line to connect to China's national rail network. The merged company is set to play an ever influential and important role in facilitating integrated land use and transport planning in Hong Kong and in the broader Pearl River Delta region.

In line with an international growth strategy, MTR has active involvement in public transport projects outside Hong Kong. In China, these include building Phase 2 of Shenzhen Line 4 and operating Shenzhen Line 4 Phase 1 and Phase 2, building and operating Beijing Line 4 through a Public-Private Partnership (PPP) arrangement and managing the Shanghai Line 9 project. In the UK, MTR has taken up the concession to operate the London Overground service through partnership with a local operator.

Light refreshments will be served prior to the presentation.

Continuous Professional Development (CPD)

Engineers Australia members are reminded that attendance at RTSA technical meetings contribute towards CPD requirements. Each RTSA technical meeting generally has a value of 1 CPD point.

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August 2008

LAST MEETING

The last meeting was a presentation by Graham Haywood, Manager Systems Engineering – United Goninan.

The topic of the presentation was “The Pacific National 92 Class Locomotives”. The paper below is based on the presentation by Graham.

The meeting was attended by 31 members and visitors and Bill Edmonds gave the Vote of Thanks.

PACIFIC NATIONAL 92 CLASS LOCOMOTIVES FOR COAL & INTERMODAL

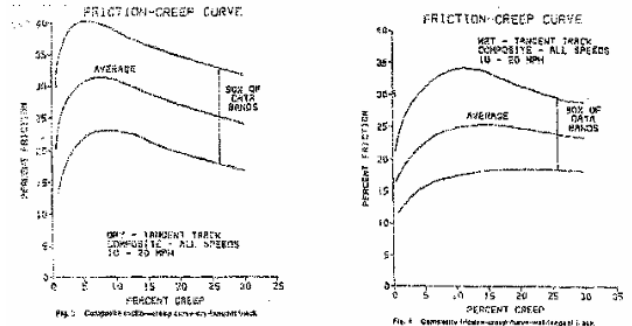
Graham Haywood
Manager Systems Engineering – United Goninan

BACKGROUND

Pacific National issued a tender for the supply of coal haulage and intermodal locomotives. The requirement was that one locomotive design was to be used for both applications. The change from one application to the other was to be simple.

In preparing the offer, a fair degree of preliminary investigation was required. This included:

- i) A comparison of the existing NR Class locomotives to a new AC Propulsion Locomotive
- ii) AC vs. DC adhesion probability
- iii) AC vs DC Trailing load comparison
- iv) % increase in trailing load comparison AC vs DC
- v) Train simulations for the specified haulage tasks of Coal & Intermodal were carried out.
- vi) Adhesion concerns expressed by track engineers were considered.
- vii) Consideration of the vertical wheel load and wheel rail friction limits torque that can be applied to the rail
- viii) Showing that AC inverter controls allow a higher average wheel torque per locomotive due to improved creep control capability.



Locomotive Friction-Creep Studies
DC Locomotive Data from 1972 to 1978.
ASME paper written by G.F. Logston, Jr.,
Staff Project Engineer, EM Division, GMC

Figure 1 – Friction Creep Curves

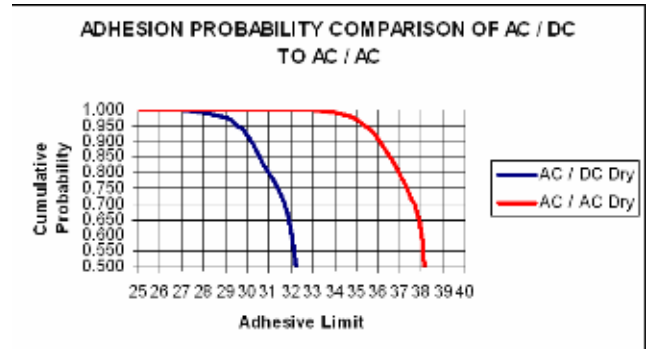


Figure 2 – Adhesion Probability Comparison

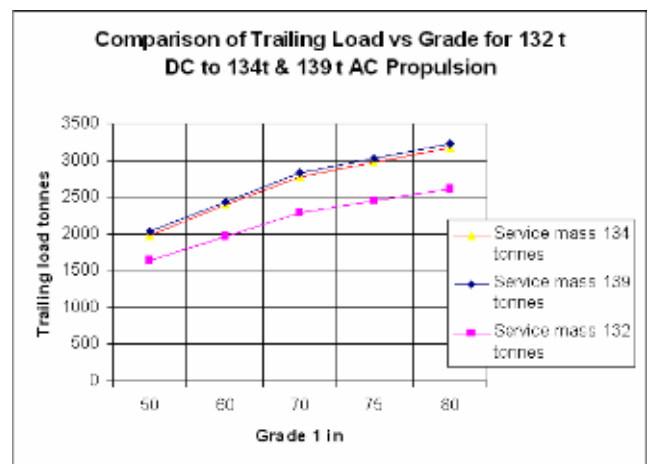


Figure 3 –Comparison of Trailing Load vs Grade

August 2008

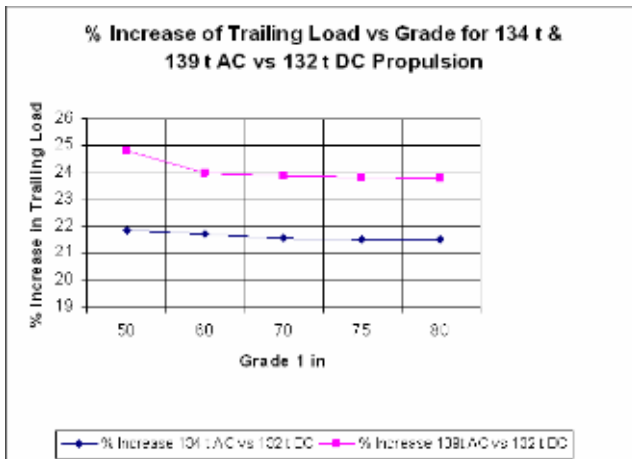


Figure 4 – % Increase in Trailing Load vs Grade

SIMULATION CALCULATION RESULTS

The simulations indicate that for the coal haulage the specified loading could be hauled with three C44ACi locomotives with a 97% probability on dry rail can be achieved.

For the Intermodal applications the C44aci locomotive can haul an increase of 20% in trailing load with the same section times and in some areas a slight reduction in fuel consumed.

It was determined that the requirement for the one design to be suitable for both coal and intermodal traffic can be achieved by changing the service mass of the locomotive. This is achieved by increasing the fuel tank level. For Intermodal applications the fuel level is 7,300 litres. For Coal applications that permit higher axle loads, the fuel level is 13,500 litres. An intermediate fuel level of 10,750 litres will permit a full service mass of 136.9 tonnes.

This ability to have three different fuel levels has been achieved by joint development of a fuelling system with “Banlaw” a company who specialises in fuel delivery.

How is this variability of fuel capacity achieved? :

A vertical multi limit switch float system has been developed by “Banlaw”. Closing of the limit switch in turn operates a solenoid at the fuel filler shutting the inlet valve preventing further fuelling to occur. A three position keyed switch is located near the fuel filler that controls which limit switch becomes live. If the fuel level in the tank is higher than the selected limit switch then a warning light illuminates in the operator cab and at the key switch.

The same limit switch float system controls the “In Line” fuelling system by energising when the fuel level is

below or at a set level and de-energising when the fuel level attains the desired level.

EVOLUTION OF DESIGN

The Cv40-9i locomotive has been a successful and very reliable locomotive design and so forms an excellent candidate as a base for an evolution of design approach to AC propulsion. This approach was applied to the QR National 5000 Class and further advanced with the PN “92” Class.



Photo 1 – NR Class Locomotive

DIFFERENCES TO BASE DESIGN

The following differences apply compared with previous designs:

- i) An increased in mass to 134 tonnes, 136.9 tonnes or maximum of 139 tonnes.
- ii) No nose access steps to sand boxes
- iii) No access to the locomotive roof
- iv) LED marker lights added
- v) Replaced shunter’s step at No.1 end with ladder
- vi) Offered RCL controls for long end leading operator controls
- vii) Microwave oven added
- viii) In Line Refuelling added
- ix) GE air cooled auxiliary / inverter cabinet
- x) Cranking transfer switch
- xi) Smaller main alternator
- xii) Split cooling for the diesel engine coolant thus allowing 4500GHP
- xiii) The use of a UGL Rail designed steel fabricated bogie
- xiv) The use of proven AC traction motors that are currently in service in China and Tibet

NEWSLETTER No 8/2008

August 2008

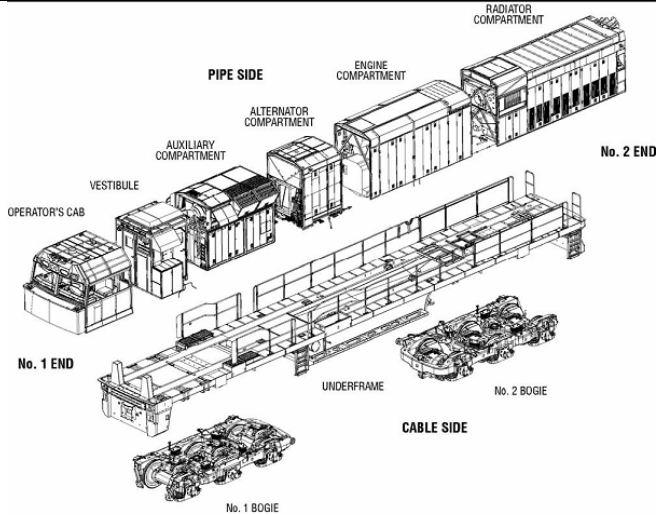


Figure 5 – Modular Design of Locomotive

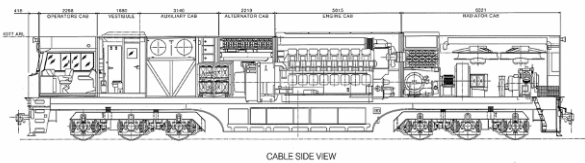


Figure 5 – NR Locomotive Side View

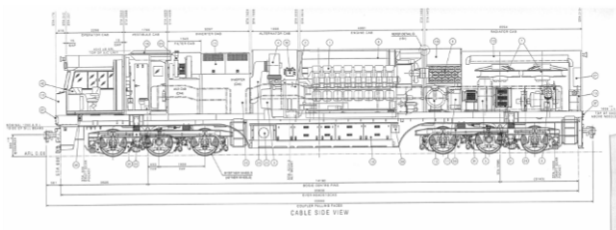


Figure 6 – PN 92 Class Locomotive Side View

The new bogie is based upon the bogie designed and supplied to General Electric for the China AC propulsion DE Locomotive.

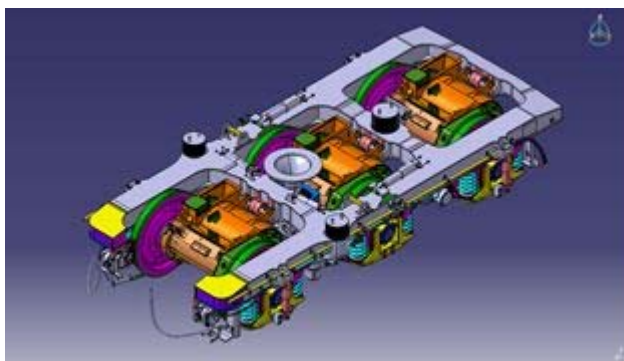


Figure 7 – Arrangement of Bogie

The 5GEB30 Traction Motor as used in Locomotives supplied to the Quinghai – Tibet railway. Note the change from traditional rubber metal sandwich

suspension spring pack to dog-bone link with rubber bushes in each end.

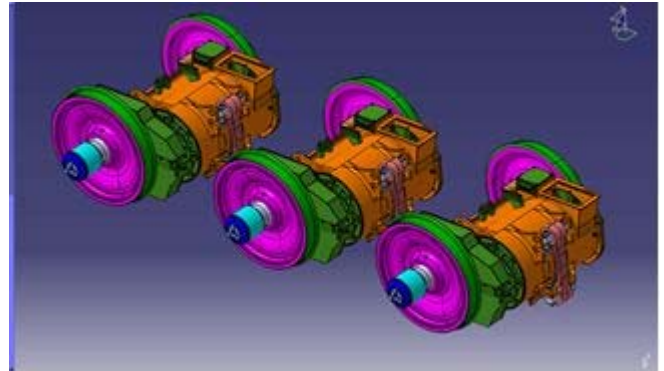


Figure 8 – Arrangement of Traction Motors



Photo 2 – 92 Class Locomotive During Construction



Photo 3 – 92 Class Locomotive Engine Module

August 2008



Photo 4 – 92 Class Locomotive Traction Control Module



Photo 5 – 92 Class Locomotive Front End

PLATFORM DESIGN

The platform utilised the NR box beam design with modifications. Careful re-evaluation of the detail design was carried out to improve fatigue life with improved transition curves in the steel plates.

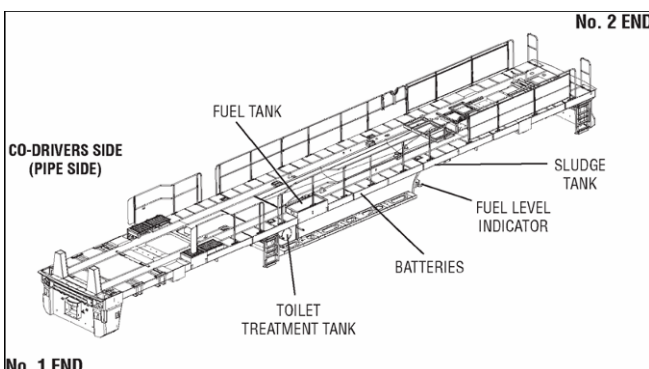


Figure 9 – Arrangement of Platform

No lateral welds are located in the bolster and load beam to provide improved air flow.

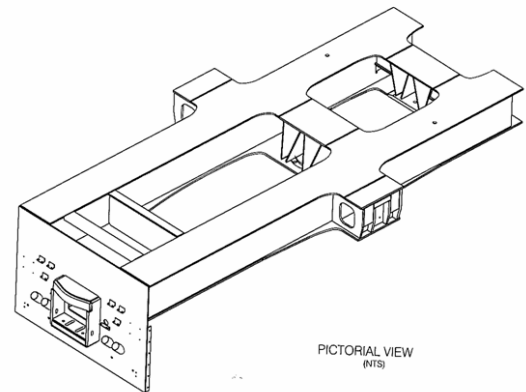


Figure 10 – Arrangement of Platform at Bogie Support
Note Longitudinal W Plate Stiffeners

The construction approach is from the bottom up, i.e. all internal gussets and bracing of the box beams are welded to the bottom flange.

The cast steel traction pin is welded to the bottom plate of the load beam.

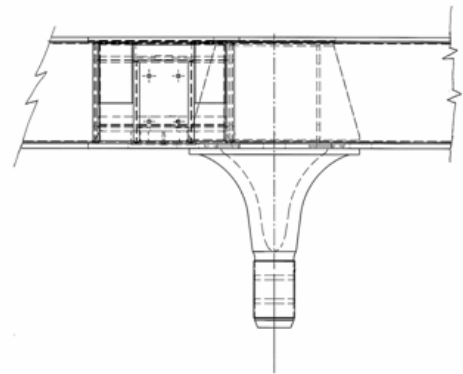


Figure 11 – Arrangement of Cast Steel Bogie Pin

W style longitudinal gussets are used to tie the top and bottom flanges together.

CHALLENGES

The following issues provided challenges but were successfully addressed:

- i) Controlling the camber of the platform when welding the 3 major sections together.
- ii) Achieving collaboration between the RCL provider and the air brake supplier.
- iii) Meeting the regulated noise emissions levels.

NEWSLETTER No 8/2008



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August 2008

- iv) Compatibility with existing older design locomotives.
- v) Accreditation testing requirements.
- vi) Sooting up of air filter elements in tunnel operations.
- vii) High temperature air inlet to engine filters.



Photo 6 – 92 Class Locomotive During Load Testing



Photo 8 – 92 Class Locomotive Hot Air Exhaust Deflectors

Chairman's Chatter – Duncan McLeod

Ownership of the rail network in New Zealand, from Government to private and back to Government, has been a tortuous saga extending back over at least 15 years.

Back in 1993, the Government sold NZ Rail (above and below rail) to a consortium of private investors, for some \$400 million. This was considered a bargain price at the time, considering that just one of the rail ferries operating between the North and South Islands, included in the sale, would have a replacement cost in excess of \$300M.

Unfortunately, the new owners appeared to be focused on maximising short-term returns to themselves, to the detriment of longer term viability. Although business levels were generally quite buoyant, there was a lack of sufficient investment in new or upgraded infrastructure and equipment, particularly considering the extent to which the network had become run-down during the latter years of Government control.

The company was listed on the NZ stock exchange in 1996. Initially, its share price performed quite well, before progressively declining. In 2002, some of the original investors, including US railroad Wisconsin Central, sold out.

The following year, 2003, Toll Holdings secured control of the company for \$231 million. Also in 2003, the network infrastructure reverted back to Government control, leaving Toll with the above-rail portion.

Toll subsequently invested about \$200 million in the business, but unfortunately was unable to agree with the Government, as track owner, on an equitable amount to be paid for track access charges.



Photo 7 – 92 Class Locomotive Air Intake Deflectors

NEWSLETTER No 8/2008



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August 2008

The track access fee dispute dragged on for several years, before Toll finally sold its rail and ferry business to the Government for \$690 million, at least \$255 million in excess of book value. The transaction was settled on 30 June 2008.

This is just the start of expenditure required of the Government. As well as the purchase price, there is \$440 million being spent on rail infrastructure upgrading, \$80 million to be invested in new rolling stock, and \$140 million (over 5 years) to retire debt inherited from Toll, a total cost to the NZ taxpayer of over \$1.3 billion.

One lesson in all of this, as we have also seen in some Australian states, is that rail does require a level of Government support in order to achieve the social benefits associated with the haulage of freight by rail over short to medium distances. Certainly heavy haul and long distance freight is more commercially viable, but rail does justify a measure of community support, particularly with the emerging necessity to reduce carbon emissions.

It is just unfortunate that the process of achieving appropriate outcomes can be so convoluted, diverting effort and attention away from the main priority – achieving adequate ongoing investment, and efficient network operation.

The New Zealand saga is a good example of that old adage – what goes around comes around!

Vale Ian Domleo (1936-2008)

Ian passed away suddenly on 11th August 2008. He was well known and respected in the railway industry in South Australia.

Ian learned his skills with British Rail at Derby before immigrating to South Australia in the early 1960's where he commenced with the South Australian Railways at Peterborough. Later he moved to Adelaide and transferred to the State Transport Authority as Permanent Way Engineer. He left the STA to take up a position with a major railway consulting firm working in Australia and the UK. For the past 10 years, he has been working with ARTC.

Ian had an expert knowledge of track and in his later years used this knowledge to draft many of the track standards currently used by ARTC. Ian's knowledge and quiet manner inspired great confidence in his advice and was often called upon to resolve technical issues.

Ian not only had a technical knowledge of railways but also had a passion for all things related to trains. He

traveled extensively to learn and experience all aspects of trains.

Ian was a member of many railway organisations including the ARHS, PWI and the RTSA, which he joined at its inception.

Ian's friendly manner, knowledge, passion and involvement gained him many friends in the railway community. He will be greatly missed.

The members of the South Australian Chapter of the RTSA express their sincerest sympathies to his family.

Letters to the Editor

Letters to the Editor are requested and are most welcome.

The exchange of the views by members of the issues that they see affecting the rail industry and the promotion of the achievements made both generally within the industry and by its members is to be encouraged. This requires your involvement.

There is plenty happening in the rail industry in South Australia. What are your views as to the proposed direction the industry is heading.

Please write your letters to the following address:

SAEditor@RTSA.com.au

CORE 2008

CORE 2008 will be held in **Perth between 7th and 10th September 2008**. The theme of the conference is:

RAIL – THE CORE OF INTEGRATED TRANSPORT

And according to John Goodall, Conference Chairman, will highlight the successful role of rail in integrated transport systems in both urban travel and freight contexts.

Registration for the conference is now opened.

Further information may be found at www.core2008.org.

RTSB Level Crossing Bulletin

The RTSB has issued a bulletin on level crossings. The bulletin may be found at:

http://www.atsb.gov.au/publications/2008/rail_bulletin.aspx

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RTSA NEW WEBSITE

A reminder about the RTSA's new website. The new website covers all of the RTSA Chapters and provides

an improved layout highlighting future meetings and reports from past meetings.

It is well worth a look at and may be found at:

www.rtsa.com.au

MEETINGS FOR 2008

Future Speakers/Dates/Topics				
Date	Speaker	Organisation	Topic	Venue
3/09/2008	Andrew McCusker	RTSA Eminent Speaker	Integrated Land Use and Transport Planning – A Success Story	Gil Langley Room, Adelaide Oval North Adelaide
7-10/09/2008		RTSA	CORE 2008	Perth WA
2/10/2008	George Erdos	ASTB	Benalla Signalling Accident	Gil Langley Room, Adelaide Oval – Joint with IRSE and PWI
6/11/2008	Tim Warren	DTEI	Relocation of Railcar Depot a/c new hospital	Chapman Hall, ENG AUST, Bagot St North Adelaide
25/11/2008	David Marchant	ARTC	AGM	Hyde Park Tavern
1-2/12/2008		ARA	AusRail	Melbourne

Note: Meeting topics and venues are subject to change. Please refer to future Newsletters for confirmation.

KEY RTSA CHAPTER COMMITTEE CONTACTS

Chairman	Duncan McLeod	08 8338 7919
Treasurer	Michael Forbes	08 8217 4127
Secretary	Daniel Martucci	08 8204 8213
N/L Despatch	Steve Torok	08 8264 2552
N/L Editor	Stephen Townsend	0400 135 481

Articles or editorial comment for Newsletter are very welcome. We have over 100 members locally some of whom will have stories, events or developments of interest that could be reported in Newsletter.

Part of the function of RTSA is to keep members in touch with what is going on in the industry and with each other and to that end we are only too happy to publish items of interest.

Send copy to the Editor, Stephen Townsend at SAEditor@RTSA.com.au

or fax to 08 8297 0992.

Electronic despatch of Newsletter is undertaken by Steve Torok – contact Steve on storok@tge.com.au if you have any problems receiving Newsletter electronically or in hard copy. Note that electronic subscribers will get their Newsletters and flyers as soon as the editorial work is done, while the hard copy mail will of course be some days slower.

For all other matters relating to RTSA SA Chapter contact Duncan McLeod (Chairman) at e-mail dmcleod@aapt.net.au, or by phone on 08 8338 7919.

Disclaimer

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