

# Pegless Road Boundary Surveys



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## ABSTRACT

*It's back to the Kosciuszko National Park - where it all began (referring to Mark Gordon's presentation on the Kosciuszko Ko-Ordinated Kadastre and the State Forests presentations)! This time, the Snowy Mountains Highway road boundary definition is given the treatment.*

*The highway is the main access road between Tumut and Cooma and provides access to the Mt Selwyn snowfields. The investigation spans from the eastern boundary of the National Park near Providence Portal to just west of Talbingo. Of the total distance of around 100 kms, 70 kms was found to have a lost or confused boundary requiring definition. This fact has been known to the DMR/RTA Survey Managers and documented since the 1970's, though with added notations: that it was a low priority or, resources were not available! Project kick off occurred in 2005 with a 'low priority (but keep it going)' timeframe and is now reaching the Deposited Plan lodgement stage.*

*The following paper has been scribed by John Gillies, a 'semi-retired' member of the team. John has the intimate knowledge of the project and his paper is a fascinating read. The paper was first published in volume 40, No 1 of the Main Roads Surveyors Association Newsletter (Dec 2010) and is presented with his permission.*

*This project displays the cooperation between government instrumentalities for mutual benefit. It highlights innovation and the practical application of technology to reduce costs to society and the reduction of greenhouse gases to the world.*

## THE MAN FROM SNOWY MOUNTAINS (HIGHWAY)

: So how did I get to here?

For those faithful MRSA readers breathlessly awaiting a follow-on story from my Kings Highway exploits — wait no more — we've moved on to Highway No. 4: The Snowy Mountains Highway. And now we're back with more tall tales and true about the creation of a new road reserve through Kosciuszko National Park from Talbingo to West Denison (no I'd never heard of it either — a largely "paper" town near Providence Portal to the west of Adaminaby).

You may remember my earlier tale about the "State Forests Project" and the creation of new road reserves through National Parks without the requirement for; and expense of; a conventional cadastral survey. Well; based on the successful pioneering of this method of road reserve creation, Dennis Clark, in 2005 the Property Manager for Southern Region in Wollongong, saw the potential for resolving a long-standing problem in his region of "rationalising" the road reserve for HW4 for the 70 or so kilometres where it passes through Kosciuszko National Park from Talbingo to West Denison.



Photo 1: The RTA's 2008 "Photo Frenzy" winner. Alex Gillies' photo of Lake Blowering from the top of Big Talbingo Mountain (plus RTA 278, of course).

But first, a bit of history! A road across the Snowy Mountains between Tumut and Cooma has been in existence from at least the mid-1800s servicing the miners at Kiandra, Yarrangobilly and elsewhere as well as the 'high-country' graziers. As it became formalised as a road for motor vehicles it was originally called the Monaro Highway, but later was renamed the Snowy Mountains Highway; and the Snowy Mountains Highway it remains today. The first of the many road surveys started in

the late 1800s with a survey for a road up Talbingo Mountain in 1891 and an 1889 survey for a one-chain road reserve from Cooma to Kiandra. Elsewhere, there was sporadic survey activity to carve out Portions where there was a demand for grazing lands and in many of these areas there was no road survey, as such, but the “evolution” of a road reserve by abuttal to the surveyed Portions. Kosciusko State Park, as the forerunner of Kosciuszko National Park, was gazetted on 2 June 1944 (...*just a month after my birthday as it happens – so I’m exactly one month older than KNP!*). Kosciuszko National Park was gazetted in 1967 — and it is around this period that the problems of 2010 had their genesis. The photo below almost tells the story.

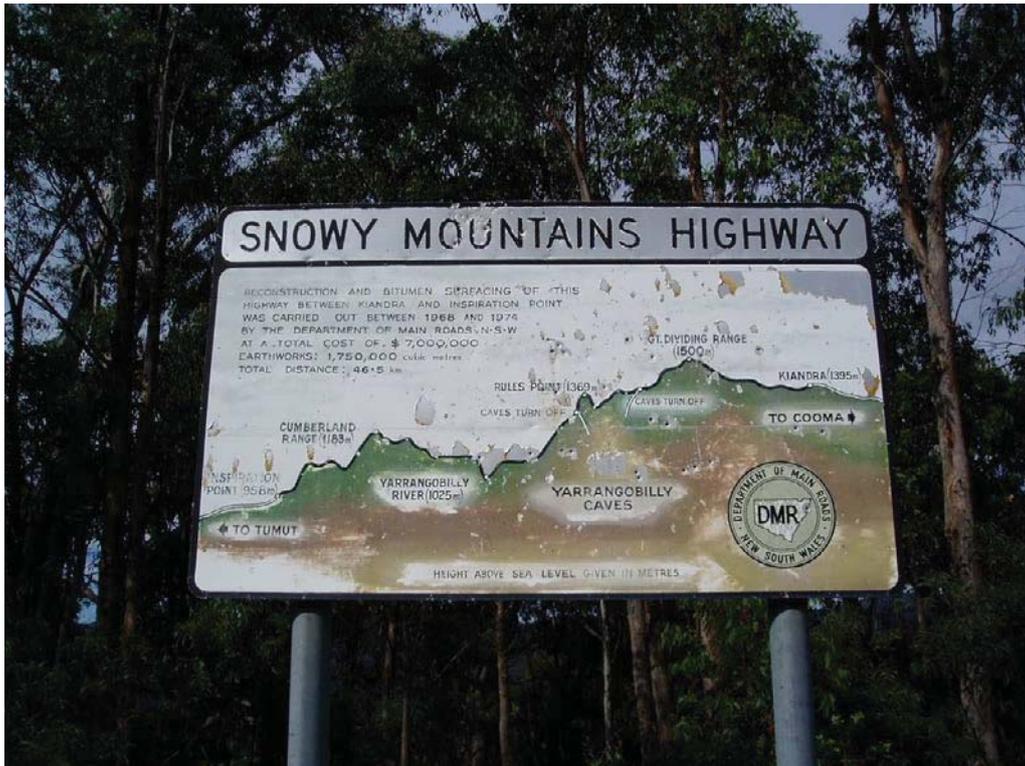


Photo 2: It’s a bit hard to read (and in fact was replaced just recently – now with RTA logo, of course!), but essentially, and at a time when the Snowy Mountains Hydro Electric Scheme construction was nearing completion, it tells the “almost inspirational” tale of the reconstruction of the Snowy Mountains Highway between Kiandra and Inspiration Point (the top of the climb up Talbingo Mountain) during the 6-year period between 1968 and 1974 at a total cost of \$7m (...and that’d be in 1974 dollars – it would probably be more like \$700m in today’s dollars!).

Prior to the start of this reconstruction in 1968, DMR surveyors had been active on some lengths of the highway. Brian Keogh surveyed a new road reserve through the village of Yarrangobilly in 1957 and then through part of Kiandra in 1962. Peter Cooper completed a long section of new road reserve between Adaminaby and West Denison in 1957-58, as well as a section of the highway through Kiandra. Fortunately, Keogh’s Yarrangobilly survey and Cooper’s Adaminaby surveys made it to plan drawing, registration and gazettal, but for reasons unknown (... *but which I suspect were related to the 1967 gazettal of KNP*), the surveys through Kiandra never got to plan drawing and remained as a couple of fully-surveyed and marked surveys destined to go no further than the beautifully drawn “final notes” in their respective DMR field books. For anyone who’s driven through Kiandra in recent years, Peter Cooper’s fieldbook of his 1958 survey through the village of Kiandra is a

real eye opener. Firstly, there were buildings everywhere (where none exist today). There was a Post Office, the 'Bushcraft Ski Hostel', and at least ten cottages, not to mention on page 9 of the field book the "*Concrete Foundations of Proposed Ski Lift*" (I kid you not; and if one looks hard today it's still there!). Secondly, and even more amazing, was the road layout portrayed in the field book. The highway with side streets and small lanes and, of course, because this was an "urban" area there was a splay at each intersection and the reference marks are concrete blocks, rather than the easier to transport and place RMGIPs! Standing on site today, with the few remaining buildings (the Court House, currently being restored, and one weatherboard cottage (Mathew's Cottage)) it's almost surreal to imagine it as Peter Cooper surveyed it in 1958!!



Photo 3: And here's the Ski Lift foundations (in 2007) with Court House and current RTA snow-plough depot in the background:

Fast forward to 1984, and the most recent DMR survey activity on HW4 was a new road reserve survey by John Farrell (... remember him??) for a new bridge and approaches for a crossing of the Yarrangobilly River in Yarrangobilly. Fortunately this one did get to a registered DP stage; but even it didn't get to the follow-up gazettal of the acquired lots as public road!

So, back to the 1968-72 reconstruction and the status of HW4's road reserve. I have no idea what negotiations may have taken place between the then DMR and NPWS and its predecessors about what survey action would take place to create a new road reserve to follow the highway in its re-constructed position. What I do know is that nothing came to fruition to create that new road reserve, and I suspect it was always

a job in the bottom of the Wagga Wagga and Wollongong (Survey & Property Manager's) in-tray which, at each succession into the job, was always described as *"this is a job that needs to be done – but it has a low priority and I haven't got around to it yet – good luck!"*

There was a brief flurry of activity on Wollongong's side of the regional border in 1976 (the northern section of HW4, as far as about Yarrangobilly Caves, is in Wagga's area, and the south-eastern section is now in Wollongong's area and before that in Bega Division), when the unstoppable John Dansie was sent out with Survey Instruction SC1070 to survey the highway between Kiandra and Rules Point and prepare a compiled survey road reserve utilising the old Regulation 46 of the Survey Practice Regs. In what seems to have become a bit of a theme for HW4 surveys, John completed his survey, drew up a survey foil, and there's where it stopped. A 1990 memo from the Divisional Engineer in Bega to Head Office notes: ... *"The Survey was completed in accordance with Reg.46 of the Survey Practice Regulations which regulation has now been cancelled. A standard real property survey to define the Highway is now necessary"* (with a handwritten note on the side of the memo saying ...*"no urgency"* ... and another note saying ...*"resources not available for at least 15 years"* !!!) John Dansie also completed a similar exercise compiling a road reserve plan for the highway from the end of Peter Cooper's survey at West Denison to Kiandra, but more of that later.

## **2: The Project Brief starts to come together**

As mentioned above, by early 2005 the 'State Forests' project methodology was fairly well sorted and Dennis Clark could see the application of this same methodology providing a solution to the HW4 road reserve problem which had so bedevilled his predecessors from the 1960s onwards.

Recapping briefly, the essential elements developed for the 'State Forest' methodology were:

- An established control survey network with permanent survey marks placed at regular intervals along the road
- Survey-accurate compiled road reserve boundaries based on the coordinated road formation centreline derived from GIPSICAM mapping but with regular connections made between the calculated boundaries and the coordinated control marks
- An exemption from marking the boundaries obtained from LPMA ( the nature of the road/national park interface being one which would rarely, if ever, need to be fenced )
- Preparation of a standard Deposited Plan which can, upon registration, be used to effect the necessary gazettals of road reserve and national park estate

And so it came to be that in June 2005, with the State Forests project in full swing, Dennis came up to Parramatta from Wollongong one day with a car boot full of old plans, old search, bits and pieces of correspondence and reports and a Project Brief which went something like: *"When you've got a bit of spare time between State Forest jobs — have a look at all this stuff and let's see if we can't establish a new road reserve for the Snowy Mountains Highway"*. And so for me began an almost 6 year, part-time dalliance with the Snowy Mountains Highway through Kosciuszko

National Park! Now, in November 2010, as the project approaches finalisation, it's almost with a touch of sadness that I can see the end of this close relationship I've had with, what is after all, just a length of road.

### 3: Getting Started

As a first step there was the sorting through and organising all the material that Dennis had supplied to arrive at the current status of the HW4 road reserve. This sorted itself out fairly logically into sections, as follows:

**Northern park boundary to Talbingo** (abt. 24 km): a fully-surveyed road reserve completed during the years 1962–70 mainly by then DMR Surveyor Ron MacKenzie (1969-70) as well as Surveyor Cronan (WC&IC – 1962) and a contract survey at the Talbingo end by Surveyor Simms (1968).

**Eastern park boundary to West Denison** (abt. 6.5 km): again, a fully-surveyed road reserve by DMR Surveyor Peter Cooper (1958).

**Talbingo to West Denison** (abt. 70 km): this length of highway thus became the “real” project as, essentially, except for a small (abt. 2 km) section of survey at Yarrangobilly by Brian Keogh (1957) and John Farrell (1984), there was no surveyed road reserve. For the most part the Parish Maps and the DCDB just showed the highway as a curvilinear road reserve with the location probably extracted from topographical mapping. In some sections, as described earlier, there was no surveyed road reserve; simply that which was defined as road by abuttal to the adjoining Portions.

Then the search for existing survey control. Surprise No.1: a SCIMS search of the whole 110 km project length revealed the existence of 3 ( *yes that's right, 3!!!*) control marks. So clearly, we were almost starting from scratch in the provision of survey control for the project. In fact, in my longish association with DMR/RTA control surveys throughout NSW I couldn't recall a single highway — even out west — which had such a long length of road with nary a control mark in existence! (*as it happened, we did find a couple of marks in the field – but they weren't in SCIMS*).

### 4. The Control Survey

In some respects, the lack of any existing control made our task a simpler one because what we were really faced with was a “greenfields” site without the constraints of fitting in with existing control. The obverse of this, of course, was how far would we have to go to extend our network to bring in sufficient control to achieve our objective of a B/2 (Class/Order) control survey in SCIMS, and what were going to be the difficulties of achieving this?

As an example, here is a photo of the Trig Station Gooandra (TS2248) within Kosciuszko National Park north-west of Kiandra. Not only was it well and truly obstructed by trees (which, of course, can't be cleared in a national park!) but it has no witness marks — simply the original ground mark under the cairn).



Photo 4: So here's the Goandra trig cairn as we found it:



Photo 5: And ultimately, here's what the "Demolition Team" (Alex Gillies and Pete Radley) had to do for us to be able to use it!

Through late 2005, as time and resources were available, the reconnaissance and mark placement continued until by January 2006 the major network was sorted out and the first of the GPS field surveys commenced. By that time we had placed around 55 new permanent survey marks (PM/SSMs) over the length of the job and had selected existing control to connect into ranging from: in the north-east, Wereboldera Trig near Tumut, to marks in Batlow; Talbingo Trig on Big Talbingo Mountain; Gooandra Trig (above); a SMHEA trig near Lake Eucumbene, and other marks nearly to Adaminaby at the far south-eastern end of the job.

As was to become something of a pattern with this job, the availability of Survey Graduates and/or students, working through their summer break meant that this was an opportunity to muster sufficient personnel to do this “part-time” project. Many of our recent students and grads (Sam Byrne, Alexandra Lyle, Ryan Fifield and Matt Behling to name a few) were able to “cut their teeth” on a real-live GPS geodetic control survey the size of which they’re unlikely to see again during their career. And not everyone gets to work in such a stunning environment!! (*...excluding the sudden summer alpine electrical storms, of course*).



Photo 6: “Big Pete” Radley loving the weather on Talbingo Mountain (photo taken by an equally wet Ray Gilmour). There’s nowhere to park the vehicle nearby, of course, so it’s parked about 800m away — no chance of shelter there!

By December 2007 (remember this was a “part-time” job!) the control survey network adjustment by Stewart Amery was complete and the Control Survey Diagram was ‘signed-off’. By mid-2008 we had all our new PSMs in SCIMS having achieved the aimed-for B/2 classification.

## 5. Matters Cadastral

### Some preliminary skirmishes:

For those lengths of the highway with an already surveyed road reserve (at the northern and south-eastern ends of the park) the first task on Dennis's list was to ascertain whether the existing road formation was within the road reserve (not as silly as you might think – remember that elsewhere, whole lengths of the highway had been relocated and reconstructed without the niceties of an accompanying boundary survey!).

So, essentially, this task was just a repeat of the 'State Forests' methodology: compile a cadastral model based on MGA coordinates and overlay the road formation centreline derived from GIPSICAM. A simple-enough task – given that we'd become "old hands" at it doing the many 'State Forests' jobs. But – there's always a but – there's always a complication — or two!

The first was that the NPWS, for whatever reason, had removed almost all the fencing which used to delineate the road reserve throughout the National Park — so this made it just that much more difficult to find a "starting point" to start looking for survey marks. Fortunately, in just a few places, they had removed the fencing alright, but had done so by chain-sawing off the fence posts just above ground level leaving the stumps — and in this way we were able to locate our first survey marks. Of course, once you've found one mark you can find two and the job's almost in the bag – right? Well, no actually — not when the next complication is a missing 20 metres! At this point I've come south from the northern park boundary near Blowering towards Talbingo with enough marks found and coordinated (by GPS) to give quite reasonable comparisons – certainly good enough to construct the cadastral model required. I've also come north from Talbingo in the same way. But there's this 20m misclose between the two! Of course, I tell myself, it's all in how I've entered the PO data from the various plans — and somewhere I've missed a one chain road reserve (I mean a 20.115m road reserve width, when you're looking for about a 20m misclose, it's obvious isn't it?).

Now, it didn't seem to matter how many times I would enter and re-enter the boundary lines from the DPs, or how many times I would close the parcels — they would always close — no missing 20m there. So what to do? Thanks to the regard with which field books were held and stored in DMR days, and with a fairly good carry over of this practice into the RTA (despite the many re-structures!) I was fortunate in being able to obtain the original field books for the particular survey in question (a DMR survey, as it happened, but don't worry Ron, your secret's safe with me!). With the field book I was then able to "re-create" the boundaries from the original traverse and lay-in data to compare it with the DP. And guess what? A simple blunder in calculating the boundary lines from the field data produced a very neat 20m error in the calculated distance — which was what ended up in the drawing, and registered, DP. Of course, because it was a calculation error in one line on one side of the road reserve, and it was a constant width road reserve with the opposite side calculated from the first — it all closed perfectly on paper! But at this point all I had was a hypothesis — and I would need field survey to prove or disprove same. Eventually, in another summer vacation period with plenty of students in tow, we were able to traverse the now thickly overgrown roadsides (... did I ever mention how well blackberries seem to grow along the shores of Lake

Blowering?) to survey the marks in question and indeed confirm that that there was nothing wrong with the field survey and marking — it was all down to a simple calculation error in calculating the new road reserve boundaries (and, for the record, the DP in question has now been amended). Oh, and by the way, that oh-so-obvious “red herring” of the missing one-chain road reserve was just that — a “red herring” ( a logical conclusion – but the wrong conclusion!!).

Similarly, at the south-eastern end of the park, an initial struggle to find the first mark and then, in time, enough marks found to complete the cadastral model. Mind you, it wasn't the removal of fences by NPWS that was the problem this time — it was the removal of fences by bushfires that did the trick — fortunately, the fencing wire and the remains of a couple of burnt out corner posts remained as evidence of the originally fenced boundaries and led us to the first of the survey marks found.



**Photo 7: Burnt-out corner post and RMGIP from Peter Cooper's 1957 survey at West Denison**

So with the odd complication overcome, I had my cadastral model of the two surveyed road reserves and the GIPSICAM centreline overlaid — and all was in order — the road formation was indeed within the road reserve and that part of the project was complete.

## And now for the remainder (all 70 kms of it!)

To recap, in terms of the existing cadastre, we had a surveyed road reserve at the start of the Talbingo Mountain ascent as our northern ‘terminal’. Similarly, a surveyed road reserve at West Denison as the south-eastern ‘terminal’ and a short length of survey through Yarrangobilly Village. In between these locations the Snowy Mountains Highway exists: (1) as a road reserve existing in law (by virtue of the 1967 gazettal of Kosciuszko National Park); it exists: (2) as linework on the Parish maps and; it exists: (3) physically as a road formation. The problem now was how to reconcile these three ‘versions’ of the highway and come up with a final product consisting of the physical highway formation (cuts, fills, structures, drainage & a nominal ‘clearance’ for maintenance purposes) contained within a surveyed road reserve.

In many ways tying in to the existing cadastre at each terminal (and the bit in the middle) was the most straightforward of tasks, and with Registered Surveyor Ray Gilmour behind the Leica the survey marks from those surveys were found and coordinated and the fixation of the existing road reserve boundaries at those locations was completed.



Photo 8: Ray “Teflon” Gilmour pressing buttons at Gang Gang Creek near West Denison — the south-eastern terminal of the “new” road reserve.

## 6: The “all-singing, all-dancing”, GIPSICAM and ROADFLIX

At the very heart of this project was Steve Greening’s GIPSICAM and the output of sufficiently accurate ( $\pm 1-1.5\text{m}$ ) MGA coordinates of the road formation centreline. Without this primary data there was no way we could have compiled nearly 70 km of road reserve boundaries to accurately contain the road formation. Also invaluable as an “office” tool for this project was the GIPSICAM derivative of ROADFLIX. With ROADFLIX it was possible to “drive” and “re-drive” the road — in both directions at any place and at any time, it could be used in the planning stages of the project to identify suitable roadside locations for placing control marks, it could be used to identify the locations of cuts and fills — in so many ways the use made of ROADFLIX in this project were almost endless. It’s a great legacy you’ve left us Steve!

## 7: Sorting out the proposed road reserve widths

Now, the existing road reserve width of the Snowy Mountains Highway, where it exists as surveyed sections at the northern and south-eastern ends of the park, is 3 chains, or 60.35m wide. Dennis Clark, using this as a precedent, decided that a 60m road reserve width would be our ‘ambit claim’ in our negotiations with NPWS. Dennis’ call was consistent with the previously surveyed sections and it simplified the issue of ensuring that all the road formation, including cuts and fills, would be contained within the road reserve. 60m, being a fairly generous road reserve width, should have easily contained almost all of the road formation — except for a short section of major construction with large cuts and fills near Rules Point. Of course, from the point of view of a simplified process in compiling a new road reserve, the wider, the easier. The narrower the ‘nominal’ road reserve, the closer the examination of the existing road formation needs to be, to ensure all the cuts and fills are contained within the road reserve.

In terms of the width of the 70 odd kms of ‘non-surveyed’ road reserve, an investigation was completed by then RTA Searcher, John Miller, in 1996 to confirm the status of HW4’s road reserve. His conclusion, *inter alia*, was that the Snowy Mountain Highway existed as a public road with a road reserve width of 20.115m wide, “... *unless a dedicated width in excess of 20.115m is shown “public road \_ \_ wide” ...*”. And in fact, there were some lengths of the highway shown 300 [links] wide on some of the parish maps. So for those sections of the highway where it was only shown diagrammatically in the parish maps, we could assume an existing ‘default’ road reserve width of 20.115m. The implications of this for our project was, of course, that any road reserve width in excess of 20.115m would have to be by way of acquisition of land from Kosciuszko National Park — and this would be when the fun would really start!

By February, 2008 we were ready for an initial meeting with the Estates Branch staff of NPWS in Hurstville and Dennis and I duly went along with our plots of the proposed 60m road reserve all beautifully coloured up showing the ‘new’ road reserve and what would be surplus road for return to KNP. This all seemed to go well and the discussions concluded with a few closing remarks from NPWS staff that, of course, “... they’d need to pass the proposal by their Regional Office at Tumut just to get a sign-off” ( ... *and this, Dear Readers, could form the basis of a whole new article!*) — but I digress.

Suffice to say that the issue of the proposed new road reserve widths for HW4 became an ongoing one and subject to negotiations with NPWS that continue still. Part way through this process there was a change of Property Manager in Wollongong and Dennis passed the Snowy Mountains baton on to Steve Waugh. One of Steve's successful 'negotiating tools' was to use the RTA's GIS resources – in the person of Greg Nagy - for production of an orthophoto of each section of the highway with my cadastral model of the road reserve overlaid on it, all with appropriate annotation. This turned out to be a very effective way to convey the extent of the proposal to those working in non-survey areas of both the RTA and NPWS. People invariably relate to a pictorial representation where they fail to comprehend a line plot of the same proposal – no matter how well it's presented.

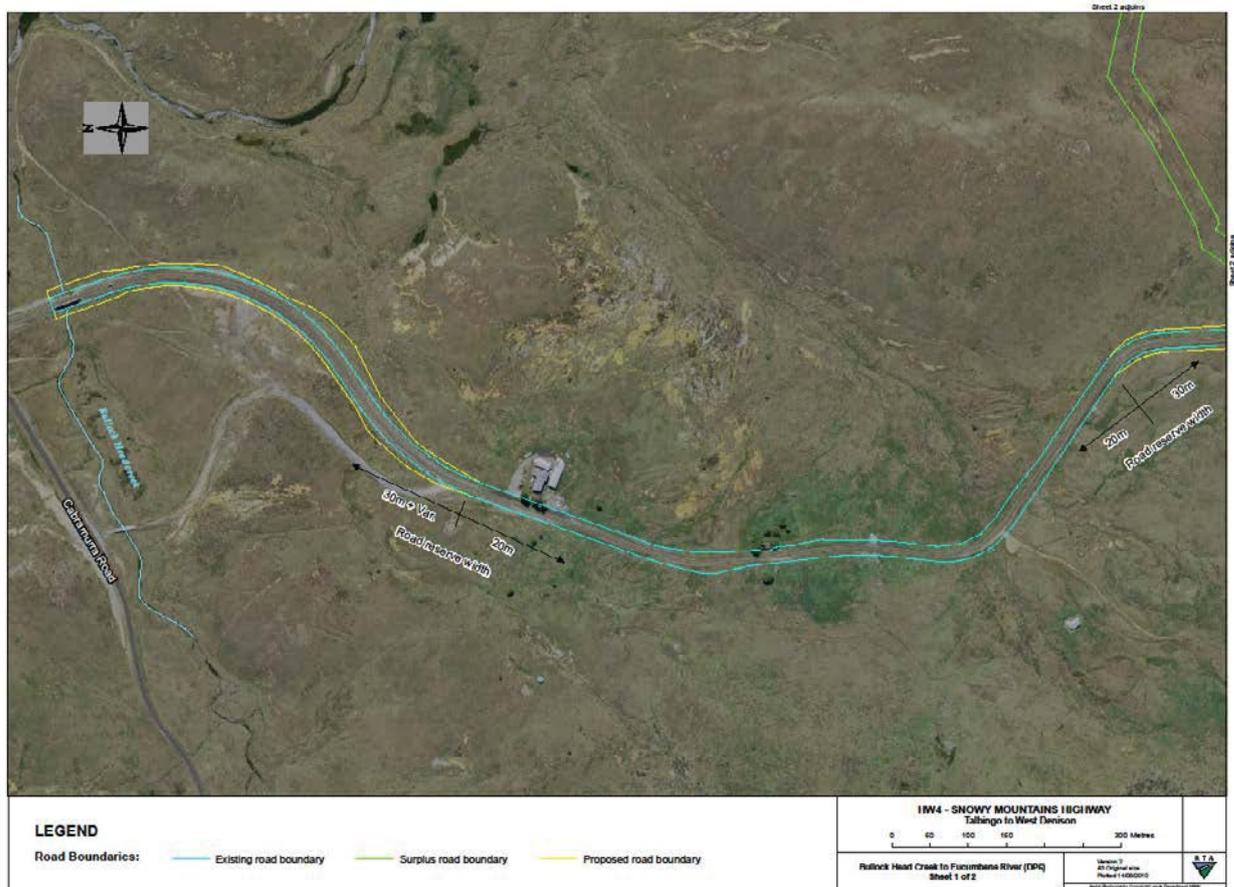


Photo 9: This is one sheet of the orthophotos covering the Kiandra area – in the top right can be seen a former location of the road reserve (it's at a very small scale, of course, but if you look really hard you can see evidence of the old road formation)

As I've alluded to above, the narrower the proposed road reserve width, the more investigation that is required to guarantee the road formation is contained within the new road reserve. From aerial photography and from ROADFLIX and from an increased familiarity with the road as the years on this project passed by, it was pretty easy to identify those areas which would require field investigation to determine those cuts and fills which were going to exceed a particular road reserve width (which at this stage we'd more or less settled on being 40m). Again, as

resources could be found, there were further field trips to 'measure-up' these large cut/fill areas.

The technique used for 'detailing' these large cuts and fills was one developed previously with the 'State Forests' project. This used a combination of Real-Time GPS to position a temporary survey station by the side of the road (to an expected accuracy of abt.  $\pm 1-2\text{m}$ ) and then using a hand-held reflectorless distance meter (a Contour XLRic) to measure the horizontal distance square to the road to the top of cut or bottom of fill. Back in the office, the position of the survey station is overlaid on the MGA Liscad model of the proposed road reserve and the position of the top/bottom of the cut/fill is plotted by distance square to the road centreline. This method also provides a check – of sorts. By placing the temporary survey station a fixed distance from the physical road centreline - the GPS position of the station relative to the GIPSIAM derived centreline provides an independent check of the GIPSIAM centreline (within the expected tolerance of around  $\pm 1-1.5\text{m}$ ).



Photo 10: Here's the intrepid student survey team of Alexandra Lyle and Ryan Fifield about to start detailing some cuts near the Yarrangobilly River. (Note R/T GPS & Contour XLRic)

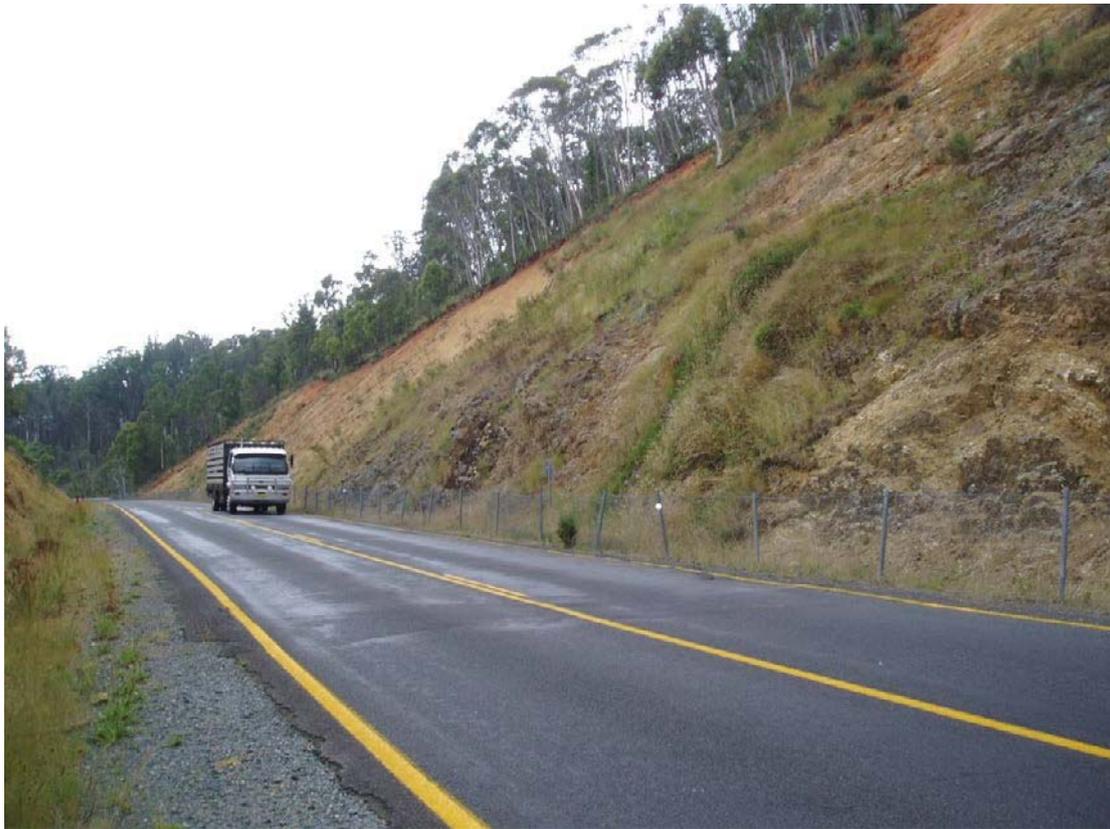


Photo 11: And here's a typically large cut on the section of highway between Yarrangobilly Village and Yarrangobilly Caves:

### **8: Let the Deposited Plans begin!**

Commencing from the northern end of the new road reserve project at Talbingo, preparations commenced to break-up the total 70 km length of the job into logical sections for the DPs. For a start the existing road reserve DP at Yarrangobilly was an obvious terminal for a DP. Then it was a case of looking at where we had placed our control marks such that we could terminate each DP with a pair of control marks. Finally, there was the matter of the variation in Scale Factor over the length of a DP. Because sections of the highway had a large change in elevation in a relatively short distance, the impact that this had on the CSF became a critical factor. For example, the climb up Talbingo Mountain from Talbingo to Inspiration Point is a climb of more than 500m in elevation over a distance of about 5 kms with a commensurately large change in CSF. Under the Surveyor General's Directions the accuracy requirement for length measurements meant we couldn't exceed an distance accuracy of 30ppm over the length of a DP so, ultimately, we had to take the unusual approach of dividing this DP into two sections in so far as the control schedules were concerned — one CSF for the first half of the DP — and a second CSF for the second half. This change of CSF also affected the section of the highway descending from Kiandra to West Denison. Fortunately, in this case, the scale factor issue was easily overcome by splitting the originally planned one DP into two.

Ultimately, by July 2010, there was general agreement from NPWS that a 40m road reserve be adopted through the park, except where localised widening was required to accommodate the road formation, and with the exception of a few special areas, for example, through the historic precinct of Kiandra, where a minimal road reserve

width was to be adopted. Finally, with the road reserve widths settled, the finalisation of Deposited Plans could begin in earnest!

### **“Defining” the existing road reserve**

With agreement reached on the road reserve widths to be adopted, the compilation of the proposed new road reserve boundaries became a fairly straightforward computational task. But now the issue of how to define the existing road reserve on the new DPs becomes a bit tricky. Bearing in mind, that the only reason for having to “define” the existing road reserve, where it is outside the proposed road reserve is that: ultimately these lot-numbered parcels of unnecessary road will be gazetted as national park; the new road reserve will be gazetted as public road; and the DCDB will then be adjusted accordingly. Also, in defining the surplus lots, the areas of land available to become park becomes a negotiating point with NPWS in balancing the area of park which is proposed to be acquired for road. A net area of 83.2 ha of land to be acquired for road from KNP looks a whole lot better than a gross area of 142 ha in a submission to the Minister for a revocation of a part of KNP.

Clearly, given that this whole exercise in ‘rationalising’ the HW4 road reserve through KNP is one in which the aim is to achieve an up-to-date and enhanced cadastre (survey-wise and in the DCDB), but without the expense - in time and resources – of a conventional boundary survey, then a way had to be found to achieve this “definition” of the existing road reserve with a minimum of field survey.

Firstly, for those lengths of the highway where there was no surveyed road reserve – and the road is just shown diagrammatically in the relevant parish maps – then, the decision was made to simply show the existing road reserve as a 20.115m wide corridor centred on the existing road formation (derived from GIPSICAM) centreline. The proposed road reserve thus becomes a 40m wide road reserve centred on the same centreline and the land to be acquired from KNP becomes the two strips either side of the existing road reserve. In a way, this is a very similar process to way the RTA currently goes about defining a road reserve through a Travelling Stock Route (TSR), so we’re not really talking about anything new here.

Elsewhere, mainly to the east and west of Yarrangobilly village, the existing road reserve is shown on the parish maps, but as explained previously, there is no road survey as such – just the road defined by the abutments of the adjoining portions. Again, given that this is just an exercise in delineating – in as simple a way as possible - the land parcels of surplus road for transfer to KNP, then the decision was made to find identifiable common points in both the DCDB and the new road reserve boundaries and simply transform the former (DCDB) boundaries onto the latter. All with an appropriate note on the face of the DP, of course. Now, although this probably is an unusual approach to take, it’s not completely new, and we ended up doing a similar thing with one of the ‘State Forests’ project DPs where an un-surveyed boundary which existed in a parish map needed to be “defined” in our DP (and that was one the LTO did accept).

And now the long-awaited return to John Dansie and his 1977(?) “Regulation 46” survey from Kiandra to West Denison, foreshadowed earlier in this piece!

You may recall from earlier on, that the original route of the road from Cooma to Kiandra had been surveyed in 1889 and can be found depicted in road plan R.3727-1603. Over time, the road formation had been re-aligned and re-constructed in many locations as well as two major deviations constructed — immediately east of Kiandra and around Sawyers Hill. All without any subsequent survey action to define the new alignment, needless to say! What John did was to traverse (using sun obs for azimuth – *on ya John!*) the centreline of the C.1977 Snowy Mountains Highway from Peter Cooper’s survey at West Denison to connect to Brian Keogh’s survey at Eucumbene River, a few kms east of Kiandra. More importantly, as far as I was concerned, he connected into survey marks from which he was able to re-define the whole of the original road plan (R.3727) between Kiandra and West Denison. Now John placed some marks and connected into other marks and I was able to find enough of these marks to re-establish John’s survey – and thus I was able to “re-define” the original road survey via John’s survey. And just in case you think there’s an element of “near-enough is good-enough” in all this, in my comparison with John’s survey over a distance of 9180m I got a difference of 0.062m — yes folks, that’s a distance comparison of 1 part in 148,000!!

This put the last piece of the puzzle of how to “define” the existing road reserve into place. A compiled, but survey-accurate, definition of the road boundaries from R.3727.

## **9. Ready for Lodgement**

And now it’s November 2010, and all eight Deposited Plans have been meticulously drawn by Steve Nicholls (in Wollongong Property Section), and checked and they are now but a hairbreadth away from being lodged with LTO. Stay tuned for my next article when I can relate the (hopefully straightforward) path to registration — but don’t hold your breath!!!!

## About the Author:

John Gillies, B.Surveying (NSW), Dip. Urban Studies (Macq), MIS (NSW), Emeritus Surveyor (NSW), Lieutenant Commander RANR (Ret'd), has spent almost all of his surveying career with the Department of Main Roads and then the Roads and Traffic Authority of NSW, with some time spent escaping to sea as an Hydrographer during a 25 year stint in the Royal Australian Navy Reserve. As a "failed retiree" (his wife, Roslyn's description), he returned to the RTA in 2004 on a short-term contract to work on the "Highly Commended" (ISNSW Excellence in Surveying awards - 2008) 'State Forests' project which he duly guided through to completion at the end of 2007. Concurrently, in 2005, he commenced working as the Project Surveyor - HW4 Road Reserve Project, the subject of this article. John has received many DFWS Awards over the years, but the one closest to his heart is his 2008 'Grand Master' achievement award for "guiding another crops of kids into the RTA way of things", which was mainly to do with mentoring and team work associated with the HW4 project. John's partner in crime, over many years, has been Ray Gilmour - both on the 'State Forests' project and - of course - on the HW4 project (and for a few years before that as well!). Ray, as the Registered Surveyor half of the team gets to take as all the cadastral glory and all of the cadastral responsibility for the project. When the Board of Surveyors and Spatial Information eventually catch up with Ray - as they surely must - I expect to be holidaying in the Bahamas.

For those of you who vaguely recall the name but can't remember what he looks like — here's a self-portrait of the author:



**A photo taken beside one of the old huts in Kiandra.**