

# "Fore-Sight"



"Fore-Sight" - Quarterly Newsletter of the Association of Surveyors of P.N.G.

## 38th PNG Survey Congress LAE, July 8th to 10th, 2004

2004 Congress Manager Luther Sipison advises that preparations are in place to make the 38th PNG Survey Congress an event to remember. The theme of this year's congress is: *"Planning, Surveying and Administration of Peri-Urban Customary Land in Papua New Guinea for Economic Development"*. Many interesting papers will be presented together with a number of different points of view.



Aerial view of the Lae Congress Venue  
Photo courtesy of GEO-GRAPHICS Limited

The theme of this year's congress is particularly relevant as we have all but run out of vacant government land to expand our cities and townships in order to meet the demands of economic development and the pressures of population growth. Imagining the predicament if there had been no land to build the Napa Napa Oil Refinery (see separate article - pages 3 to 6).

We have many members in our Association who can contribute meaningfully to the problem that this year's congress will address. Input from the academic professionals engaged at the University of Technology in Lae will be a welcome addition to the congress.

As with all Survey Congresses, we look forward to the social aspect as well and the opportunity to renew friendships with our PNG colleagues and surveying friends from overseas. Lae has a number of attractions to offer and has arguably the best golf course in the country.

Looking at coming events overseas there are a number of up-coming congresses and other meetings that have relevance to our current and future surveying outlook in Papua New Guinea. With our renewed association with FIG, it would be pleasing to see a PNG delegation present at the Regional Conference in Jakarta during the first week in October. Perhaps this is the ideal opportunity for PNG to present a paper and gain some recognition on the international scene.

It is with the deepest regret that this issue of "Fore-Sight" bids farewell to one of our most respected and long-standing members - Fellow Adelbert Alois. A true surveying professional, and true gentleman. Adelbert gave so much to the surveying profession in PNG on a regular basis over many many years. His passing is a great loss to us all - and our sympathies are passed to his family and friends.



"Surveying New Horizons - Beyond the Black Box"  
PNG Survey Congress theme 1997

For those ASPNG members who have embraced the *Spatial Sciences Institute* in Australia, you should be receiving your free copy of *Position* magazine every two months or so. This is a very informative journal covering many facets of the surveying profession as well as covering mapping and geo-information technology. There are regular features on innovative approaches to challenging projects and quite substantive editorial issues covered as well.

For non-members of the *SSI*, you can subscribe to the magazine at very reasonable cost of AUD\$ 130.00 for twelve issues (postage included)

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### COMING EVENTS :

**Exhibition :** Qld Mining & Engineering Exhibition - Mackay  
27th to 29th July

**Conference :** GITA Annual Conference - Melbourne  
9th to 11th August

**FIG Regional Conference :** For Asia and the Pacific - Jakarta  
3rd to 7th October

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## Report from ASPNG Council

By Masang T. Bangindo, Hon. Sec. / Treasurer

Greetings, to you all members and friends, I would firstly apologise to the members for not getting this issue of the *Fore-Sight* out in time to reach you before the Survey Congress. I am sorry if this issue reaches you late.

Any way to begin with, I hope you have read the draft copies of ASPNG reply to Voluntary Customary Land Registration, CPD policy, Code of Professional Conduct for Surveyors, and Surveyors Code of Ethics. By now you would have made your comments and we the council would very much like to hear your views. It is you the members that will help, guide and shape the Association to take on the changes and challenges. This is not the end as it is only the beginning for the Association to start taking on this changes.

Now that we have started to put out the various policies, we have to implement them. By that we have to set up committees to cater for them, eg With CPD policy, there will be a permanent committee to address the CPD activities, organising and running of these activities, awarding of CPD points, monitoring and maintaining the members CPD registry.

There are other areas that we need to look at, eg, ASPNG Constitution and By-Laws, our input in the surveying industry and the Universities.

### Membership Applications

A total of 6 membership applications were received and will be brought up during the 239<sup>th</sup> Council Meeting.

### University Prizes Awarded at the 36<sup>th</sup> UniTech Graduation March 2004

The Academic Board award of prizes – 2003. The Association of Surveyors of PNG Inc. prizes as follows;

Best first year student with the highest overall academic results through out the common year in Surveying and Cartography was awarded to John Wamoi with an amount K200.00.

Best second year student with the highest overall academic results through out the diploma in Cartography was awarded to Tai Seke with a mount K250.00

Best second year student with the highest

overall academic results through out the diploma in Surveying was awarded to Steven Aka with amount K250.00

Best final year student with the highest overall academic results through out the Bachelor of Technology in Surveying, was awarded Chris Banako with an amount K300.00.

### ASPNG 2004 38<sup>th</sup> Survey Congress Update

The Survey Congress is nearing it's set date on the 8<sup>th</sup>, 9<sup>th</sup>, and the 10<sup>th</sup> of June and we hope to see many of you at the Congress.

### FIG News

The Secretary has received a copy of the agenda and appendices from the FIG General Assembly meetings held at the Intercontinental Athenaeum Athens in Athens, Greece. I have also received copies of invitation and call for papers on the 3<sup>rd</sup> FIG Regional Conference on Surveying the Future – Contributions to Economic, Environmental and Social Development in Jakarta, Indonesia, October 3 – 7 2004.

### Other News

The University of Applied Science in Germany is introducing their International Master's Degree Programme to us. This internationally oriented programme is unique in combining the study of cartography and geodesy. It is supported by the German Academic Exchange Services (DAAD) and is designed to meet the needs of foreign students as well as internationally oriented German students. The Master's Degree Programme has been awarded full accreditation from the national accreditation agency ASIIN, since September 2003. Interested members who want further information can contact me for the brochures

### Fore-Sight

As this is the only medium for getting news and information to our members, let us be aware that there are costs involved in getting the newsletter out to members. Our only source of finance is from the member's annual membership fees. It is you the members that will keep the *Fore-Sight* going.

Members are also urged to put pen to paper and let us know about what you are doing. As surveyors, we work in isolation and communication is difficult, but need to keep in touch and be informed about the changes around us.

Thank you and please send us your views and comments to

**Masang T. Bangindo**  
Hon. Secretary / Treasurer.

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## CONDOLENCE MESSAGE

The Members, Council of the Association of Surveyors of PNG, Chairman and the Surveyors Board of PNG hereby express our deepest sorrow for the loss of our colleague and long-standing member (**Fellow**), **ADELBERT ALOIS**.

Our heartfelt sympathy is also extended to the late Adelbert's wife, Niakayap and children - Kaspar, Brian, Aumi, Mathew and Stephen. We share with you our thoughts and prayers at this time of sorrow. May the Lord comfort you.

The late Adelbert served our Association and the Surveyors Board with diligence in the Position of President, Secretary, Treasurer, Council Member, and Surveyors Board Member many times in the past.

**We salute you Adelbert**  
**Rest in Peace**

Stephen Patrick Low, President

Masang Timothy Bangindo,  
Hon. Sec / Treasurer

# Surveying Report : PNG's Napa Napa Oil Refinery Project

*By Masang T. Bangindo*

It is a pleasure to share with you my involvement in the construction of PNG's Napa Napa Oil Refinery Project dated March 2003 – December 2003. Project summary and photos taking from InterOil web site address <http://www.interoil.com>

*Below is a map of the Port Moresby area in Papua New Guinea. The line indicates the location of the refinery.*



*Refinery Site Preparation November 10<sup>th</sup> 2002.*



## Aim

The aim of this report is to familiarise our self with the type of survey tasks, terms used on the construction site and the survey methods used to carry them out.

## Brief

Arman Larmer Surveys was contracted by Clough Niugini to carry out setout surveys for the construction of PNG Refinery project. The surveys included and covered the following:

- Set out for footings excavation
- Set out levels for underside of blinding (U/S Blinding)
- Set out levels for underside of Footings (U/S FTG) top of blinding
- Set out centre line of Footing (CL FTG)
- Set out levels for top of concrete (TOC)
- Set out Pedestal corner.
- Set out bolt centre line, bolt projection and TOC
- As constructed surveys (as built) of bolt and TOC
- Set out steel base plate (packers) for steel columns ejection work
- Verticality survey of as constructed high steel columns and cylindrical stacks east/west and north/south alignments.
- Set out profile board for pipe track sleepers and footings.
- Set out profiles to levels, edges of sleepers and centre lines.

*Set out of footings foundation Process Area. 1m to 1.5m below ground level.  
Tank pad construction in the background*



#### **Control Marks**

Control marks and coordinates were supplied by Clough Niugini. The coordinate datum used was in PNG 94 and Local Grid in a 35 ° swing from Grid North. The level datum was in Mean Sea Level.

#### **Set Out Drawings**

All set out drawings and set out coordinates were supplied by and were to remain the property of Clough Niugini. This includes the field books, sketches, diagrams and calculations used on the project.

#### **Survey Equipment**

Survey equipment use was a Wild Lecia Total Station Theodolite (TC805) with associate.

#### **Methods Used**

The *Total Stations User programs* used were;

##### **Set Station**

*Station coordinates are set either manually from the keyboard or from the internal memory (IntMem) and set the Orientation.*

##### **Free Station (Resection method)**

*Two (2) to maximum of 5 known points with coordinates are observed to calculate the Free Station coordinates (X, Y, Z) Observations can be done in Face left and Face right. Cuts traversing time.*

##### **Set Out (by coordinates)**

*The setting-out technique is base on the coordinate system with the instrument turn until  $H_z = 00^{\circ}00'00''$  and the distance measured repeated to required accuracy i.e. close enough to "zero" eg.  $\pm 1\text{mm}$  to less then  $\pm 5\text{mm}$ .*

##### **Ref. Line (Reference Line)**

*This program is used to set out offsets in relation to base line, centre line (reference line) or rotated by angle and distance.*

#### **Survey Tolerance**

This set out survey was very precise with tolerance of  $\pm 2\text{mm}$  to  $\pm 3\text{mm}$  or under  $\pm 5\text{mm}$ .

Every set up station was needed to be checked before any set out work was carried out or as specified. Check measurements between points set out were carried out to make sure these points were set out correctly.

#### **Quality Control**

As part of the Quality Control, all equipment used on the project had to be tested or calibrated and calibration results provided.

#### **Surveyors Role**

Surveyors play a very important role in this sort of a multi construction set out project. They covers many things from actual survey set out work, monitoring construction, check surveys, as-built surveys or as-constructed surveys and certifying that the structures have met the required specifications or tolerances.

#### **Summary**

To summarise, the main aim of this brief report is to share with fellow surveyors and point out the type of surveys carried out and the method used to carry out these survey tasks

The survey tasks are the same but the methods used to carry them out is changing, i.e. with already established control, additional point coordinates (x, y, z.) can be derived using Free Station of the Total Stations User programs. No need for traversing, observing bearing and distance to calculate coordinates.

Points are set out using coordinate technique and not bearing and distances as previously used. This reduces calculation time as set out points are already supplied in coordinated data form.

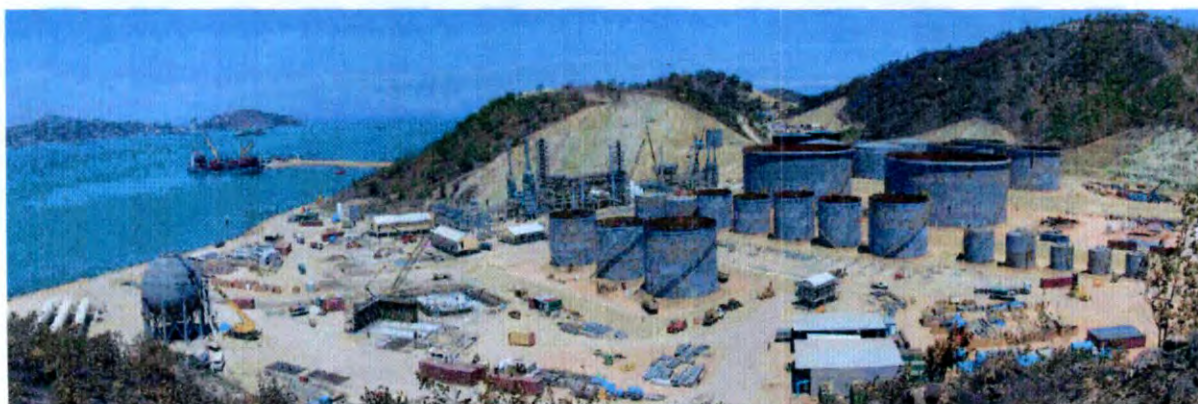
The Total Station User Programs are design to tackle survey calculation and it's a matter of getting to know how to use them and understand the data required for input and results it gives.

As measurement scientists, we must master our tools of trade to fully utilise them to give the best results and carry out survey task satisfactorily.

Construction set-out surveys are really taking a two dimensional figures or shapes on the plan or drawing and constructing them into three dimensional shape on the ground

### InterOil Refinery - Project Overview

*Tank Farm, Sphere, Propane Bullet tank, Control rooms, surge basin, Wastewater treatment plant, process area and jetty in the background. Refinery Panoramic view August 29<sup>th</sup> 2003. Looking from the East*



### The Investment Need for a Refinery in Papua New Guinea

Papua New Guinea is one of a few oiliferous countries that does not have its own refinery. All PNG crude oil is exported and all the nation's refined fuel requirements are imported from Singapore and Australia at distances of 2,200-7,000 km. InterOil is currently building a refinery that will use domestic crude to produce a range of petroleum products which will supply the entire PNG market leaving a balance of product that will be exported. InterOil's Project Agreement with the State of Papua New Guinea will enable the refinery to capture most of the freight costs and refinery margins, which are currently paid to international shipping and oil companies. The refinery will be beneficial to the economy of Papua New Guinea and its citizens in that valuable foreign exchange reserves currently used for the importation of refined products will now be conserved.

### State Support for the Project

The State has signed a Project Agreement and Extension Deed with InterOil in which the State has undertaken to ensure (if necessary, through legislation) that the domestic distributors purchase all of their petroleum products from the refinery (subject to availability), at the Import Parity Price. No dumping of cheaper products will be permitted. The Import Parity Price is the price set by the Price Controller on a monthly basis. This calculation is virtually identical to the "landed Cost Review" currently applied to the local distributors.

**The InterOil refinery project is currently the single largest investment project that is being undertaken in PNG.**

### The Advantages of InterOil

The InterOil core project team consists of a highly experienced group of individuals each with extensive experience in their chosen fields and wide ranging contacts within the oil industry. InterOil thus has tremendous depth of industry experience to draw on during the construction period and following. The internationally regarded contractor, Clough Engineering, based in Perth, Western Australia has been awarded the construction contract on a turnkey basis.

Due to the high level of confidence vested in the Directors and Management, InterOil has developed strong relationships with oil majors, Shell and BP and have procured the required finance of US\$85 million from the US Government Agency (OPIC) with which to complete the project. Upon completion of the project InterOil will have committed US\$209million to the "Refinery Project." To date InterOil continues to deliver on its promise to the Government of PNG and the shareholders of InterOil.

### The Refinery Description and Products

The refinery's nominal capacity is 32,500 bpd, sized to meet the current and predicted demand for the whole of the PNG market. The configuration that has been chosen takes advantage of the light sweet crude (such as Kutubu crude that is found in PNG) and so avoids the need for hydro treating or complex and expensive heavy oil processing such as catalytic cracking and coking. The refinery thus consists of only atmospheric distillation plus a modest catalytic reformer for production of gasoline blendstock ie an ultra-simple hydroskimming complex. This means that both capital cost and operating cost are comparable on a \$/barrel with the more typical 'world scale' refineries.

The nature of the crude oil will result in an excess of naphtha, which will be for export in two grade-one for the petrochemical feedstock and the other for ethylene production. The shipping of two grades commands a price premium as it avoids the more expensive 'splitting' process that would otherwise be required. Other products include propane, butane, gasoline, jet kerosene, diesel and low sulphur fuel oil (~0.13wt%).

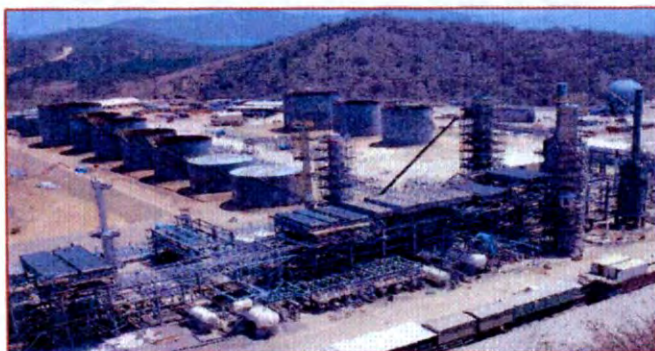
The refinery site is situated in an area surrounded by hills, which shield the view from the City of Port Moresby, across the harbour. Several measures have been taken to minimise visual impact. Great attention has been paid to environmental matters and despite the absence of formal regulations, InterOil has committed itself to meet or exceed the recommendations of the World Bank for new refinery installation.

Port Moresby has the only sheltered, deep-water harbour in the region. In fact, the harbour draft exceeds that of both Sydney and Brisbane. The attraction of this is reduced shipping costs for InterOil.



The refinery jetty design has been made flexible to facilitate vessels of all sizes up to 110,000 dwt as the refinery tank farm is determined by shipping parcel sizes and not refinery throughput. Small vessels can load crude oil from the PNG river systems and unload at the refinery. Crude tankers will then be able to load at the sheltered InterOil refinery terminal, avoiding costly demurrage problems currently experienced exporting PNG crude.

*Process area & tank farm from the west, 30.09.2003*



*Inside the control room*



Thank you for allowing me to share this report with you.

**Masang T. Bangindo.**

.... And thank you Masang for contributing such an interesting and well-informed article - Ed.

## Product Review : MobileMapper® from THALES NAVIGATION



### EASY-TO-USE AND EASY-TO-OWN MOBILE MAPPING

Shaun Pini at THEODIST Limited has on offer a remarkable handheld GPS unit that also provides the functionality of a GIS data logger. The MobileMapper® by Thales Navigation is a mobile mapping system combining full GIS data collection and navigation software in a handheld GPS receiver.

It is backed by powerful office support software for easy data display, editing and export. Export file formats supported are .SHP (ArcVIEW), .MIF (MapInfo) and .DXF (the universal drawing exchange format for use in eg. AutoCAD).

MobileMapper® includes the features most users really need - without the burden of overly complicated, rarely used functions.

Both the field and office software are specially designed for ease of use ensuring minimum training is required.

Magellan GPS Systems also offers Street Data that can be loaded onto the expandable SD card from DiscoverAus CD Software. And while that's fine if you're working in Australia - what about if your project is in PNG (?). Well, that's not a problem ... the MobileMapper receiver can display ESRI / MapInfo files as full colour maps so its easier to work with even complicated and unfamiliar GIS datasets. Data transfer to your PC or laptop is handled via a simple serial or USB cable but can also be transferred using the removable SD card.

Power supply is by 2 AA batteries, with up to 8 hours life with Alkaline batteries at 25° Celsius. There is an external power port for extended operation time.

MobileMapper is also highly shock resistant (can withstand a 1.5 meter drop to concrete), and water resistant (withstands water immersion for up to 30 minutes at a depth of one meter). Its basically waterproof and even floats.

### GPS Performance & Accuracy

Real Time Performance with WAAS (RMS) is <3 metres horizontal 2DRMS (95%).

It has 12 independent GPS and WAAS / EGNOS channels and an external port for differential corrections from RTCM receivers.

The built-in antenna is high sensitivity quadrifilar helix with an external antenna available as an option system accessory.

### Typical Areas of Application

**Utilities :** Maintaining power poles, distribution networks and oil and gas pipelines; providing damage assessment reports; documenting service calls.

**Forestry :** Mapping facilities, access roads, lease boundaries, fire boundaries, infestations and habitats.

**Agriculture & Farming :** Planning operations, preparing crop reports and chemical application permits, mapping facilities boundaries an roads

**Environment & Resource Management :** Preparing environmental impact reports, documenting water resources, landfill issues, mapping chemical leaks, wildlife habitats and storm damage

**Corporate & Govt Assets Management :** Managing geographically dispersed assets such as park facilities, fire hydrants, street lights and irrigations systems

**Public Safety :** Crime locations, etc

The **Field Software** combines GIS data collection functions with full navigation features. GIS data logging capabilities include :-

- GIS feature libraries for logging feature descriptions
- Support for logging point, line and area features
- Feature offset function for logging hard to reach features
- Feature nesting function for logging features without closing other features already being logged, eg. inserting a PMV bus stop while mapping a road
- Repeat feature function for rapid logging of features with identical descriptions, eg. poles along a road
- Grid mapping utility for collecting evenly distributed measurements (water depth, chemical concentration, etc) required for contour map generation

The **Office Software** is used for linking the MobileMapper to your GIS, and its key features include :-

- Feature library creation
- GIS data display and editing
- Uploading of GIS data and base maps to the MobileMapper receiver
- Definition of data collection grids
- Display in different coordinate systems and map datums
- Export of data to .SHP, .MIF and .DXF

### Cost : PNG K6762.80 incl GST

Its nearest competitor is the *Leica GS20 PDM* at around three times the price.

*Our thanks to THEODIST for this article.*

## SURVEYORS' CPD QUIZ

**When a line of levels is being run with a dumpy level on which the bubble is slightly out of adjustment, the best way to minimize errors in the elevation of the turning points is to :-**

- Centre the bubble before each rod reading
- Use the target for each rod reading
- Make the length of the fore-sights and back-sights approximately equal
- Make sure the legs of the tripod are embedded firmly in the ground

Answer "B" was the correct answer to the last question.

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## Members & Other News ...

**Surveyors** often do it hard in the bush, but what about when you're in town (?) ... how about being dedicated enough to the profession to put your thoughts and recommendations down on paper about *Customary Land Registration* and doing it by candlelight from a humble abode in a settlement. Our Council members really are a dedicated lot.



Its not often *The Cartographer* comes across a classic but check out the map at the left. *Port Moresby* doesn't rate a mention, neither does *Auckland*, and where's *Perth* - surely not in the A.C.T. where *Curtin* should be !!! And *Canberra* (?) - oh well. Maybe things are not what they seem ... could this be a case of 'how to lie with maps'? In fact the map is a 'thematic map' - and only shows the geographic location of universities that have a special connection with 'geomatics' or spatial data studies in this region.

**Surveyor David Sinclair** writes : "*Congratulations on the excellent production of the March 2004 edition of Fore-Sight. Very impressive. What a great variety of info, an enjoyable and informative read. I feel I have some insight into the activities and problems our profession is facing in PNG. Its lucky we are a resilient and versatile mob*". The Editor thanks David for his best wishes and in turn recognizes the members of Council who deserve praise for the excellent job they are doing and other members of the ASPNG who are contributing meaningfully to our profession ... and to this newsletter.

**Hydrographic Surveying Guru and former PNG Surveyor Dan Fitzhenry** is actively involved as you would expect with the *Australasian Hydrographic Society* - his e-mail contact is [fitzynet@bigpond.net.au](mailto:fitzynet@bigpond.net.au)

## "Light Refreshments ..."

"Mad dogs and Aerial Surveyors go out in the midday sun ...."



And just when he thought he was winning the 'Rat Race' ....



## Editorial Comment : CEE PEE DEE for UUU and MEE

Inspired by Rod Gould a year or so back, I was moved to write a Congress Paper about CPD - *Continuing Professional Development* or *Career Path Development* as its sometimes known. Regrettably I didn't get very far with the paper - I found it harder than I thought to write about CPD.

I did come up with a title though : "*CPD - In Pursuit of Professional Excellence*". The opening paragraph went something like this....

"IN PURSUIT OF PROFESSIONAL EXCELLENCE ... some are born to it, and some famous names come to mind - Julius Caesar, Adolf Hitler and Forest Gump. To the best of my knowledge only one of these was a surveyor. For others, its just plain hard slogging. However, there is an alternative and I'd like you to take time and consider - CPD - continuing professional development".

The heading topics I intended to address were *Initial Qualifications, Professional Associations, Work Experience, Need for Change,*

*What Is CPD, Incentives and Rewards, Opportunities, and A Role Model for PNG.* On reflection it would have been a fairly boring paper.

I am impressed with the current formulae proposed and put forward by our Council in relation to this important subject. I believe the intended *CPD Program Content* is achievable - and this applies equally to all members of our Association - whether they be new graduates or surveyors of vast experience. The majority of the areas require little or no expenditure by members - other than the spending of time, mainly in contributing to the affairs and or events organized by the Association. 20 CPD Points to be accrued over any two consecutive years is reasonable. I should imagine that in accruing many of those points it would not only enhance a surveyors professional standing but also be quite a bit of fun along the way.

Many members will not have to change - they are already accruing the points anyway by their current involvement. I look forward to being associated with the ASPNG CPD Program. - Ed.