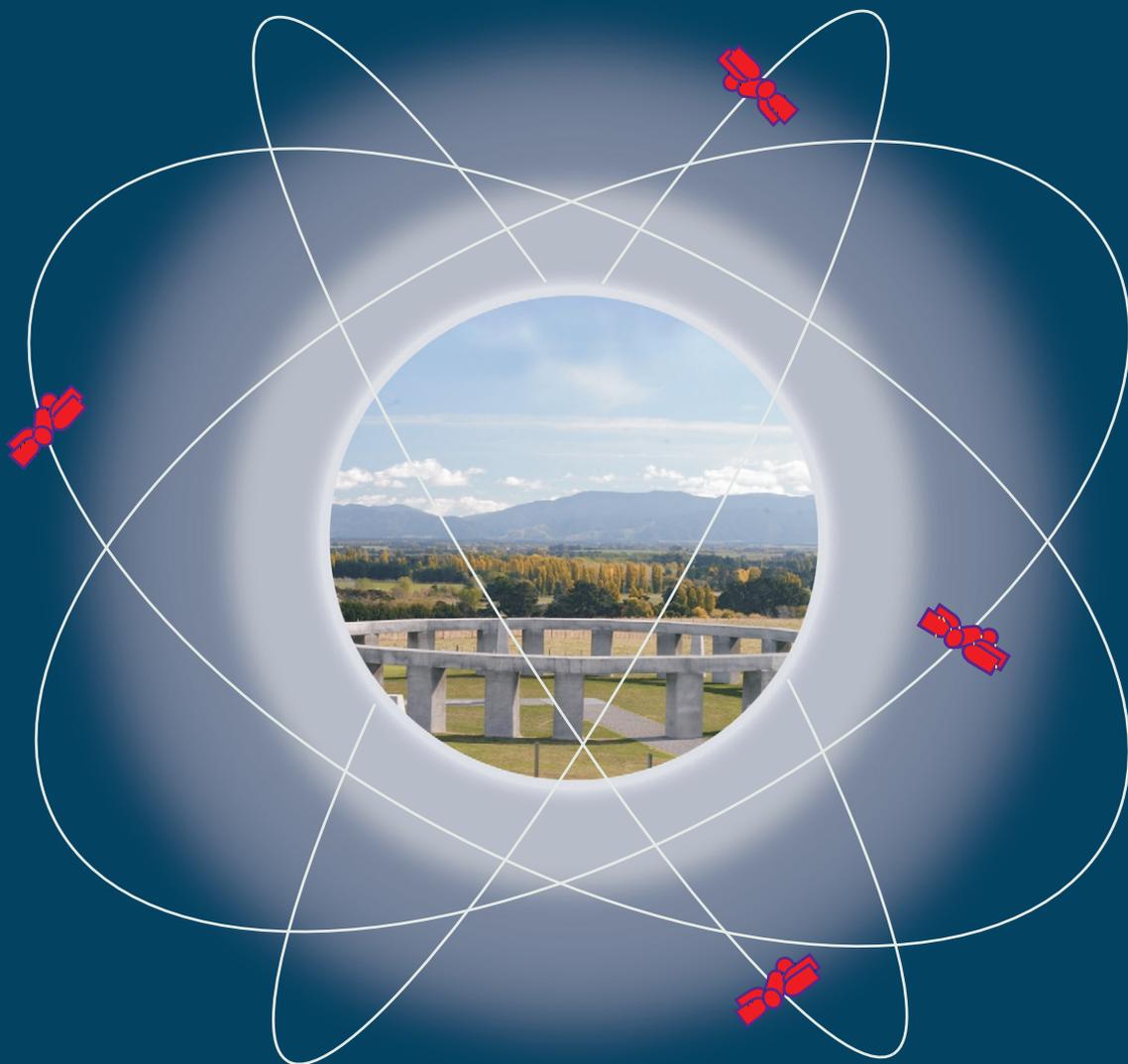


# NEW ZEALAND SURVEYOR

Journal of the New Zealand Institute of Surveyors No. 298 September 2008



- Public engagement in land-related decision issues through the use of Open Source Web mapping tools
- The built environment professional's contribution to major disaster management

- Video evidence and the land surveyor in a changing technological environment
- The Australasian Hydrographic Surveyors Certification Panel

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# NEW ZEALAND SURVEYOR

*The views expressed are those of the authors and are not necessarily those of the New Zealand Institute of Surveyors.*

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Mr. Bruce Wallen, Survey Manager, Discovery Marine Ltd

Two anonymous referees

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## COVER PICTURE

Stonehenge Aotearoa symbolises the long history of surveying and astronomy to which modern surveyors are heir. It is a working structure designed for its Wairarapa location, and was built by Phoenix Astronomical Society members with support of the Royal Society of NZ.

Photograph: Chris Picking

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**EDITORIAL**

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# Get on it!

**ANDREW TAYLOR**

Editor

'Get on it, not in it' is one of those business clichés we will hear, consider and understand, accept for its logic and succinctness, then ignore at our peril. As a profession we generally work too hard, take on too much pressure, take too few holidays, charge too little and do not balance work appropriately with life away from work. While this says a lot about the passion surveyors have for their work, there has to be a better way.

Short term financial targets, client pressures and deadlines, the joy of fieldwork, the stimulus of a job well done and the need to see material results all lead us to consistently prioritise work 'in' the business over work 'on' the business. The 'on it' part of our work can be referred to as the hard yards which include staff management or training, review or establishment of systems, business planning and goal setting as well as personal up-skilling – the non-chargeable stuff. This work can appear to lack concrete reward or recognition and it can be years before we feel anything has been achieved. Regularly devoting even small amounts of time to such matters can bring huge improvements in the efficiency, profitability and enjoyment of our work, and it is only through such improvements that we can ensure our businesses will endure and that they will then work properly for us.

There is nothing new in this message which has relevance to us individually and as a group. Previous editorials have hinted at the consequences to our profession of taking our eye off the bigger picture. We have been too 'in it' in the past and as a result new professions have successfully established focussing specifically on sizeable portions of our traditional work. Landscape architects are often required to confirm that our subdivisions are appropriate or not. Planners and resource management lawyers front hearings, often without a surveyor even in the room. Local authorities now need to be pushed hard to accept civil engineering certifications from surveyors. These are all examples of areas where our expertise is overlooked. At the same time we are seeing the dumbing down of the cadastre. GIS and GPS mean everyone thinks they can survey and map, so our core spatial measurement work is also being challenged. No one can be sure where all of this might leave the traditional surveyor.

The Institute of Surveyor's equivalent of 'Get on it, not in it' is embodied within the Registered Professional Surveyor and

Continuing Professional Development initiatives. A huge amount of good work is being carried out to keep practitioners informed of the changes in our world. But if we do not individually and collectively respond to these changes we will allow the standing of our profession to be further watered down. The next wave of change is upon us in the form of up-skilling to lead the movement towards sustainable development – it is important that we stand up and accept this challenge before someone else does.

Last year the Christchurch branch took up that opportunity and ran a very successful conference around the theme Developing Sustainable Societies. This year's theme of Development in a Changing Landscape aims to build on the previous conference and to stimulate your mind to further consider the next round of changes.

Allow the 2008 conference in Napier from 19 to 22 October to be the catalyst for a fresh look at what you do and how you do it. A full and varied conference has been prepared – the timetable including all details of the social and partner's programmes is available on the NZIS website [www.surveyors.org.nz](http://www.surveyors.org.nz).

A break will put steam in your tank to handle the Christmas rush. Bring your wife or partner to Hawke's Bay, Wine Country and stay on for a while. Late October is a terrific time to visit – winter will be over making way for our wonderful Mediterranean climate. Hawke's Bay is a region rich in delicious produce with beautiful scenery, award winning wines and wineries, gourmet experiences, unique wildlife, stunning architecture and a rich cultural heritage. This is the perfect excuse to experience a part of our country you otherwise might not visit.

Come and enjoy, breathe, relax, taste, escape, and refresh – all under the guise of Continuing Professional Development. That is what 'Get on it, not in it' is all about.

There may never be another year where it is so easy to take time away from business. Even if you pass up the opportunity to spend time in Hawke's Bay in October please consider 'Get on it, not in it'. Look at your business from the outside, think about the future, take a holiday, and carefully consider the work life balance.

See you soon in Napier.

## G BRENT HALL

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Brent Hall completed his PhD in Geography at McMaster University (Hamilton, Canada) in 1980. He has worked at the University of Auckland (Geography) and the Universities of Guelph (Geography), Wilfrid Laurier (Geography) and Waterloo (Planning and Geography) in Canada. In 2007 he was appointed as Professor and Dean of Surveying at the University of Otago. His teaching and research interests focus on Geographic Information Systems, especially the use of this technology for problem solving in developing countries and in decision support in various areas of Planning. He has co-authored one book on spatial database management and has an edited forthcoming book on Open Source approaches to spatial data handling. He has also authored or co-authored numerous chapters in other books and over 50 papers in refereed international journals. He has held a Visiting Chair in GIS at the University of Utrecht in the Netherlands and been an Erskine Fellow at the University of Canterbury. His most recent work focuses on Web-based GIS for decision support in various application domains.

# Public engagement in land-related decision issues through the use of Open Source Web mapping tools

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## ABSTRACT

This paper reports on the development of a web-based tool that facilitates broad-based community input into issues such as proposed subdivision design, redesign of existing land uses, and placement of community-based facilities among other things. The software is at the forefront of a new breed of participatory tools that allow users to interact with each other in real time through a map interface. Interaction can be between individuals and/or groups, with planners, land administrators, and with vested interest groups. The software, named MapChat, runs over the internet using a Web Map Service (WMS) and Open Source (OS) programming. The objectives of MapChat, its design and current functionality are described. A sample application for assessing existing and new sites for new affordable housing in the seasonal resort town of Collingwood, Ontario, Canada is presented. The paper concludes with observations regarding the practical use and extensions of the software for a range of land-related decision issues.

## INTRODUCTION

Recent innovations in the development of web-based geographic information systems (GIS) have resulted in much wider spatial data availability and web map use than ever before. The appearance and widespread use of Google Earth and Google Maps and complementary mapping tools such as Yahoo Maps and Microsoft's Digital Earth, Virtual Earth and Live Local have, at least in part, been responsible for this surge in interest. The new approaches to web mapping parallel increasing interest, especially within the academic community, in moving GIS technologies beyond traditional areas of use in government and the private sector into the public domain.

Developments in public participation GIS (PGIS) have the potential to turn traditional

GIS use on its head and elevate its public dimension to the forefront of the industry. Communities of web map users are rapidly emerging in non-traditional domains. The geographic dispersion of applications is rapidly diffusing away from North America and the nature of developers embraces more than the traditional GIS technicians and programmers. The new communities of application developers are essentially 'organic' and not well organised. However, the internet serves as a forum for the integration and transfer of ideas, applications and code (see, for example, <http://www.yes2wind.co.nz/maps/dynamic7.asp> and <http://googlemapsmania.blogspot.com/search/label/New%20Zealand>).

Within the PGIS academic research community, interest has focused on two areas, namely the investigation of protocols

to engage the public in the use of GIS, and the design and implementation of tools to develop and manage applications that use spatial data. This paper focuses on the intersection of these two areas of interest. Specifically, it describes a new software tool that allows local communities and interest groups to organise themselves and provide both formal and informal input into spatial decision issues.

The tool is named MapChat, to emphasise its mapping and discussion foci. Several characteristics distinguish it from other web-mapping applications, including Google Maps and Microsoft Live Local. Its main distinguishing characteristic is the use of a component-based open source (OS) approach, where existing OS tools are enhanced by extensive new coding. All source code is provided freely to other developers to implement, add to, and utilise. The tool facilitates synchronous chatting by instant messaging, similar to Microsoft's popular Instant Messenger tool. However, MapChat differs in that the medium of discussion is a 'live' web map, where existing and participant-created features are at the centre of the discussion.

This paper is structured as follows. The next section discusses the objectives of PGIS. Following this, the high-level design of MapChat is briefly described. An application of the software in the town of Collingwood, Ontario, Canada is presented. The conclusion summarises the main points of the paper and notes future software enhancements that are either in progress or planned.

## PUBLIC PARTICIPATION GIS

PGIS has gained a reputation as GIS in practice (Sieber 2006) through the large number of practical contributions it has made to the academic literature (see for example, Rambaldi and Weiner 2005; Rambaldi et al. 2006). These contributions are also evident in the popular and highly developed Open Forum on Participatory Geographic Information Systems and Technologies (<http://www.ppgis.net>).

The current state of PGIS practice is aptly

summarized in the following excerpt from Laituri (2006) in the Urban and Regional Information System Association's (URISA) public participation GIS conference proceedings of 2006:

- PGIS projects are long term.
- PGIS projects need funding to reflect the long term investment and sustainability.
- A well thought out, sensitive participation plan is essential.
- The plan must be sensitive to community time, input, and contribution. It is important to recognise variable scales of engagement (local, regional) and multiple avenues of engagement (meetings, weblogs).
- Tool development is critical for data visualization. Tools need to be developed that allow users to sift through data efficiently and effectively.
- PGIS projects must be demand driven and responsive to community needs. There needs to be recognition of multiple bottom lines or contexts for such projects (societal, economic, and environmental).
- Working with local knowledge is multi-faceted. It includes several common activities: filtering of goals and information through workshops and meetings; access on a Website, protocols for reciprocity, educational processes to facilitate such activity, development of web-based, open source products, establishment of networks and methods for access that include registration and passwords.
- PGIS involve complex activities of a multi/inter-disciplinary nature. New cooperative relationships are often the result of PGIS activities.

PGIS practice is increasingly focused on the internet and the use of OS resources to avoid the crippling costs, especially for individuals as well as small and non-profit users, of proprietary, closed systems. Moreover, PGIS seeks to engage multiple participants

(individuals and groups) using multiple techniques for participation, and the forms of PGIS practice are widely varied and contrasting. It involves a complex process of community engagement and is affected by contextual factors including cooperation of local, regional and central governments for sharing data resources and facilitating different levels of inclusion. Successful PGIS implementation requires knowledge of the people involved, their values, expectations, experiences, and collective wisdom, both in scientific and non-scientific form, as well as understanding socio-political power and control factors (Jankowski and Nyerges 2003). It also requires data processing and communication tools, as without these there is no basis for the discussion of spatial problems.

In essence, the goal of PGIS theory and practice is to facilitate non-technical participation in spatial decision issues by providing people with non-technical GIS-based tools that do not require specialist knowledge to use them. However, this goal has proven elusive as the PGIS paradigm has faced many challenges, especially as far as the development of practical tools is concerned. In this context, usability and access to the participation process are centrally important considerations.

To conceptualise the access dimension of PGIS, Carver (2003) proposed an adaptation of Arnstein's (1969) ladder of public participation that takes into account digital information, the use of the Internet and Web for communication, and spatial data that are accessible and displayable as a web map. Carver's (2003) 'e-participation' ladder includes five stages of increasing participation from online information, through restricted communications, online discussion, opinion surveys, and the actual use of online decision support systems (DSS). Tulloch and Shapiro (2003) expand on this concept, combining the e-participation ladder with ease of access to spatial data into a two-by-two matrix that contrasts four classes of usage, namely high/low participation, and easy/difficult access. They suggest that high participation and easy access will most likely lead to the

success of a PGIS project, assuming that fundamental software usability goals are met. The unstated assumption is that high participation and ease of access are necessary prerequisites for successful PGIS, regardless of other factors.

The ladder metaphor has been used extensively both to design and to evaluate public participation processes. Design is proactive and normally occurs at the beginning of a process. Evaluation is more critical and contemplative and normally occurs at the end of a process. One of the dominant characteristics of different approaches to PGIS design is that there is no standard design for an exercise that involves the use of spatial data and basic GIS-like tools. An approach that seeks explicitly to connect multiple users, whether individually or as a part of a common interest group, and that does not require them necessarily to be in the same place at the same time, is likely to be an approach with a high degree of participation as access becomes less of an issue. Hence, an approach that unites design and ease of access, where ease of access is built directly into the software, is likely to be successful. As noted earlier, two of the fundamental reasons for the popular success of Google Maps and the competition from Microsoft and Yahoo are their relevance to users and ease of use. These issues are taken up in both the rationale for and design of the participatory tool discussed in the following section.

However, simply fusing design with participation does not guarantee success in bringing a broader constituency of users and perspectives into spatial decision issues. Practical barriers must also be considered. In this context, there is a need for access to representational and accurate spatial data and their presentation in a user-friendly interface. Local challenges, such as socio-political representation and resistance to accepting inputs from non-experts, compound these barriers (Warren 2004).

Throughout more than a decade of intensive discussion and research in the PGIS domain, these issues still remain poorly understood and largely unresolved. The reasons are

embedded in the multiple complexities that impose themselves upon PGIS practice. Given the limited progress in these areas, there is perhaps an opportunity to look elsewhere for a solution, to expand the vision and examine the principles and dynamics in the arena of global participation via the Internet. In this regard, the popular mapping applications noted above are showing the academic community the way in terms of popularizing spatial data use.

Hence, a fundamental task is to craft accessible, participatory tools using non-proprietary, low cost methods that allow open communities of practice to evolve. There are two means of achieving this, namely via 'mash ups' of Google maps with other applications, or by adapting and customizing existing OS geospatial software to create new tools. The following section describes the high level design, implementation, and functionality of an OS tool named MapChat, the rationale for which is participation of individuals and/or groups, access, and ease of use.

### HIGH LEVEL DESIGN OF MAPCHAT

The MapChat tool relies on several existing OS projects that are commonly used for developing Web mapping applications. The main components include the pre-eminent OS object-relational database management system, PostgreSQL (<http://www.postgresql.org>), with the PostGIS (<http://postgis.refractor.net>) spatial extension. MapServer (<http://mapserver.gis.unm.edu>) for its WMS with the Chameleon template system (<http://chameleon.maptools.org>) deployed for the

user interface. Chameleon itself relies on the presence of server-side scripting using hypertext pre-processor (PHP) language (<http://www.php.net>), and the PHP MapScript library (<http://www.maptools.org>) that provides MapServer functions within PHP code.

MapChat itself consists of a web-based portal that provides secure user authentication (login), access to hosted discussions, and management tools programmed in PHP. MapChat discussions are presented in a modified Chameleon web-mapping interface. A series of customized widgets or tools are implemented to provide the unique controls and functions required by the tool to facilitate ease of access and use for non-technical users. Further, in order to create the multi-user environment required for MapChat, functions using Asynchronous JavaScript and XML (AJAX) are built into the interface. AJAX allows data to be sent and received by a Web page through an object in JavaScript code. Upon receipt of new data by a user's Web browser, functions are triggered depending on the content of the data (e.g., a chat message from one user to another in a MapChat discussion), which in turn dynamically update the hypertext markup language (HTML) presented to the user in his/her browser.

Figure 1 illustrates the general high level design of MapChat based on these components. In general, the tool can be hosted from any PHP-enabled web server that has local or remote access to a PostgreSQL/PostGIS database. In the case

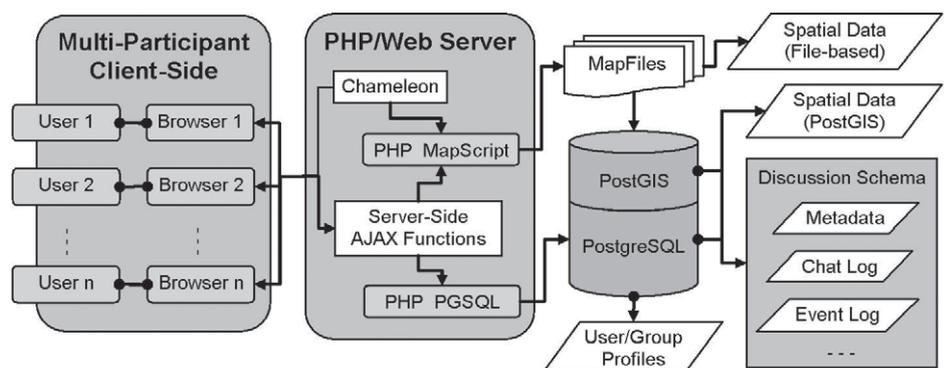
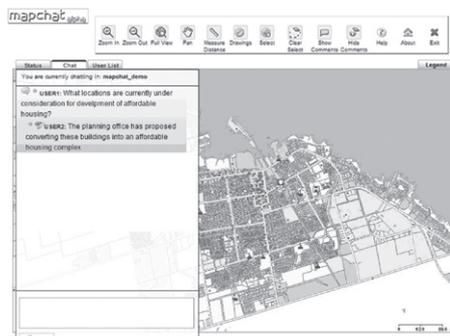


Figure 1: High level design of the MapChat Tool (Source: Hall and Leahy 2008)

of MapChat, the Apache web server (<http://www.apache.org>) is used. Users can login and use the tool using any modern, standards-compliant web browser that supports the use of dynamic HTML (DHTML) and AJAX (e.g. Internet Explorer, FireFox, Safari). The main mapping interface is rendered from the Chameleon template and sent as HTML code to the browser, while individual AJAX scripts receive input and return data in response to specific events called by the browser as users interact with the tool. Event data returned from AJAX requests are then processed by corresponding callback JavaScript functions in the browser.

The concept is simple, yet very powerful in terms of facilitating dispersed input into discussions using the web. Clearly, this allows for more democratic input into discussion over important planning issues that may have long term impacts not only in a local area, but as precedents for more dispersed instances of the same types of development elsewhere. The call for increased input and participation in planning is therefore made possible without the need to engage in face-to-face contact by being in the same place at the same time.

Individual participants in a MapChat project must first register to participate in the discussion. They are sent a unique login and password via email and permissions are assigned to them by the chat manager or moderator of the project. This allows individuals to participate by themselves in a chat or as members of a specific group. The use of group membership not only allows



**Figure 2: MapChat interface with Chat Tab Open (Source: Hall and Leahy 2008)**

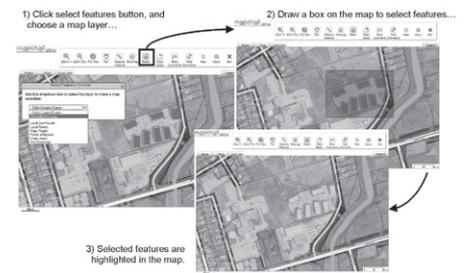
global privileges to be assigned to specific users, but it also allows topic-oriented discussions to be set up for specific groups of users. As noted above, group and individual discussions must be deliberately created and managed by chat administrator using the utilities provided through the MapChat portal. For example, the two users (user1 and user2) shown in Figure 2 would have been created by the administrator at the outset of the discussion.

In the event that multiple groups have been created or formed during a discussion, specific users might be included in a message thread at different times or some may be included with reduced privileges (e.g., to allow passive observation without the option to contribute to a discussion).

Typically, all chat messages appear for all users participating in a discussion. However, if specific recipient users and/or groups are explicitly identified by the sender of a message, then these messages will only be delivered to the corresponding individuals and/or groups, and will appear in a separate dialogue as a private message. This approach is consistent with most other forms of group discussion, where the capacity for private discussion between participants is normally an option (e.g., private messaging in web-based forums, or emailing individuals registered in an email list).

In some contexts, the capacity to do this may be important, where some participants may feel less confident about speaking openly without some level of confirmation from other individuals (similar to individuals who may feel reserved about speaking openly in face-to-face public meetings). In instances where factions exist or evolve in a discussion the ability to chat and strategize in private prior to re-entering the public discussion is also very important. Hence, the underlying design principles of accessibility, flexibility in implementation and interactivity between participants are explicitly recognised in the way that the tool manages discussions and allows participants to operate both publicly and privately with maximum ease.

In addition to reviewing map layers and

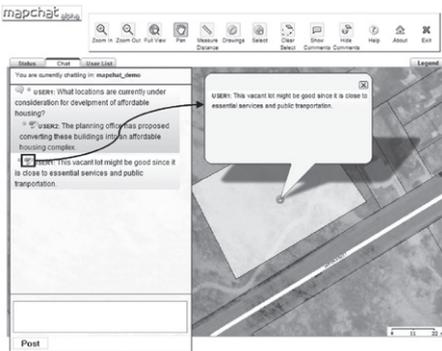


**Figure 3: Selection of Map Features for Chat Discussion (Source: Hall and Leahy 2008)**

chatting with other participants, one of the most innovative aspects of MapChat is the ability to link messages explicitly with existing map features, as well as with user defined points, lines or areas that describe features of interest. These linkages persevere in the MapChat map views and database unless explicitly deleted, making them available for individual and/or group review as well as analytic roll back and analysis of discussions and resolutions to spatial decision problems.

To select and comment on map features the user clicks on the map selection button in the toolbar and chooses a map layer from the interface shown in Figure 3 step 1.

Once a layer is chosen, the user must click and drag the mouse on the map canvas to draw a rectangle (step 2). When the mouse is released, the map selection tool executes a function that submits the coordinates along with the chosen layer, and the user's session ID. The user's current map view is loaded and the selected layer is queried to find the features within the coordinate extents. If any features are returned, their properties are recorded in a record set in the 'selected features' table in the corresponding discussion database, and a layer is added to the map to highlight these features in the map (step 3). If the features are a new selection, then a unique identifier is created to identify the records that are added to the selected features table, while an existing identifier is used if the features are added to a current selection set. This identifier is saved in the user's PHP session, so that subsequent actions can retrieve the corresponding records from the selected features table. Finally, when the



**Figure 4: Chat-Spatial Feature Linkage, by Participant (Source: Hall and Leahy 2008)**

AJAX function is complete, a new map view is generated and a response is returned to the browser to update the display.

The spatially-linked message is sent to other online users, and its selection identifier adds an icon to the message when it is displayed in the chat dialogue indicating it is associated with features in the map. When users click this icon their map view is zoomed to the extent of the associated features with clickable icons superimposed on the map view. When clicked, each icon opens a Google Maps-like chat ‘bubble’ that displays all messages contributed by any user associated with that feature (Figure 4).

To make the tool useful for resolving differences and identifying consensual points of reference on the map, a suite of functions are planned to assess the chat content (Gilbert 1997). Such assessment can take several forms of representation, as discussed by van Eemeren and Grootendorst (2004). Rinner (2006) has transferred the basis of earlier work in this area into the spatial domain, and Arias et al. (2000) and MacEachren and Brewer (2004) have suggested how spatial data presented via visual displays can be used in a multi-participant discussion. The task remains to program aspects of this research into MapChat software and this is high on the list of priorities for the next phase of development during the coming year.

**COLLINGWOOD EXAMPLE**

To illustrate the utility of MapChat for community-based discussions, a pilot study was undertaken in the seasonal resort



**Figure 5: Location of selected sites by SCATEH participants during MapChat discussion (source Noble 2007).**

town of Collingwood, Ontario, Canada. Collingwood is a popular skiing venue during the Canadian winter and is within an hour’s drive of metropolitan Toronto. Its location on the shores on Lake Huron’s Georgian Bay adds to its attractiveness.

These amenity factors have propelled property values upward in recent years. This has had a dual effect on local residents and the large seasonal workforce that services the ski fields in the winter months. Local residents can

opt to take a short term return on increased property values by selling. However, this may force them into lower quality housing if they remain in Collingwood. Seasonal workers are in a continual bind, where high price rental housing of reasonable quality makes affordable housing a scare commodity.

To address these issues, the local government of Simcoe County has formed an affordable housing task force, and several non-profit groups have started to organise themselves to discuss the problem and seek equitable solutions for local residents and seasonal workers. One such organisation is the Simcoe County Alliance to End Homelessness (SCATEH). This group is comprised of local citizens, representatives from other groups such as the Georgian Triangle Housing Resource Centre, and members of various religious congregations.

Members of SCATEH were approached in the spring of 2007 by researchers from the University of Waterloo, Ontario (UW) to discuss the use of MapChat as a means of

**Table 1: Sample comments made in chat log on selected properties for affordable housing (see Figure 5 - Source Noble 2007)**

Comment Number	Comment
4	The west side of this park has been zoned multi-res for the last 25 years, but was rezoned by the town at the request of neighbours who opposed its being developed as affordable housing.
5	This is the section that was to accommodate 54 units under the Canada-Ontario Affordable Housing agreement. It was rezoned from multi-res to parkland at the request of neighbours.
10	This looks like it is in the town’s official plan for multi units and affordable housing. It is close to the schools and to town and shopping. It has been left undeveloped for many years since the surrounding area has been developed. It is for sale. I am not sure of the zoning or density.
24	The markings for this property are not very accurate but this is the south end of the soccer field that became so controversial and the vacant land beside it that is privately owned. If this privately owned parcel could be acquired affordably there would be a fair amount of land available to develop. The youth soccer field could be reconfigured to run East to West on Ontario Street with the elimination of the tennis court that is no longer used and repositioning the playground to located behind
25	There are a number of existing dwellings that could be upgraded/renovated to provide a mix of rent geared to income and market value rental/purchase (freehold/condo) dwelling units.

reviewing the location of officially designated affordable housing in the community and identifying potential locations for new housing. It was decided to use MapChat in three distinct ways for this study (for a more extensive discussion of this study see Noble, 2007). First, a group session was convened where participants assembled at the same location at the same time, along with researchers from UW who helped to introduce them to the MapChat tool and to establish a comfort zone with its use. In this session, participants worked by themselves using MapChat to select and annotate locations without the multi-user chat function enabled. In this case, use of the tool is analogous to a digital diary of exploration of the digital map layers of the town relative to the problem of affordable housing location and supply.

After this initial experience with the software participants were asked to access the tool on the Internet from their own home and to continue commenting on and selecting features without the assistance of the UW researchers. This input could occur at any time after the initial workshop for several days duration. After the deadline passed, the tool was temporarily taken off line and all individual comments and selections were merged into a common database that all participants could access and review. In this case users were identified by a sequential userid in order to preserve their anonymity within the group. The common database was then posted to the MapChat Web site (<http://gaia.uwaterloo.ca/mapchat>) and was opened for additional discussion and comment within the group as a live multi-participant discussion where users could chat with one another, ask questions about other user's selections, and continue to refine their own selections and comments.

As a result of the three forms of interaction with the SCATEH participants, a series of potential sites for affordable housing were identified in the town of Collingwood. The sites and a sample of the associated comments are shown in Figure 5 (see circled parcels and Table 1 respectively).

Based upon the participant discussion, it was possible to take the identified sites, plus the associated comments and, after GIS-based post processing, to arrive at a set of commonly agreed potential affordable housing sites in the town. Use of GIS analysis assured that these sites were consistent with local planning guidelines for affordable housing location and settings in Collingwood. Additional GIS-based analysis was undertaken to ensure that the most preferred sites were not spatially clustered together, were within geographic proximity to bus routes and other basic urban services (schools, shopping etc.), and in medium to high density locations.

Experience from this application showed that the MapChat tool has great promise as a means of bringing non-technical users together in a virtual forum to discuss a spatial decision issue and to use basic yet very functional GIS tools on the Internet. The fact that all members of the SCATEH user group had only low to basic computing skills, and none had ever before interacted with spatial data of any sort on any computing platform, confirms that it is possible to use MapChat in the manner that the design of the software intended. However, this pilot study also revealed one or two areas in which the tool needs refinement of existing functions and creation of new extensions. These, along with concluding points are discussed in the next section.

## CONCLUSION

In comparison with the relatively large range of protocols, tools and techniques that have appeared in the PGIS literature and in practice during the past decade, MapChat offers, in principle, a viable means of engaging public participation in issues that deal with locational or spatial decision making. This is best assessed by comparing its range of capabilities with those discussed by Laurini (2001).

In the first instance, the tool was conceived and designed specifically to foster accessible individual and group communication using the most pervasive communication media the world has known, namely the Internet.

The tool was programmed to facilitate sophisticated, yet transparent, information management, including both spatial data in the form of map-based objects and associated informal, text-based, chat logs. Functional and flexible capabilities for graphic display of map layers were also developed. However, a number of other capabilities including spatial analysis, process models, advanced spatial visualization, decision models and structured group process were deliberately not implemented on the basis that these functions are not consistent with a tool intended to be used by primarily non-technical users.

Based on the summary of the Collingwood project, it is clear that its primary development goals were achieved. However, in order for the software to move beyond its chat and map feature selection functions, it is important to expand the code base during the coming year. In this regard, functions to view and seek compromise solutions to spatial decision problems and the ability to be able to identify a common spatial frame of reference for diverse participants are areas of future development.

The ability for an analyst to be able to mine a chat database for common concepts and terminologies used by participants may reveal insights into spatial thought processes and reveal how individuals conceptualize space and work through a decision problem cognitively, drawing upon different spatial concepts as they formulate a perspective on the problem. Also, the ability to identify differences and similarities in approaches to spatial recognition and basic analysis may provide useful insights into understanding spatial decision making for diverse groups of participants. In MapChat, the ability to be able to analyze the chat logs and spatial feature selections and annotations is particularly useful as chats can be rewound, stopped and investigated at any point of the discussion process.

Beyond the functional and technical extensions of the basic software it is important to expand the sphere of use of the tool to encompass additional spatial decision

problems with additional communities of users. This practice-based dimension of the tool is perhaps its most challenging, yet most rewarding aspect. In addition to developing new MapChat projects, propagation of the software through encouraging additional OS software developers to utilize the existing code base to customize their own applications and engaging public groups to develop their own map chat forums remain at the centre of the development strategy.

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# The built environment professional's contribution to major disaster management

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## SUMMARY

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The Royal Institution of Chartered Surveyors (RICS) President's Commission on Major Disaster Management was born out of the Indian Ocean tsunami, which so deeply affected people worldwide. The RICS identified a broad range of skills that would be of value to the long-term relief effort following a major disaster. Feedback from front line humanitarian relief agencies and non-government organisations (NGOs) has identified three points of intervention in the disaster cycle where these skills would add value: at the planning stage (disaster risk reduction); in the immediate aftermath phase (advice on short-medium term shelter); and in particular for the long-term reconstruction effort. The *Mind the Gap* report, published in June 2006 has been widely accepted by the Humanitarian Relief Community, including the UN and World Bank. Its main conclusions are –

- The world needs a better system and needs to be better prepared for dealing with major disasters.
- International (aid) agencies are geared to an efficient and fast response in terms of humanitarian relief. However, the same agencies and NGOs are not versed in the requirements of the reconstruction process. The paradox is that a major disaster is all too often a development issue
- The international community has no strategy for dealing with these longer-term development issues.

The RICS, through its Commission, is seeking to bring together an international coalition representing all the built environment skills. Already this coalition is coming together as a 'coalition of thought' but the drive is to set up an effective coalition of action to address the gaps.

## INTRODUCTION

When discussing major disasters, one will frequently think of the 2004 Indian Ocean tsunami, which killed nearly 250,000 people (Christian Aid 2005), affected the lives of many more, and will be known as one of the worst disasters in living memory (UN-

ISDR 2006). However, less well-publicised disasters, both natural and man-made, continue to affect lives worldwide. In 2006 alone there were 395 natural disasters affecting 134.5 million people worldwide, causing \$19 billion worth of damage (CRED 2007).

Although disasters affect many developed countries, it is developing countries where more fatalities and destruction occur, and where there is less capacity for re-development: 98% of those killed and affected by natural disasters were from developing countries (Tearfund 2005).

The RICS President's Commission on Major Disaster Management (MDMC) was convened after the 2004 Indian Ocean tsunami in response to members' concerns on what they and the RICS could do to help. Since then the Commission, made up of members of the RICS and other built environment professionals, has explored the strategic and practical ways it could bring the skills of RICS members and others involved in the built environment to provide help in the return to normality for those affected by disasters each year.

The MDMC's work has been driven by the recognised gap between relief and reconstruction (Lloyd-Jones 2006), addressing man-made as well as natural disasters. Whilst the emergency response to disasters swings into action with a relatively efficient process for immediate relief, the longer term need for shelter and reconstruction of homes and infrastructure is addressed more slowly. The tsunami is an example of a highly funded disaster, where the lack of adequate reconstruction remains an issue two years after the event: an example is that 70% of tsunami-affected people in India are still living in temporary shelter (Oxfam International 2006). Long-term reconstruction is 'constrained by the lack of planning, co-ordinated management and targeted funding of the response in the post-disaster recovery phase.' (Lloyd-Jones 2006).

Within the construction process after a disaster, there is an opportunity to 'build back better', by ensuring risk reduction, resilience, sustainability and community input are designed into redevelopment. Work by FIG Working Group 8.4 (FIG 2006) has highlighted the contribution of the surveyor as a geodetic engineer in disaster risk management, and the MDMC

seeks to utilize the wider contribution of various surveying disciplines, and the built environment professions generally.

## PROBLEMS IDENTIFIED WITH THE RECONSTRUCTION PROCESS

### *Why are communities becoming more vulnerable?*

An average of 354 disasters of natural origin occurred a year in the period 1991 to 1999, yet from 2000 to 2004 this rose to an average of 728 a year (IFRC 2005); at the same time, the numbers of people affected rose. There are a number of reasons why people are becoming more at risk of disasters. Whilst some disasters are due to natural causes, the affects are often actually 'man-made' in that vulnerability to natural disasters is increased by human land use patterns, and use of natural resources.

Climate change is predicted to cause more extreme weather events, with more rain and hurricanes, and more dry spells. The world is already experiencing this change - while 'the number of geophysical (sic) disasters - earthquakes, tsunamis and volcanic eruptions - has remained steady... the number of hydro-meteorological (weather-related) events - including droughts, windstorms and floods - has more than doubled since 1996.' (Christian Aid 2005).

Nearly three billion people (almost half the world's population) live in coastal zones. People were far less affected by the Indian Ocean tsunami where the coastal ecosystems were intact - forests and plantations protected coastal villages from the wave (UN-ISDR 2006). Overuse and damage of such resources have left people vulnerable where they once had protection.

Millions of people live in areas vulnerable to natural disasters due to rapid urban growth (Tippel 2007). More of the urban population is living in poverty, so increased urbanisation has led to more people being vulnerable due to insecure land rights, poorly built housing, and unstable informal settlements (ibid).

Whilst initiatives such as the Hyogo Framework for Disaster Risk Reduction (UN-ISDR 2005) have put into place

policies for risk reduction, tools and processes are required for implementing these policies (Lloyd-Jones 2006).

### *Mind the gap*

The MDMC hypothesised that there was a 'gap' between immediate humanitarian relief and long term reconstruction. In June 2006 it published its report *Mind the Gap* (Lloyd-Jones, T 2006), produced by the Max Locke Centre of the University of Westminster, UK, which identified this gap and gave reasons for why it may exist.

These reasons include institutional constraints, gaps in communication, lack of access to appropriate use of professional skills and knowledge to support the local effort, and failures in management and planning. It was also found that the funding of recovery from disasters is inflexible and short term-focused, which made it difficult to plan and create a smooth and rapid transition to long-term reconstruction. Since the report, the issue of funding has begun to be addressed by the World Bank (World Bank / UN-ISDR 2006) though this still remains an issue.

Lloyd-Jones found that the capacity of the local authority to plan and implement recovery strategies is usually very limited and often incapacitated as a result of the disaster - local and international NGOs, working with local communities, are needed to supplement government rehabilitation efforts. Land tenure issues are also a block to reconstruction because establishing and asserting property rights is often a major problem.

The international organisations involved in disaster relief are often geared towards providing immediate relief and usually exit the situation once short-term relief has been provided. On the other hand, with the Indian Ocean Tsunami there was enormous pressure to be visibly seen to spend the huge amounts of public donations that were made. However, NGO's acknowledged that they were not reconstruction experts - a report commissioned by the International Federation of Red Cross and Red Crescent Societies (IFRC), evaluating its response

during the first few weeks after the tsunami, 'concluded that the organisation had so much money that it entered areas – like house-building on a massive scale – that were outside its usual mandate and poorly handled' (Lloyd-Jones 2006). Despite the difficulties highlighted, *Mind the Gap* identified the feasibility of a framework to bridge this gap, using experiences from past disasters.

### ***What the RICS can bring***

The RICS supported the creation and continued work of its MDMC as part of its Royal Charter remit to work in the public interest. The MDMC can provide the humanitarian relief community with access to the built environment profession across the world through its members, and through connections with other built environment organizations. Following the *Mind the Gap* report, the MDMC has commissioned work on providing a framework to bridge this gap. The expertise and experience of RICS members can provide creative and long-lasting solutions to problems with risk reduction and reconstruction in a disaster scenario.

### ***Discussions with the humanitarian relief community and needs identified***

Meeting with those already involved in disaster relief and recovery has been crucial to the MDMC's approach in seeking ways to bridge the gap. From the discussions had with the humanitarian relief community (such as UN organisations, NGOs, professional bodies, the World Bank, the World Economic Forum) the following were key issues raised –

- The RICS is seen as a way for the community to access firms in the built environment private sector, which the community have not taken the time to engage in the past
- The NGO and humanitarian sector does not have expertise in the built environment
- There is a need for immediate professional advice at the scene of a disaster (for example mapping damage to infrastructure to identify routes

to sites, assessing buildings for safety before people can return to their homes, identifying rubble materials that can be used again), and during the recovery phase

- The international community is beginning to look at disaster relief in terms of risk reduction and preparedness, so the work of the Commissions should address this area.

## **HOW THE BUILT ENVIRONMENT PROFESSIONS CAN CONTRIBUTE**

### ***Surveyors skills set***

The *Mind the Gap* report (Lloyd-Jones 2006) identified the skills that surveyors could bring to disaster risk management and reconstruction –

- Assessing disaster-related damage
- Land surveying, GIS and rapid mapping of disaster impacts and risks
- Monitoring funding
- Valuation, cost planning and spending priorities; development finance
- Procurement and project management
- Sourcing construction materials and equipment
- Building quality audits pre- and post-disaster, particularly resistance to disaster risks
- Aiding logistical planning
- Aiding local government land administration, cadastral mapping
- Knowledge of land and property legislation, providing support on land rights and claims
- Knowledge of local regulatory frameworks and ways they could be improved
- Training and knowledge transfer
- Disaster risk assessment
- Links with other built environment professions; inter-disciplinary and team working
- Contacts with local business and industry

- Knowledge of appropriate forms of disaster-resistant construction and engineering.

There are chartered surveyors all over the world – RICS has 140,000 members in 146 countries. Local knowledge is important to applying some of these skills. It is important that those involved in disaster risk reduction and management are aware of the diversity of skills offered by the built environment community, and one of the aims of the RICS has been to raise awareness of these skills.

### ***Raising awareness of surveyor skills***

Discussions with NGOs and the humanitarian relief community indicated lack of awareness of what surveyors did. There are also many agencies who do not know who to contact for built environment advice when they are called to a disaster. Consequently, monitoring and evaluation of reconstruction efforts is being carried out without professional help. The MDMC have proposed a guide to the built environment profession for aid workers to help overcome this lack of knowledge and educate agencies in the basics of the range of skills that can be offered. In this respect the MDMC will be working with other built environment professions in the UK: the Royal Town Planning Institute (RTPI), Institute of Civil Engineers (ICE) and the Royal Institute of British Architects (RIBA), and with charities such as Architects for Aid, RedR-IHE and MapAction, who provide assistance around the world where professional help is needed.

### ***Bringing together a coalition of thought on the reconstruction process and providing assistance to this coalition***

The meetings that have been held with the humanitarian relief community have brought together a 'coalition of thought' seeking the best way forward in implementing disaster reduction strategies. They have recognized that it is important to bring together the relief and development communities to ensure a smooth transition from relief to reconstruction (Lloyd-Jones 2006). Stakeholder engagement is crucial to the work of the MDMC in bridging the gap.

Those with experience in disaster zones can provide valuable feedback on the development of a framework to bridge the gap, and they also are requesting help from the MDMC for projects which require surveyor expertise. An example of this is work with a major charity where the MDMC have helped with the tender process for the monitoring and evaluation of partner construction projects. The MDMC have also been asked to advise on an international risk assessment project by a UN agency.

This coalition of thought is beginning to develop an understanding of how the built environment profession can add value to work that needs doing in disaster risk reduction and reconstruction.

### *Bridging the gap*

The MDMC has commissioned the University of Salford, a six star research institute in the UK, to develop a framework to bridge the identified gap. Research has already been carried out on 'designing' the bridge, looking at a framework for disaster management and reconstruction, engaging with stakeholders to the framework, and identifying funding sources to develop and implement the framework.

The Process Protocol (University of Salford 1995) is a high level process map, with two sub levels, which outlines construction best practice from the very start of the process right through to handover. The Protocol is already widely used in the UK construction industry. Research has identified that the Process Protocol could be adapted for the disaster scenario to act as a tool for those working in reconstruction after a major disaster. This tool could be used by local, and national government, the humanitarian relief, and development communities.

As the work of the MDMC will address man-made and natural disasters, the MDMC is working to validate the Protocol in both scenarios. When this work has been carried out this summer, further work will be commissioned to consult with the future users of the Protocol to ensure that it is practical and usable by stakeholders.

### *Lobbying for build back better and other risk reduction measures*

Another area where the MDMC can bring its skills is in lobbying national and local governments to plan for and implement risk reduction measures, and ensure funding is made available for permanent reconstruction. Currently, attention is drawn to areas after a disaster, yet risk reduction is inadequately addressed in the development process. This has been identified to be due to lack of understanding and ownership, competition with competing issues, and lack of political will, despite the fact that risk reduction measures can cost less than post-disaster recovery (Tearfund 2005). From discussions with agencies attempting to implement the Hyogo Framework, local and national governments appear to be slow to incorporate risk reduction policies, with some being better than others.

As well as policies for risk reduction at a national and local level, there is also a gap in knowledge around risk. Whilst 86 disaster hot spots (Dilley et al 2005) have been identified, based on areas with more than 30% GDP, which are at risk of two or more hazards, information on condition of buildings, and their vulnerability to various disasters is not accessible in one location. The UN-ISDR aims to compile this information, and have asked the MDMC to advise on this.

### ISSUES FOR THE FUTURE

The issues raised by agencies involved in humanitarian relief and disaster risk reduction emphasise the need for a seamless as possible process from disaster recovery to development.

The MDMC hope to be able to provide ways to bridge this gap, by the work outlined above. The MDMC will also be working on a practical level to aid NGOs, for example in advising on tendering bids for reconstruction work and methodology on risk assessment surveys, monitoring and evaluating reconstruction projects commissioned by NGOs, bringing the private sector to the discussion, and being

the conduit for them to provide pro bono advice and guidance.

In the meantime, the MDMC will continue to bring together actors on the built environment and disaster management stage. It is important to remember that reconstruction is not a linear process – by 'building back better', homes and infrastructure become more resilient to the next disaster, and fit for purpose for the communities they are provided.

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# Video evidence and the land surveyor in a changing technological environment

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## ABSTRACT

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For land surveyors, there is a long established principle that the raw data from field observations and measurements as evidence should be available for inspection, checking and reprocessing long after the original surveyor has passed on. Before the advent of electronic data recording devices, there existed the simple rule that supposedly faulty observations should not be erased, but crossed out and the correct figure written in next to it in the field book. Nowadays, electronic data recording is a matter of course, and when this data serves as evidence in court there is the associated difficulty of ensuring that the data is admissible.

Digital photographs and video recordings are being used increasingly as items of evidence, including in land tenure claims and boundary disputes. There are different rules for admissibility depending on whether data is considered real or merely demonstrative. Other issues relate to the authenticity of the data presented as evidence, whether the evidence would prejudice either party and the inability of counsel to cross-examine the evidence, the weight the court will assign to particular items of evidence, and if the data is considered necessary and relevant to the matter at hand. Canada's courts, including the Supreme Court of Canada – Canada's highest court, have had to deal with this issue in a number of cases, and these serve to provide guidelines for gathering storing and presenting video evidence and electronic evidence in general.

## INTRODUCTION

The land surveyor has long filled the role of data collector, processor and interpreter of data as boundary evidence. In some jurisdictions, the surveyor's role can be considered to extend beyond that of expressing an expert opinion and be considered the field judge.

A long established principle is that the raw data from field observations and measurements as evidence should be available for inspection, checking and reprocessing long after the original surveyor has passed on. Hence the longstanding rule

that observations should not be erased, but crossed out and the new 'correct' observation written in next to the crossed out observation. Even if a blunder has been made, the incorrect observation should still be readable in the event of a later, perhaps independent, inspection. If the observations are complete, easily interpretable and unchanged, then a surveyor who did not make the observations can reprocess them and, under cross examination, probably confidently remark on their quality and on the quality of what was deduced from them by the original surveyor.

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Technology has changed the nature of the surveyor's data now, to the extent that most of it is in electronic format, and it poses problems for the long established data as evidence rule. It is difficult for a surveyor doing an independent audit of another surveyor's work to confidently state that the observations are authentic and that there has been no editing of the data. For example, GPS derived vectors are not measurements. Rather they are reductions of measurements and can be considered calculations. As mentioned above, long established practice is that one can erase a calculation and recompute the result, but one cannot erase an observation. Thus GPS and other similarly electronically captured observations should be retained in their original form. Even then, there may be questions as to the data's authenticity in court. Unlike hand written observations, the detection of tampering or editing is more difficult when dealing with electronic data.

Nowadays, multi-media data such as photographs, audio files and video files may be an important part of collected evidence relating to various aspects of rights in land, including boundaries. This is not entirely new, as the second author dealt with a case of extinctive prescription over a servitude (easement) in South Africa where the deciding evidence was an 8 mm film of children playing alongside a fence in the 1960s. The film clip was regarded as being sufficiently persuasive to show that the plaintiff had used the disputed land for more than 30 years as if no servitude existed over it. The defendant then conceded without proceeding to trial.

A second experience was where video was used to dispute the second author's and another surveyor's adjudication of the position of the high water mark of the ocean at Cape Aghulas at the southern tip of Africa. The other surveyor was unfortunate to be served the subpoena, and part of the trial proceedings consisted of watching numerous videos which the plaintiffs had taken, contesting our adjudication of the position of the high water mark. In this instance the case was thrown out of court on

a technicality (in essence, the plaintiffs were told they should not call the Supreme Court out of recess merely because they wanted to go fishing), and the admissibility of the videos did not enter proceedings.

Additionally, aboriginal case law in Canada has indicated increased acceptability of oral histories as evidence (e.g. *Delgamuukw v. British Columbia* 1997). Thus, a greater role for multi-media data can be contemplated in land law.

We discuss the fundamentals of the law of evidence in the context of these changed circumstances, with particular emphasis paid to the sufficiency of videotape evidence in disputes relating to land use, and capturing boundary evidence for claims to rights in land.

### VIDEO AS AN ACCEPTABLE FORM TO PRESENT EVIDENCE

The use of video as an evidentiary tool is a logical progression from the court's acceptance of conventional photography to aid triers of fact (judges, juries, dispute resolution tribunals) in coming to a decision in a dispute. As technology becomes more adept in recording human behaviour, the courts have generally responded in an accommodating manner, striving to see how the technological advancement can be integrated into the existing rules of evidence. To this end, the 1996 Supreme Court of Canada case *R. v. Nikolovski* (1996) is helpful, as Justice Cory indicates the acceptability of presenting evidence in video format:

"The powerful and probative record provided by the videotape should not be excluded when it can provide such valuable assistance in the search for truth. In the course of their deliberations, triers of fact will make their assessment of the weight that should be accorded the evidence of the videotape just as they assess the weight of the evidence given by *viva voce* [spoken] testimony."

*R. v. Nikolovski* (1996: para 22)

The reference to the weight accorded video evidence in Justice Cory's statement additionally indicates that a video recording

will be subjected to the same standards that are required of other forms of evidence. Therefore, to understand whether a particular videotape will be accepted in court, a working knowledge of the principles of evidence is required.

### LEGAL PRINCIPLES AFFECTING VIDEO EVIDENCE

Factors to consider when contemplating the use of a video recording as evidence include: whether the evidence is relevant to the issue in question, what type of evidence the court will classify the video to be, whether authentication is required and other admissibility concerns, and the weight accorded a video tape in the scheme of all the evidence presented in a particular case.

#### *Relevance*

While the *R. v. Nikolovski* (1996) case indicates videotape to be an appropriate method of presenting evidence generally, whether the evidence will be admissible as an exhibit in court is a different question altogether. Admissibility is concerned with what the evidence purports to prove, and it begins with an understanding of the legal concept of relevance.

Generally, evidence is relevant if it has the tendency to make the proposition for which it is tendered more probable (i.e. the evidence is probative – it serves to substantiate or test a proposition or inference) and the fact sought to be established concerns a matter in issue between the parties (i.e. the evidence is *material*). In *Anderson v. Maple Ridge* (1992: para 26) the British Columbia Court of Appeal indicated that this was a determination to be left to the trial judge and deemed it to be a matter of her logic and human experience. While this definition is admittedly vague, concerned parties may take solace in the fact that the threshold for proving whether evidence is relevant is very low. Indeed, the rule of general admissibility spelled out in *Morris v. R.* (1983: para 5) reflects this assertion, indicating that all evidence that is logically probative is admissible, and is only excluded when it is unduly prejudicial (e.g. when it would be

exaggerated; when it would confuse the jury; or when it is used for an unfair purpose).

### *Prejudicial*

When applied to the taking of videotape evidence, it is this balancing of the probative value of the evidence versus the prejudicial effect which is of initial importance to the surveyor.

The *Anderson v. Maple Ridge* (1992) case indicates that potential prejudicial effect can sometimes be overcome with a caution or warning to the triers of fact to avoid using the evidence in a prejudicial way. A wiser approach, however, would be to adopt filming techniques that minimize prejudice, and in this regard, the writings of Elliot Goldstein are very helpful. In terms of subject matter, Goldstein (1999: 46) discourages the use of sympathy arousing pictures, gruesome pictures, over-emphasis on particular matters, and innuendo of suspicion. It is the video-recorder as the dispassionate observer who will be of most assistance for the trier of fact, and embellishments (or even a discernable perspective) by the filmmaker will only detract from the evidence's value.

In addition to how content is presented, Goldstein (1999) outlines technical factors that could contribute to the evidence being found to be unfairly prejudicial. These include video editing, audio editing, tape and film speed distortion, colour distortion, optical distortion, as well as various other means of potential distortion that may arise from changes in technology. A person looking to tender a video recording for use as evidence should be cognisant of these potential criticisms, and be prepared to disclose the techniques that have been adopted to ensure the evidence is a true representation of what it purports to be.

### *Authentication*

As a preliminary standard, the legal concept of continuity should be respected for any video that is produced in contemplation of litigation. Continuity refers to the ability to show a chain of custody from retrieval of the exhibit to the courtroom, and operates

as a method to prove that the evidence was retrieved from a particular place and has not been tampered with (Stuesser 2005: 230).

Generally, video evidence is tendered in two different ways; either as real evidence or as demonstrative evidence. Demonstrative evidence consists of charts, models, and re-enactments and serves as a tool to assist the trier of fact in understanding other evidence in the case. In a trial involving land claims, for example, demonstrative evidence might be a diagram of the lands in dispute, a map of a geographical area, or perhaps aerial photos of the land plot, which contribute to the judge's understanding of particular features at issue in the case. Demonstrative evidence does not need authentication, but its worth depends on whether it accurately represents what it purports to show. The judge needs to be satisfied that the demonstration will genuinely assist the trier of fact and not distort the fact finding process. In essence, the concern remains whether the probative value outweighs the prejudicial effect (*R. v. Macdonald* 2000: para 42).

Alternatively, real evidence is tendered not as some helpful aid, but as evidence itself. In contrast to demonstrative evidence, real evidence needs to be authenticated. Again, we can make use of a trial involving land claims as an example. Where customary land use was an issue at trial, videotapes of people actually using the land would be an example of a videotape tendered as real evidence. Rather than acting as an aid, the videotape is tendered as evidence that the land is in fact used in a particular way. Goldstein outlines four different persons who are capable of authenticating real video evidence: The camera operator; a person present when the videotape was recorded (a bystander); a person qualified to state that the representation is accurate (a guard watching a monitor); or an expert witness (Goldstein 1999: 44-45; *R v. Schaffner* 1988).

Following a determination of whether or not authentication is required, the usual steps for authentication involve calling a witness with personal knowledge of the object, asking the witness to describe the object

before showing it to the witness, allowing the witness to examine and identify it as genuine, and asking that the object be entered as an exhibit, with an appropriate stamp applied by the clerk.

### *Weight*

Once a videotape has been accepted as an exhibit at trial, of principal interest to the party tendering it should be the evidentiary weight accorded to it. Rather than involving a legal test, weight is a judicial tool that allows for a more cautious approach to evaluating evidence than admissibility/exclusionary dichotomies permit. While a low threshold for determining relevance may guarantee a videotape's initial admissibility, its ultimate value relies on the judge's determination of weight. A determination of this kind permits a judge to admit a wide array of evidence, and to postpone an evaluation of the sufficiency of the evidence until all of the submissions have been made.

Goldstein outlines a handful of factors in presenting video evidence that may affect weight: the veracity of the authenticating witness; the kind, form, degree, and nature of any distortion, the quality of reproduction and degree of clarity; and the length of time the associated parties appear on videotape (Goldstein 1999: 47). As can be observed, these considerations are subtler than the evaluation of evidence at the admissibility stage, but otherwise differ very little. As a general guide, while relevance is concerned with the balance of probative evidence versus prejudicial effect, weight should be construed as an evaluator of both the sufficiency and the bias of the evidence.

While considering how a judge or jury will perceive the videotape, the tendering party should be equally aware that opposing counsel will be afforded an opportunity to make arguments concerning weight (just as they are afforded an opportunity to make arguments on admissibility). Video material that is produced in anticipation of future litigation should therefore appreciate the importance of consistent documentation, neutrality, objectivity, and similar virtues that uphold the purity of the recording,

while simultaneously striving to minimize any surrounding factors that may contribute to an apprehension of bias.

Finally, weight accorded to a given piece of evidence may differ from judge to judge, and will be entirely reliant on the facts of the case. There is no predicting what value a piece of evidence will ultimately hold at trial; rather, in the case of videotape evidence, the prudent gatherer should merely be aware of the court's appreciation of intelligent, thorough and unbiased investigation techniques.

### ***Hearsay and the ability to cross examine***

Hearsay is a statement, made out of court, which is offered as proof that what is stated is true. Generally, hearsay evidence is inadmissible in court both because it is unsworn testimony (it is not under oath) and also because there is no opportunity for cross examination on the statements (Delisle et al 2004). For example, returning to our issue of customary use in a land claim case, a videotape containing community members commenting on how they use their land would be subject to the hearsay rule and possibly deemed inadmissible: the comments are not under oath, neither have the comments been subjected to contemporaneous cross-examination.

Until the 1990 Supreme Court of Canada case *R v. Khan* (1990), the hearsay rule was regarded as virtually absolute, subject to various narrow categories of exceptions (such as admissions, dying declarations, declarations against one's own interests and spontaneous declarations). The judgment in *R v. Khan* (1990) instead indicates two legal requirements to allow for the introduction of hearsay evidence: Reliability and Necessity.

### ***First requirement for the inclusion of hearsay testimony: reliability***

In determining whether hearsay evidence is to be admitted, Justice McLachlin indicates in *R v. Khan* (1990) that the trier of fact must first ask whether the evidence is reliable. Issues that may be relevant to this determination might include the time when the statement was given, the general demeanour of the party making the

statement, and the absence of any reason to expect fabrication. In *R v. Khan* (1990), a disinterested declaration was found to hold the requisite quality of reliability, in that the statement was not made in favour of the party's interest.

Following this lead, the judgment in *R v. B* (K. G.) (1993: paras 75 – 112) provides a structured elaboration on this requirement of reliability, including an outline of the mitigating factors of videotape evidence with respect to hearsay testimony. Importantly, 3 key factors which contribute to the reliability of hearsay testimony are elucidated: oath, presence, and cross-examination.

In regards to the oath, Justice Lamer in *R v. B* (K.G.) (1993) indicates that:

“[T]he presence of an oath, solemn affirmation or solemn declaration will increase the evidentiary value of the statement when it is admitted at trial. The witness should be warned by the statement-taker that the statement may be used as evidence at a subsequent trial if the witness recants, and be advised of the specific criminal sanction that will accompany the making of a false statement. ... As does the formal swearing of the witness in the trial process, this warning and the administration of the oath should serve to bring home to the witness the gravity of the situation and his duty to tell the truth.”

For Canadian purposes, Lamer indicates that this warning should refer specifically to ss. 137, 139, and 140 of the *Criminal Code*, and the elements of and sanctions for those offences should be repeated by the statement-giver (*R v. B* (K.G.) 1993: para 95). In Alberta, oath-taking powers have been granted to the land surveyor by virtue of s.13 of the *Surveys Act*, R.S.A. 2000, c. S-26.

Secondly, Justice Lamer addresses the ability of videotaped testimony to capture the presence of the witness, observing that “in a very real sense, the evidence ceases to be hearsay in this important respect, since the hearsay declarant is brought before the trier of fact” through the use of the video recorder. Presence is indicated as the

“witness's reaction to questions, hesitation, degree of commitment to the statement being made, etc.,” and its value resides in the ability of the trier of fact to “assess the relationship between the interviewer and the witness to observe the extent to which the testimony of the witness is the product of the investigator's questioning.” For this assessment to be complete, the statement must be videotaped in its entirety.

If the video recording involves questioning, leading questions should be avoided by the examiner. There are two types of leading questions: a question that suggests the answer and a question that assumes a fact in dispute. Stuesser (2005: note 5 at 191) is instructive: “[I]t is trite law that the party who calls a witness is generally not permitted to ask the witness leading questions... The principle behind the rule is that in direct examination you are presenting witnesses favourable to your case, who are sympathetic towards your client and who are susceptible to your suggestions. Therefore, suggestions on your part are not permitted.” An examination full of leading questions may incur significant objections, and is likely to be given little weight at trial.

Thus, a video recording's ability to capture both the oath and the presence greatly contributes to a finding of reliability when evaluating whether hearsay testimony should be admitted at trial. Where a video recording remains deficient, however, is in its ability to allow for a contemporaneous cross-examination at the time the statement is made, which Lamer concludes “is the most important of the hearsay dangers.” While his judgment indicates that the inability to contemporaneously cross-examine can be quickly remedied by providing an opportunity to cross examine at trial, the helpfulness of such a suggestion is questionable when one considers why the hearsay evidence is being offered in the first instance. If the witness is on hand to be cross-examined during the trial, it would be far easier to avoid the legal particularities surrounding the hearsay statement in favour of *viva voce* testimony. Lamer recognizes this, of course, and in doing so provides

great assistance to those looking to introduce videotaped testimony at trial by holding that “the inability to cross-examine should not be a barrier to substantive admissibility,” where other, unnamed, “circumstantial guarantees of reliability may suffice to render such statements substantively admissible.” In light of such guarantees, the absence of cross-examination is to instead inform a determination of weight.

*Alleviating the decrease in reliability associated with an absence of contemporaneous cross examination*

When considering video evidence in relation to land, one of the ways Lamer’s suggestion of alternative guarantees of reliability might be heeded is through the testimony (and associated cross-examination) of an expert witness (who may already be on hand for the purposes of Authentication). For instance, in a situation where a multitude of statements is required to demonstrate the customary usage of a portion of land, by combining expert testimony with other measurements made by the expert (e.g. a land surveyor’s own measurements, an archaeological record), the expert may be in a better position to be cross-examined on the truth of the testimony than each individual community member who has provided a video-taped statement.

To this suggestion the Canadian case law, while still somewhat unsettled, convincingly indicates that where an expert’s opinion is based in part upon hearsay evidence (the videotaped statements) and in part upon admitted facts (historical measurements, the archaeological record) the matter is purely one of weight (R v. Jordan 1983; R v. Lavallee 1990). From such a position can be predicted that as sole reliance on the hearsay testimony as the basis for an expert opinion goes down, the weight attributed to the opinion will increase. Such a position serves as validation for Holloway’s (1952) comments that “a surveyor should never give any consideration to hearsay evidence which is not thoroughly confirmed by other independent evidence.” While the courts have become more flexible, these historical comments remain an instructive guide.

Summarising the above, it is likely that pre-recorded video-testimony can satisfy the first requirement of the hearsay exception if the testimony is sworn (under oath,) and the video recording is of a sufficient standard to communicate to the trier of fact the presence of the witness. Justice Lamer’s holding in R. v. B (K.G.) (1993) indicates that an inability to contemporaneously cross-examine witnesses on their recorded statements should not be a barrier to substantive admissibility, and instead should be a consideration when making a determination as to the weight accorded the evidence. Furthermore, in an analysis of the law surrounding hearsay and expert opinion, the writers suggest that testimony involving expert opinion based partly on the video-testimony and partly on the expert’s own findings will serve to bolster the reliability (as well as the general weight) accorded the evidence.

*Second requirement for the inclusion of hearsay testimony: necessity*

The second requirement outlined in R. v. Khan (1990) to allow for the introduction of hearsay evidence is necessity. Generally, necessity is interpreted as consisting of a determination of whether the reception of the hearsay statement is ‘reasonably necessary.’ In R. v. Khan (1990: 546), “sound evidence based on psychological assessments” indicating the potentially traumatic or harmful nature of having a child testify in an open court was suggested as a potential satisfier of the necessity requirement. R. v. Smith (1992) held that the death of a declarant before trial was also a sufficient scenario for a finding of necessity.

The clearest construal of this concept, cited in both R v. Smith (1992) and R v. B (K. G.) (1993), uses the criteria set out by Wigmore (1923) to define the classes which may be found to satisfy the necessity requirement:

- (1) The person whose assertion is offered may now be dead, or out of the jurisdiction, or insane, or otherwise unavailable for the purpose of testing. This is the commoner and more palpable reason.
- (2) The assertion may be such that we cannot expect, again, or at this time, to

get evidence of the same value from the same or other sources ... The necessity is not so great; perhaps hardly a necessity, only an expediency or convenience, can be predicated. But the principle is the same.

Thus, necessity generally operates to require a sufficient reason to accompany the admission of hearsay evidence into the court. To the consideration of a matter involving video evidence in relation to land, it should be stressed that whether or not necessity were to be determined is entirely fact based. Recognizing this caveat, we suggest that (in addition to the categories in which necessity might normally be determined) convenience may be a factor capable of satisfying the second class of necessity as set out by Wigmore (1923) above. If a number of statements were recorded testifying as to the customary usage of the land, and the witness statements are more useful in the context of the video displaying the land in question, the requirement of necessity might be established when the impossibility of gathering contemporaneous evidence of similar breadth and quality is considered.

**RELEVANCE TO VIDEOS OF BOUNDARY EVIDENCE**

Videos cameras and digital still cameras are being used increasingly by survey field crews nowadays. The challenge is to develop methods to ensure that the video clips and photographs will be considered as valid evidence in court. In fact, the following applies to most forms of electronically captured and stored evidence.

Videos and photographs may be of major assistance in resolving boundary disputes. For example, a witness called before a Board constituted under section 9 of the Surveys Act of Alberta to provide testimony on a survey error, may perhaps use a video to demonstrate aspects of his or her testimony, as per the high water mark dispute mentioned earlier. In this instance the witness is subject to cross examination and the video would merely be demonstrative. The video might provide valuable assistance in understanding the facts of the case. The witness can also

be cross examined as to the authenticity of the video and the facts that it purports to establish.

Likewise, if a land surveyor interviews a witness about evidence relating to a boundary, whether they are both compelled to attend under sections 14 and 15 of the Surveys Act or not, the statement of evidence has to be signed by the witness. Recording the interview on video would also serve to provide a more comprehensive picture of the case, particularly if the interview takes place in the field, and even more so if the deponent is illiterate. However, the primary evidence would be the signed written record – unless of course the video shows this to be inaccurate.

One possible problem arises if field crews take videos of objects in the field and this video then becomes necessary as evidence in litigation. Space does not afford a detailed description of the procedure to be followed in creating and storing this video. Suffice it to say, that the crew members and office staff should attempt as best they can to ensure that the video is regarded as authentic and will stand up to the evidence criteria mentioned above. It should still be useable as evidence if the person who took the video leaves the firm.

## CONCLUSION

The proliferation of digital video technology in recent years has introduced alternate ways for the surveyor to record his or her observations. In contemplation of a legal

role for these recordings, this paper has examined the evidentiary hurdles that must be addressed when considering the introduction of video evidence in relation to land to the courtroom. Beginning with the general acceptability of video evidence in Canadian courts, addressed above are the legal concepts of relevance, authentication, weight, hearsay, and the potential concerns created by the inability for opposing counsel to contemporaneously cross examine the witness testimony. While the relevant statutory provisions of the particular jurisdiction in which the evidence is sought to be used may nuance the common law standards set out above, a working knowledge of the principles of evidence will allow a surveyor to confidently make recordings and observations that attach a legal weight.

## ACKNOWLEDGEMENT

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Simon is also a Licensed Cadastral Surveyor and an Associate of Eliot Sinclair & Partners Ltd., a Christchurch based surveying, engineering and planning consultancy. Although no longer an active hydrographic surveyor, he is heavily involved in promoting a greater understanding of hydrographic surveying within the wider surveying fraternity, associated professions, the maritime industry, and state and national governments in New Zealand and Australia.

# Meeting certification needs of professional hydrographic surveyors: The Australasian Hydrographic Surveyors Certification Panel

## INTRODUCTION

The use of new and ever-more sophisticated technologies requires the hydrographic surveyor to have the necessary competencies and knowledge to undertake complex field operations. In multi-million dollar offshore oil and gas projects, tighter tolerances requiring greater skills and expertise are now demanded. In environmental mapping there is a greater need for the acquisition of accurate data. In traditional harbour and shipping route surveys, as ships get larger, exporters demand maximum loading while, at the same time, under keel clearances diminish. The responsibility resting on the shoulders of the hydrographic surveyor therefore becomes increasingly heavier.

Specialist certification in hydrography by the Australasian Hydrographic Surveyors Certification Panel (AHSCP) recognises the hydrographic surveyor's knowledge and experience to perform hydrographic surveying tasks, and the ability to apply that knowledge assessed against rigorous international standards. Certification is also a 'professionalism pathway', giving the hydrographic surveyor the opportunity to enter the mainstream of the Australasian surveying profession.

The certification process is designed to ensure that those purporting to be hydrographic surveying specialists have the appropriate skills, education and experience to meet

contemporary demands. For the surveyor it provides a simple, recognizable confirmation of competence. For employers, it provides security in knowing that the surveyor's academic knowledge and experience have met rigorous international standards; for the legislator, it provides a process whereby it can be legislated that competent professionals carry out critical hydrographic surveying tasks.

## HISTORICAL PERSPECTIVE

The practice of hydrographic surveying in New Zealand and Australia pre-dates that of land surveying by a considerable margin, if we consider that esteemed hydrographers such as Tasman, Dampier and Cook had charted significant areas of the coastline of both countries prior to European migration and settlement.

However the two surveying disciplines have evolved in very different ways. Until the end of World War II, hydrographic surveying was concerned exclusively with charting surveys for navigational purposes; a task which the British Royal Navy undertook on behalf of the Australian and New Zealand Governments until relatively recently. The Royal Australian Navy (RAN) assumed the responsibility for hydrographic surveying in 1920 and the publication of charts of its waters in 1942 (AHS 2007). The Royal New Zealand Navy (RNZN) assumed similar

responsibilities in 1949 (Haskins 1966). Today the National Hydrographic Authority in Australia is the RAN Hydrographer of Australia as the Head of the Australian Hydrographic Service. Land Information New Zealand is New Zealand's National Hydrographic Authority.

Up until the 1960s, most hydrographic surveyors were primarily 'ex-droggies' or qualified mariners and navigators who had learned their surveying 'on the job'. Because their work was quite different to that of their land surveying colleagues, hydrographic surveyors in Australia and New Zealand were for many years excluded from the development and regulation of the surveying profession (ISA nd).

It was the exploration for offshore oil and gas from the 1960s onwards, and the rapid development of ports and harbours that created an unprecedented demand for hydrographic surveying skills with a concurrent requirement for larger-scale, higher precision work. By the 1970s, an international consensus was forming around the need for some form of regulation and recognition of the hydrographic surveying profession. In 1977, the International Hydrographic Organisation (IHO), and the International Federation of Surveyors (FIG), resolved to form an International Advisory Board on Standards of Competence for Hydrographic Surveyors (IAB). The first set of *Standards of Competence for Hydrographic Surveyors* released in 1977, is reviewed and updated by the IAB on a regular basis. The current version, the ninth edition published in 2001 (IAB 2001), is available on the IHO website at <http://www.iho.shom.fr/>. In 2001 the IAB was expanded to incorporate the International Cartographic Organization (ICA) to become the IHO/FIG/ICA International Advisory Board.

In Australia, efforts to provide a regulatory framework were pursued without success during the 1980s. A partial resolution was found through the coincidence of two events in the early 1990s. Some 100 hydrographic surveyors voted unanimously, at the Hydrographic Society Symposium

in Sydney in 1991, to find a means of industry regulation and accreditation for hydrographic surveyors. In 1992 the Institution of Surveyors, Australia (ISA) expressed a wish to widen its membership to include all aspects of surveying, and agreed to the establishment of commissions for different specialities modelled on the FIG commissions (ISA nd).

The 1993 meeting of the Reciprocating Surveyors Boards of Australia and New Zealand was briefed on the need for the regulation or accreditation of hydrographic surveyors, and was supportive of the idea. The ISA Hydrographic Commission was subsequently formed and charged with the task of establishing a means of accreditation. The Australian Hydrographic Surveyors Accreditation Panel (AHSAP) was formed as a result.

The Panel held its first formal meeting under the chairmanship of Commodore John Leech (Hydrographer, RAN) in 1994, and so began the process of assessing candidates for accreditation (ISA nd). In 2001 the Australian Hydrographic Surveyors Accreditation Panel had become the *Australasian* Hydrographic Surveyors Accreditation Panel with the ratification of the Trans-Tasman agreement between the ISA and the New Zealand Institute of Surveyors (NZIS). The AHSAP had by this time accredited a number of applicants from New Zealand and other countries and its work was becoming recognized internationally.

In 2004, the ISA, and four related associations, founded the Spatial Sciences Institute (SSI). The Australasian Hydrographic Surveyors Accreditation Panel became the Australasian Hydrographic Surveyors Certification Panel (AHSCP), in line with SSI conventions that recognize accreditation of courses of study and certification of individuals. The AHSCP is jointly sponsored by the NZIS and SSI.

AHSCP certification is increasingly recognised in Australia and New Zealand, with the requirement for accredited or certified hydrographic surveyors now regularly specified in: government and

port authority contracts; national and state hydrographic surveying standards; and as a pre-requisite for employment within the industry.

### THE AUSTRALASIAN HYDROGRAPHIC SURVEYORS CERTIFICATION PANEL

The composition of the AHSCP, and the *Guidelines for the Certification of Hydrographic Surveyors* under which it operates, is formulated to meet international hydrographic standards.

Since its inception, the AHSCP has had an evolving and diversified membership, representing a broad range of hydrographic expertise. It represents all the IAB nominated hydrographic surveying specialisms representing:

- Nautical charting
- Coastal zone management
- Industrial offshore surveying
- Education
- Private practice

The incumbent RAN Hydrographer chairs the Panel as an ex-officio member. Panel members are all Level 1 Certified Hydrographic Surveyors and are elected to a two-year term of office. In order to maintain continuity, elections are held annually.

The current Panel consists of:

Chairman:

Commodore Rod Nairn, RAN (Hydrographer of Australia)

Members:

Mr Peter Barr (SSI Private Practice)

Commander Gareth Cann, RAN (SSI Nautical Charting)

Mr Simon Ironside (NZIS Education)

Mr Gareth Jones (SSI Industrial Offshore Surveying)

Mr John McCarthy (SSI Surveys for Coastal Zone Management)

The latest version of the AHSCP *Guidelines for Specialist Certification in Hydrography* (AHSCP nd) is available on the SSI website at [www.spatialsciences.org.au/](http://www.spatialsciences.org.au/) and the NZIS website at [www.surveyors.org.nz/hydrographic.asp](http://www.surveyors.org.nz/hydrographic.asp)

## THE CERTIFICATION PROCESS

Applicants are assessed in accordance with the IAB *Standards of Competence for Hydrographic Surveyors* Category A and Category B qualification criteria (IAB 2001).

Certification confers eligibility for membership of SSI, ISA or NZIS, subject to their approval. However certification is an open process and to obtain certification a person need not be a member of SSI, ISA or NZIS nor are successful applicants required to join any of these organizations.

Successful applicants are certified to Level 1 or Level 2 standard, which avoids confusion with Category A and Category B and recognizes the important point of difference, i.e. the evidence of appropriate experience. Any person who meets the certification standards is recognised as a 'Certified Professional (Hydrographic Surveying Level 1)' or 'Certified Professional (Hydrographic Surveying Level 2)'.

Applicants are assessed in terms of their overall hydrographic surveying expertise, rather than their hydrographic surveying specialisms.

### Level 1

The avenues available to the applicant for Level 1 certification, which can be regarded as the Professional Level, are –

#### 1. Category A course

And a minimum aggregate period of two years appropriate experience in practical hydrographic surveying, of which a substantial amount of the sea-time component should be in-charge time.

#### 2. Suitable bachelor degree or equivalent in surveying or an allied discipline together with a Category B course

And experience as stipulated above.

#### 3. Suitable bachelor degree or equivalent in surveying or an allied discipline

And a minimum aggregate period of five years of appropriate surveying experience, 2.5 years of which should be practical hydrographic surveying, of which a substantial amount of the sea-time component should be in-charge time.

#### 4. Long term practice

Knowledge and long-term practice in hydrographic surveying that, in the opinion of the AHSCP, demonstrates an expertise that is not less than that stipulated in the first three categories. The cut-off date for this 'grandfather' clause is 31 December 2008.

### Level 2

The alternative avenues available to the applicant for Level 2 certification, which can be regarded as the technician level, are:

#### 1. Category B course

And a minimum aggregate period of two years appropriate experience in practical hydrographic surveying.

#### 2. Surveying or allied discipline diploma or certificate

And a minimum aggregate period of five years of appropriate surveying experience, of which two and a half years should be practical hydrographic surveying.

#### 3. Long term practice

A knowledge of, and long-term practice in, hydrographic surveying that, in the opinion of the AHSCP, demonstrates an expertise that is not less than that stipulated in the first two categories. It is not possible to upgrade from Level 2 to Level 1 under this clause, and the cut-off date for this 'grandfather' clause is 31 December 2008.

### Assessment

Applicants are required to submit details of their educational qualifications, a detailed logbook of practical work experience verified by the applicant's supervisor, and a minimum of two references. Examples of relevant work undertaken or other information that will assist the assessment process may also be submitted.

Panel members individually assess each application and a final assessment is made at a teleconference or at face-to-face meetings, which are held quarterly throughout the year. Careful consideration is given to the applicant's expertise from each Panel

member's professional perspective and in terms of the current AHSCP guidelines. Decisions made by the Panel must be unanimous.

Applicants are often asked to provide further information by way of clarification or expansion of their logbook, or by submission of field work examples. In marginal cases the applicant's referees' are asked to provide additional background information to support the application. A personal interview by the Panel is also an option, although it is more common for an individual Panel member to conduct the interview and report back. This is principally a matter of logistics as the Panel consists of members living in various parts of Australia and in New Zealand, and it only meets on a face-to-face basis once a year.

As at December 2007, 145 Hydrographic Surveyors have been assessed by the AHSAP or AHSCP, with:

- 88 holding accreditation or certification at Level 1
- 33 holding accreditation or certification at Level 2
- 22 still in the process of assessment by the AHSCP
- 2 unable to be accredited at either Level 1 or Level 2.

### Sea-time and operational experience

The AHSCP sea-time requirement is largely based on Section 4.3 of the current edition of the *Standards of Competence for Hydrographic Surveyors* (IAB 2001), which states that:

"Appropriate national organizations, or alternatively institutions providing a programme which has been recognized, are encouraged to provide a certificate of field proficiency for successful academic students. It is suggested that such certificates be awarded only to students who present log book records demonstrating completion of at least 24 months of supervised field experience in hydrographic surveying, at least 50% of which was afloat."

For those without the Category A or B qualification but with an appropriate

surveying degree/diploma/certificate or equivalent the requirement is expanded to cover five years of appropriate surveying experience, two and a half years of which should be practical hydrographic surveying and, for Level 1 certification, a substantial amount of the sea-time component should be in-charge time.

The underlying philosophy of both the IAB and AHSCP sea-time requirement is recognition that an understanding of, and familiarity with, the marine environment is an essential part of the hydrographic surveyor's knowledge base, and is one of the distinguishing characteristics of the profession.

Traditionally, hydrographic surveyors (mostly navy employed) went to sea for long periods, and sea-time was regarded as an accurate measure of their competence. In the military sense, onboard a naval hydrographic vessel, such as *HMNZS Resolution* or *HMAS Melville* for example, sea-time is a reasonable measure of competence where a wide variety of circumstances are met and dealt with under supervision, which is an ideal way to gain experience. However civilian trained surveyors do not spend their life at sea, and the assumption in their case that sea-time is an indication of competence, is not necessarily valid.

Over time, the nature of the work undertaken by applicants has diversified, and there is a growing trend for hydrographic surveyors worldwide to spend less time at sea. This is true of most Western navies, research institutions, and the industrial offshore surveying sector where Norway pioneered the trend in the 1980s by limiting offshore personnel rotations to 14 days.

For many surveyors the sea-time component of the operational experience requirement is unrealistic and undervalues their hydrographic specialism. Coastal zone management, inland waterway and port and harbour surveyors in particular, have found it consistently difficult to 'get over the line', largely due to the nature of their work. Hydrographic survey field work in these disciplines may only constitute part

of a day's work, with the remainder of the day taken up with field work preparation, calculations or the processing of data from a previous survey. All are valid hydrographic surveying tasks undertaken onshore.

The Panel has come to the view that, although sea-time was intended as a de-facto measurement to ensure a high standard of competence, it is not intended to exclude surveyors from certain sectors and, in terms of competence assessment, a comprehensive understanding of data collection and interpretation is weighted equally with an understanding of the marine environment.

The current norm for the number of days worked offshore in any given year is 150 to 180. This range has been confirmed by RAN and the Marine Division of Fugro Survey Pty. Ltd. as representatives of the nautical charting and industrial offshore surveying sectors in Australia and New Zealand (although these norms hold for the profession as a whole, world-wide).

As the profession inevitably evolves to meet changing circumstances it is essential that the certification process acknowledge these changes. Therefore, whilst it is important to remain consistent with IAB standards, the Panel must be guided by contemporary practices in the equitable assessment of the sea-time component of operational experience requirement.

This has led to a re-evaluation of the sea-time requirement whereby sea-time is defined as time spent surveying whilst embarked in a hydrographic survey platform (which may be an aircraft). For the purposes of certification, one year of sea-time is defined as 180 days. For shore-based hydrographic surveyors, one day is defined as seven and a half hours.

### *Flow on*

The principle objective of the Panel since inception has been to certify a standard of hydrographic surveyor competency, thereby reducing the risk of unqualified and inexperienced persons carrying out hydrographic surveys.

The effect of hydrographic surveyor accreditation and certification has been

gradual. Over time, however, the cumulative effect has been the acceptance of the Level 1 and Level 2 standard as the de-facto qualification standard for the maritime industry, and for national and local/state government in Australia and New Zealand.

Three significant publications have been developed to supplement IHO Special Publication S44 – *Standards for Hydrographic Surveys* (IHO 2008) for the guidance of hydrographic surveys in Australia and New Zealand, which have the employment of AHSCP Certified Hydrographic Surveyors embedded in their guidelines:

- The Australian Ports and Marine Authorities Hydrographic Surveyors Forum, which is also chaired by the incumbent Hydrographer of Australia, has developed a set of generic *Principles for Gathering and Processing Hydrographic Information within Australian Ports* (AAPMA 2005), based on IHO standards with a tightening of error specifications to meet the requirements of an individual port's Under Keel Clearance formulae.
- *Standards for Hydrographic Surveys within Queensland Ports* (Maritime Safety Queensland 2007).
- *Good Practice Guidelines for Hydrographic Surveys in New Zealand Ports and Harbours* (Maritime New Zealand 2004).

In addition:

- The definitive Land Information New Zealand publication *Standards for Hydrographic Surveys (HYSPEC) Version 3* (LINZ 2001), whilst not explicitly referring to Level 1 Hydrographic Surveyors, requires the minimum qualification of the Surveyor-in Charge to be completion of a Category A accredited course, and a minimum of five years field experience in nautical charting.

### *Legislative recognition*

In the 13 years that the AHSCP has been active under the umbrella of the Institution of Surveyors, Australia, the New

Zealand Institute of Surveyors, and the Spatial Sciences Institute, there have been a number of changes that make our original commitment even more valid.

The level of responsibility borne by the Hydrographic Surveyor has increased considerably, largely influenced by the following factors:

- The increase in the size of ships has significantly decreased the tolerances for under keel clearance in ports and channels.
- The precise surveying requirements of the offshore oil and gas exploration industry including the construction of offshore platforms and submarine pipelines and cables.
- The increasing importance of the marine cadastre including the EEZ and national offshore boundaries to government.
- The imposition of national security measures in our ports and marine environment.

The role of the hydrographic surveyor is rapidly expanding in line with these factors, and it is the view of the AHSCP that these responsibilities cannot rest on unqualified and inexperienced shoulders. The AHSCP also recognizes that a hydrographic surveyor is a highly qualified international professional who needs to be certified to international standards, and therefore the process under which he or she is certified must be internationally recognised.

Just as the Crown has long realised its responsibility with respect to the guarantee of land titles in Australia and New Zealand by requiring the registration or licensing of cadastral surveyors, jurisdictions throughout the world are increasingly recognizing that hydrographic surveys, particularly port and harbour surveying, should only be undertaken by suitably qualified surveyors.

It is for this reason that the AHSCP is seeking to have its Specialist Certification in Hydrography process endorsed as the National Competency Standard for Hydrographic Surveyors in New Zealand

and Australia, and for the certification to be recognized internationally. To this end, the AHSCP has applied to the IAB for recognition of its certification process.

Already the de-facto Australasian standard, international recognition will clarify the status of AHSCP certification for the benefit of the relevant Australasian regulatory authorities. Our aim is the statutory recognition of AHSCP Accredited and Certified Hydrographic Surveyors as those professionals suitably qualified to undertake hydrographic surveys, in effect Registered Hydrographic Surveyors. The long-term objective of IAB recognition is full international transferability of hydrographic surveyor certification.

Recognition of certification schemes is currently outside the scope of the IAB, although it is considering such a scope change and the matter was discussed at a FIG Commission 4 (Hydrography) workshop in 2006. Minutes of the workshop note: "... the subject of international recognition or certification is contentious as it may conflict with standards and guidelines set out by existing national surveying authorities and programmes at state and regional level. There has to be a mandate from sponsoring organizations to support these certification programmes and the cost associated with them." (FIG 2006).

We do not accept that, in our case at least, endorsement is contentious and it is worth considering who the existing national surveying authorities are in this context. In New Zealand, the National Hydrographic Authority is within Land Information New Zealand (LINZ). The Authority sets and monitors the standards under which hydrographic surveys, in particular nautical charting, are conducted in New Zealand, and LINZ standards are aligned with IHO standards.

In Australia, the National Hydrographic Authority is ultimately the Hydrographer of Australia as Head of the Australian Hydrographic Service (AHS), which is part of the Royal Australian Navy. The AHS is responsible for the conduct of hydrographic

surveys in Australia, and for the co-ordination and determination of policy and standards, which covers both hydrographic surveying and charting. AHS standards are also aligned with IHO standards.

Notwithstanding the overarching responsibility of the AHS, the Australian States have responsibility for their waters out to the three-mile limit. Therefore the relevant State Regulatory Authorities will also need to be persuaded of the need for regulation.

There are undoubtedly some challenges involved in convincing these authorities to accept the principle of hydrographic surveyor registration and the AHSCP certification process as the mechanism for registration. This is particularly so in cross-jurisdictional areas such as ports and harbours, or within certain offshore limits. Nevertheless, we are encouraged by the wide acceptance of the certification process to date in our two countries.

### *International pathways*

The need to protect the public from non-qualified service providers is internationally recognised, and the concept of hydrographic surveyor certification in conjunction with professional institutions has been gaining momentum in the international arena for some time (Greenland 2006).

The Association of Canada Lands Surveyors (ACLS) is in the process of implementing a hydrographic surveyor certification programme that has several similarities to the AHSCP process. Under the Canadian system the ACLS Board of Examiners assesses applicants and awards the ACLS Hydrographic Surveyor Certificate.

Candidate eligibility is governed by:

- Academic qualification – Category A/B, Bachelor of Surveying degree or equivalent.
- Operational experience including marine training prerequisites – two years for those with Category A/B, five years for those with a surveying degree/equivalent.

Certification retention is contingent upon adherence to the ACLS Code of Ethics and verified continuing professional development (Leyzack, 2003).

The Royal Institution of Chartered Surveyors (RICS) offers a hydrographic surveying pathway to membership of its geomatics faculty. This requires the applicant to hold a recognised qualification, and completion of an Assessment of Professional Competence (APC) or Assessment of Technical Competence (ATC), depending on which membership category or pathway is chosen.

The RICS offers a variety of routes to membership. The geomatics APC is aimed principally at graduates, and the ATC at prospective technician members. The geomatics APC includes mandatory, core, and optional competencies, and involves up to 24 months structured training, 96 hours of professional development, interviews and assessment (RICS 2006). The RICS does not offer a hydrographic surveyor certification programme.

The International Marine Contractors Association (IMCA) provides training, certification and personal competence programmes, and guidance for hydrographic surveyors and related personnel employed in the offshore oil and gas industry (IMCA 2003). IMCA certification is focussed primarily on the establishment of consistent standards within the offshore industry. However IMCA is not a professional institution, offers no professional home and its certification process cannot be regarded as a professionalism pathway.

### QUEENSLAND BOARD OF SURVEYORS - HYDROGRAPHIC SURVEYOR ENDORSEMENT

Under the Surveyors Act 2003, Queensland has already introduced a form of hydrographic surveyor registration by way of registration endorsement, albeit only within its own jurisdiction. The AHSCP is engaged with the Queensland Board of Surveyors to ensure that this process reflects the principles of international qualification, certification and recognition.

Under Section 9 of the Act, the Board has been granted the authority to:

- (a) Establish competency frameworks for qualifying persons for registration and registration endorsements.
- (b) Accredite entities for assessing the competency of persons under the competency frameworks.

The registration process under the Act recognises the surveyor as a 'generalist' to which registration endorsements, such as the hydrographic surveying endorsement, attach.

For a candidate to obtain a hydrographic endorsement they must first be registered, which entails:

- Holding a degree in surveying from a recognised institution;
- Completing at least twelve months practical experience at a professional level;
- Completing a professional training agreement and a professional assessment project to the Board's satisfaction.

To be assessed under the endorsement module for hydrographic surveying, a Registered Surveyor is expected to have hydrographic skills, knowledge, and experience. The module assesses the surveyor's practical application of their hydrographic knowledge over an indicative period of 200 hours. The Board is currently considering whether candidates can opt for assessment by the AHSCP.

The AHSCP Chair has suggested to the Board that as the AHSCP guidelines are aligned to international standards of competence, they alone should be used for competence assessment. The previous AHSCP Chair, Commodore Bruce Kafer, has also highlighted the fact that, under its current policies, the Queensland Board of Surveyors can register surveyors with a hydrographic endorsement who do not meet AHSCP criteria, and that surveyors accredited or certified by the AHSCP might not be eligible for registration in Queensland. The Board have acknowledged

that under the Act there may be some instances where accredited or certified hydrographic surveyors may not be able to obtain registration in Queensland.

The Queensland hydrographic endorsement is not transportable, being limited to the Queensland State jurisdiction and the current model does not align to the principles of international qualification, certification and recognition or a national competency standard. However dialogue with the Queensland Board of Surveyors is continuing and the AHSCP is confident that an outcome acceptable to all parties can be achieved.

### CONTINUING PROFESSIONAL DEVELOPMENT

There is a community expectation that professionals have a high level of expertise in their chosen field (Cann 2006). Continuing Professional Development (CPD) is defined, within the context of the SSI, as the "... continuing training and education that develops and maintains relevance and currency of competencies and knowledge within and/or across the specialisations comprising the spatial sciences" (SSI 2008)

The NZIS CPD policy recognises that "... within the range of the surveyor's skills the maintenance of standards, currency of knowledge and the protection of the public are fundamental responsibilities" (NZIS 2007)

The ISA requires that "... A member shall endeavour to advance the science and practice of surveying and ... shall continue his professional development throughout his career ..." (ISA 1994), in accordance with the ISA Code of Ethics.

The AHSCP is committed to ensuring that certified hydrographic surveyors maintain a level of knowledge that is current and relevant within and across the hydrographic surveying profession. This is crucial to the acceptance and implementation of the National Competency Standard. Applicants who have obtained professional certification through the AHSCP are eligible for membership of ISA, NZIS and SSI (although membership of SSI is

open to all persons). However membership is not mandatory. The SSI requires that a member must achieve no fewer than 20 points per year, 15 of which must come from core CPD activities or 40 points over a two-year period, 30 of which must come from core CPD activities.

NZIS Members are expected to achieve at least 20 CPD points in a twelve-month period and Registered Professional Surveyors are required to achieve 50 CPD points over a 24-month period with a minimum of 20 points gained directly from their field of expertise. An ISA Certified Professional Surveyor must record a minimum of 20 CPD points during any two consecutive years as part of their continuing professional development. AHSCP Certified hydrographic surveyors who elect not to join SSI, NZIS or ISA are expected to maintain high professional standards and achieve the same amount of CPD points as members. Those who fail to comply with these requirements will have their certification revoked.

## CONCLUSION

The standards, accreditation and licensing for land-based surveyors are usually determined by national or state requirements. However, this regime is too restrictive for hydrographic surveying. The profession of hydrography is necessarily international. It provides the underlying data to support nautical products that enable the safe navigation of shipping globally. Hydrography involves bathymetry, sea-level analysis, precision positioning, seabed examination, and other marine measurements that support a range of other activities including environmental impact studies, marine scientific studies, infrastructure development, offshore exploration and resource exploitation.

Many of the major service providers and customers in these industries are multinational companies or governments, and the work of the hydrographic surveyor frequently transcends boundaries; one project may span local, regional, state and even national jurisdictions. For these reasons the standards applicable to hydrography must be internationally consistent.

It follows then that the education and certification of hydrographic surveyors has to be consistent with, and closely aligned to, international standards and norms. Though some hydrographic surveying training courses are recognised internationally through the FIG/IHO/ICA International Advisory Board on Standards of Competence for Hydrographic Surveyors, there is no internationally agreed certification process for recognizing the professional qualifications of individuals.

The AHSCP is attempting to fill this void. It has a certification process that assesses applicants based on their proven levels of training, qualifications and experience and it is the intention of the AHSCP that this process gains statutory recognition as the National Competency Standard for Hydrographic Surveying in Australia, New Zealand and internationally.

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Beeby, Nicol.....	HAMILTON 3240	Chisman, Lance.....	MOSGIEL 9092	Donn, Gerald.....	AUCKLAND 1141
Beggs, Diane.....	AUCKLAND 2010	Christiansen, Graham.....	Queensland 4341 AUSTRALIA	Downey, John.....	TAURANGA 3140
Belcher, Alan.....	CHRISTCHURCH 8025	Christie, James.....	NEW PLYMOUTH 4310	Downing, Grant.....	TAURANGA 3112
Belcher, John.....	CHRISTCHURCH 8140	Chung, Hon Cheong.....	Sabah 88901 MALAYSIA	Doy, Alan.....	NEW PLYMOUTH 4340
Belgrave, Vincent.....	PICTON 7251	Churchill, David.....	AUCKLAND 2142	Drinkwater, Spencer.....	OREWA 0946
Bell, Albion.....	TAUMARANUI 3920	Clapham, Mark.....	GISBORNE 4040	Drown, Peter.....	LOWER HUTT 5040
Bell, James.....	NSW 2587 AUSTRALIA	Clapperton, John.....	AUCKLAND 1348	Dryden, John.....	CHRISTCHURCH 8052
Benge, Russell.....	CHRISTCHURCH 8141	Clark, Gary.....	NORTH SHORE 0752	Dudding, Ian.....	NEW PLYMOUTH 4312
Benning, Michael.....	AUCKLAND 1141	Clark, Gordon.....	OAMARU 9444	Duley, Ralph.....	NAPIER 4183
Benton, Keith.....	NORTH SHORE CITY 0620	Clark, Kathryn.....	AUCKLAND 1141	Duncan, Brian.....	AUCKLAND 1344
Besseling, Adrian.....	GISBORNE 4040	Clark, Mairi.....	WELLINGTON 6011	Dunwoodie, Morrison.....	THAMES 3540
Bevin, Anthony.....	WELLINGTON 5032	Clark, Neil.....	CHRISTCHURCH 8440	Durkin, Paul.....	CHRISTCHURCH 8247
Birch, Kevin.....	PUKEKOHE 2340	Clements, Louis.....	AUCKLAND 2013	Dwyer, Neill.....	AUCKLAND 1023
Birch, William.....	PUKEKOHE 2340	Clouston, Andrew.....	WELLINGTON 6145	Dyer, Mark.....	ROTORUA 3040
Birt, Wayne.....	WHANGAREI 0112	Coburn, Leah.....	London SW17 8RL UNITED KINGDOM	Dyett, David.....	WELLINGTON 6003
Blackman, Andrew.....	MANUKAU CITY 2241	Cochran, Mark.....	AUCKLAND 1141	Dymock, Peter.....	CROMWELL 9342
Blaikie, Allan.....	CHRISTCHURCH 7400	Cocks, Alistair.....	CHRISTCHURCH 8140	Eagleson, Don.....	AUCKLAND 0748
Blaikie, Norman.....	Victoria 3006 AUSTRALIA	Cogswell, Phillip.....	CAMBRIDGE 3450	Easdale, Frank.....	CHRISTCHURCH 8013
Blair, Adam.....	TAUPO 3351	Cogswell, Ronald.....	CAMBRIDGE 3434	East, Kevin.....	ALBANY 0792
Blance, Ian.....	TAUMARANUI 3946	Coll, Christopher.....	WESTPORT 7866	Eathorne, Norman.....	NAPIER 4112
Bland, Geoffrey.....	NEW PLYMOUTH 4340	Collie, John.....	TAURANGA 3140	Edgar, Mark.....	PARAPARAUMU 5254

Elder, George	ALEXANDRA 9320	Grierson, Ralph	Victoria 3101 AUSTRALIA	Hudson, Bennick	GISBORNE 4010
Ellison, Paul	TAURANGA 3142	Griffin, Kerry	OREWA 0946	Hudson, Richard	AUCKLAND 0640
Elliston, Gordon	KATI KATI 3178	Griffin, Robert	TITOKI PDC 0112	Hughes, Charles	CROMWELL 9342
Elrick, Michael	WHANGAREI 0140	Grigg, Alexander	NELSON 7010	Hughes, David	Oberrohrdorf CH-5452 SWITZERLAND
Endicott-Davies, Lyndon	AUCKLAND 1141	Gudgin, Anthony	OREWA 0946	Hughes, Peter	WELLINGTON 6037
Ericson, Paul	GISBORNE 4040	Gunn, Warren	HASTINGS 4156	Hunt, John	AUCKLAND 0640
Eyeington, Robert	HAMILTON 3206	Gutsell, Jeremy	CHRISTCHURCH 8141	Hunter, Andrew	Alberta T2W 429 CANADA
Falconer, Patricia	INVERCARGILL 9810	Gwyn, Jonathan	TE AWAMUTU 3840	Hurford, Craig	PARAPARAUMU 5254
Falis, Michal	THAMES 3540	Haanen, Anselm	WELLINGTON 6145	Hurring, Brendan	TAURANGA 3140
Falloon, David	Nadi FIJI	Haddon, Paul	DUNEDIN 9054	Hurst, John	ROTORUA 3010
Falloon, Garth	TAUPO 3351	Halkett, John	HAMILTON HM FX BERMUDA	Innes, Mingo	WANAKA 9343
Farquhar, Hugh	PALMERSTON NORTH 4410	Hall, Andrew	CHRISTCHURCH 8140	Ireland, Craig	TE ANAU 9600
Faulkner, Neale	AUCKLAND 1141	Hall, Peter	TIMARU 7910	Ironside, Simon	CHRISTCHURCH 8140
Fear, Robin	CHRISTCHURCH 8081	Hallam, Deborah	TAURANGA 3141	Irving, Jeffrey	CHRISTCHURCH 8440
Fitch, Blair	Queensland 4573 AUSTRALIA	Hallam, Rowan	AUCKLAND 1141	Ison, David	WAITAKERE 0657
Finch, Philip	OPUA 0200	Hallett, Leon	MOSGIEL 9024	Jackson, Blair	INVERCARGILL 9840
Fink, Colin	PALMERSTON NORTH 4440	Halsey, David	AUCKLAND 1024	Jackson, Colin	NEW PLYMOUTH 4340
Finlay, Donald	AUCKLAND 1740	Hampson, Rogan	NORTH HARBOUR 0751	Jackson, Phil	IL 61550 U. S. A.
Finlay, Russell	TIMARU 7940	Han, Andrew	JOHNSONVILLE 6440	Jackson, Ron	AUCKLAND 1025
Finlayson, Mark	AUCKLAND 1149	Handisides, Anthony	CHRISTCHURCH 8041	James, Timothy	AUCKLAND 1141
Finney, Robert	AUCKLAND 0948	Hanify, Bruce	LOWER HUTT 5019	Janes, Rodney	HAMILTON 3210
Fitzgerald, Josephine	WELLINGTON 6140	Hannah, John	DUNEDIN 9054	Jeffery, Douglas	ROTORUA 3015
Flaherty, Michael	ROTORUA 3040	Hanrahan, Malcolm	RANGIORA 7440	Jellie, Simon	WELLINGTON 6143
Flaugere, Pascal	NEW PLYMOUTH 4310	Hansen, Christopher	QUEENSTOWN 9348	Jennings, Robert	WELLINGTON 6011
Fletcher, Michelle	CHRISTCHURCH 8024	Hansen, Kai	Victoria 3806 AUSTRALIA	Jepsen, Roderick	Suva FIJI
Fluker, Stuart	WHANGAPARAOA 0945	Harder, Graeme	KATIKATI 3177	Johnston, David	MOSGIEL 9053
Foot, Brian	HASTINGS 4156	Harding, Lawrence	UPPER HUTT 5018	Johnston, Graeme T	OTAGO 9018
Ford, David	DUNEDIN 9010	Harford, Kerry	QUEENSTOWN 9348	Johnstone, David	AUCKLAND 0630
Forde, Christopher	CHRISTCHURCH 8052	Harris, Gavin	MATAMATA 3440	Joll, Ian	INVERCARGILL 9840
Fordyce, Barry	TAURANGA 3110	Harrison, David	Victoria 3104 AUSTRALIA	Jolly, Stephen	TAUPO 3351
Forrester, Craig	PUKEKOHE 2340	Harrison, John	WANGANUI 4574	Jones, Basil	DUNEDIN 9010
Forsyth, David	TAUPO 3351	Hart, Nathan	Buckinghamshire HP6 6QE ENGLAND	Jones, John	AUCKLAND 0600
Fortune, Murray	GORE 9740	Hartnell, Graeme	MARTON 4741	Jones, Robert	NELSON 7042
Foster, Michael	JOHNSONVILLE 6440	Harvey, Campbell	TAURANGA 3140	Jones, Simon	NELSON 7040
Foster, Tania	CHRISTCHURCH 8140	Hastings, Josette	ROTORUA 3015	Jopson, Fraser	DUNEDIN 9054
Fowler, Graham	CHRISTCHURCH 8141	Hastings, Rupert	ROTORUA 3015	Jorgensen, Ralph	WELLINGTON 6140
Fox, Carl	CHRISTCHURCH 8141	Hatfield, Donald	DUNEDIN 9058	Joyce, Peter	WANAKA 9343
Fox, David	CHRISTCHURCH 8141	Hatten, Mark	AUCKLAND 0753	Judd, Kevin	PALMERSTON NORTH 4440
Fox, Stephen	WELLINGTON 6140	Hawes, Christopher	CHRISTCHURCH 8140	Juffermans, Allen	NEW PLYMOUTH 4340
Francis, Paul	TAURANGA 3140	Hawke, Anthony	BLLENHEIM 7240	Jull, Graham	NORTH SHORE 0630
Fraser, Tony	CHRISTCHURCH 8023	Hawley, Peter	WHITIANGA 3591	Kam, Barry	BAY OF ISLANDS 0245
Friel, Edward	DUNEDIN 9012	Hayes, Martin	CHRISTCHURCH 8140	Keen, Ron	LAKE HAWEA 9345
Fry, Andrew	CHRISTCHURCH 8141	Hayman, Anthony	WARKWORTH 0941	Keir, Chadley	TAUPO 3377
Gair, Wayne	WELLINGTON 6144	Haymes, Graeme	BLLENHEIM 7240	Kelly, Gerald	TAURANGA 3140
Galbreath, Christopher	MASTERTON 5840	Haynes, Sean	CHRISTCHURCH 8023	Kemeys, Colin	TAURANGA 3141
Gardner, Reece	CHRISTCHURCH 8247	Haynes, Warren	CHRISTCHURCH 8140	Kendon, Stuart	AUCKLAND 0620
Garlick, Warren	PAPAKURA 2244	Hayward, Matthew	WELLINGTON 6140	Kent-Johnston, Alastair	AUCKLAND 1141
Garmonsway, Myles	CROMWELL 9342	Head, Joanne	WELLINGTON 6037	Kerr, Trevor	CHRISTCHURCH 8062
Garnett, Trevor	NELSON 7020	Healey, Ryan	AUCKLAND 1141	Kettle, Graeme	KERIKERI 0245
Gasson, John	PUKEKOHE 2340	Heazlewood, Dean	AUCKLAND 0630	Keucke, Rodney	HAMILTON 3240
Gautam, Jai	AUCKLAND 1041	Heffernan, Barry	RANGIORA 7471	Khaw, Chong Jin	AUCKLAND 1141
Gawn, Brett	WELLINGTON 6141	Heilbronn, Graham	Brisbane, Qld 4004 AUSTRALIA	Kho, Teng Hong	93350 Kuching Sarawak MALAYSIA
Geddes, Mark	Surrey SM5 1NB ENGLAND	Hellendoorn, Foster	THAMES 3540	Kiddle, Bruce	WELLINGTON 6140
Geeves, Daniel	TIMARU 7910	Hemi, Richard	AUCKLAND 0650	Kiernan, Peter	WELLINGTON 6037
George, Brent	CHRISTCHURCH 8141	Henderson, Graham	BLLENHEIM 7201	Killian, Ian	TAURANGA 3140
George, Ken	MANUKAU CITY 2103	Henderson, John	AUCKLAND 1541	King, Brett	PAIHIA 0247
Gibson, Michael	NEW PLYMOUTH 4340	Hendry, Bruce	DUNEDIN 9014	Kinnear, Alan	AUCKLAND 1141
Gilberd, Hugh	WANGANUI 4501	Hermann, John	NEW PLYMOUTH 4340	Kinnear, Stuart	UPPER HUTT 5018
Gilberd, Mark	HAMILTON 3240	Hewitt, Martin	CHRISTCHURCH 8140	Kirk, Jamie	QUEENSTOWN 9300
Gilchrist, Errol	NELSON 7010	Hewson, Ronald	NORTH SHORE 0752	Kirkman, Scott	WANAKA 9343
Gillespie, Ian	WHANGAREI 0140	Hii, Kiong Hua	Bandar Seri Begawan BB3577 BRUNEI	Kiss, Stefan	NEW PLYMOUTH 4310
Gillies, Philip	AUCKLAND 0650	Hill, Ian	DARUSSALAM	Knapp, Christopher	WHANGAREI 0112
Gilson, John	CHRISTCHURCH 8022	Hill, Toni	AUCKLAND 0602	Knarston, Keith	AUCKLAND 0740
Ginn, John	MANUKAU CITY 2241	Hindess, John	LOWER HUTT 5010	Knight, Hayden	QUEENSTOWN 9348
Godfrey, Thomas	Warwick CV34 5TP ENGLAND	Hislop, Murray	TAUPO 3351	Knight, Peter	DUNEDIN 9054
Goldschmidt, Donald	WELLSFORD 0975	Histed, John	TE AWAMUTU 3840	Knight, Philip	AUCKLAND 0944
Goodin, Mark	WELLINGTON 6140	Hocken, Darren	AUCKLAND 1541	Koenders, Ronald	AUCKLAND 2010
Goodsir, Jamie	HASTINGS 4156	Hodges, Darren	CHRISTCHURCH 8140	Koning, Stephen	NEW PLYMOUTH 4340
Goodwin, Graeme	HAMILTON 3240	Hodges, Robert	QUEENSLAND 4556 AUSTRALIA	Ladyman, Raymond	TAURANGA 3140
Goodwin, Ronald	AUCKLAND 0932	Hogan, Cheryl	NSW 2250 AUSTRALIA	Lagerstedt, Mark	PAIHIA 0247
Gordon, Keith	WHANGAREI 0110	Hollands, David	AUCKLAND 0627	Lai, Mark	HAMILTON 3240
Gough, Kris	LOWER HUTT 5040	Hollier, John	Bribie Island 4507 AUSTRALIA	Laing, David	TAURANGA 3140
Gourdie, Hugh	NELSON 7010	Holmes, Wallace	PUKEKOHE 2340	Lamb, Gordon	NORTH SHORE CITY 0752
Gourdie, Ian	NELSON 7010	Honeywill, Abby	CENTRAL OTAGO 9572	Lang, Robert	AUCKLAND 0627
Gowland, Trevor	GOLDEN BAY 7142	Hoogsteden, Christopher	DUNEDIN 9054	Lash, Phillip	WHANGAREI 0140
Grace, Desmond	TURANGI 3334	Hope, Rodney	CHRISTCHURCH 8140	Latham, David	TE AWAMUTU 3840
Graham, Richard	CHRISTCHURCH 8141	Hopper, Christopher	ROTORUA 3015	Lathey, Wilson	PARAPARAUMU 5254
Grainger, Colin	AUCKLAND 0741	Horne, Brett	WELLINGTON 6140	Law, Kin Kok	CHRISTCHURCH 8042
Grant, Charles	WANAKA 9343	Horne, Craig	MOSGIEL 9053	Lawrie, David	PUKEKOHE 2340
Grant, David	CHRISTCHURCH 8042	Hosken, Anthony	DUNEDIN 9054	Lawson, William	HANMER SPRINGS 7360
Grant, Donald	WELLINGTON 6145	Hosking, Allan	Liverpool L13 2DF ENGLAND	Lawton, Richard	ROTORUA 3040
Gray, Penelope	Cardiff CF5 1QA WALES	Hosking, Peter	WHANGAREI 0112	Leary, Ian	WELLINGTON 6037
Green, Philip	THAMES 3540	Houghton, Ashley	UPPER HUTT 5140	Leckie, Cameron	INVERCARGILL 9872
Greig, Alistair	CHRISTCHURCH 8140	Houghton, Raymond	KATI KATI 3177	Lee, Eng Kwang	Sydney, NSW 2077 AUSTRALIA
Greig, Barry	CHRISTCHURCH 8141	Howarth, Graeme	NEW PLYMOUTH 4340	Lee, Storm	WHANGAPARAOA 0945
Grierson, Ian	AUCKLAND 1141	Hrstich, Daniel	KOHIMARAMA 1071	Lendrum, Robert	UPPER HUTT 5140

Lennox, Stuart.....	TE AWAMUTU 3840	McKinlay, Colin.....	NEW PLYMOUTH 4312	Page, Michael.....	NORTH SHORE 0630
Leong, Chin Hin.....	Negara BRUNEI DARRUSALAM	McKinlay, Ian.....	SOUTH CANTERBURY 7982	Palleson, Alfred.....	HAMILTON 3281
Leford, Edward.....	HAMILTON 3216	McKinnon, Donald.....	DUNEDIN 9054	Palmer, Neville.....	LOWER HUTT 5040
Leung, George.....	Mong Kok, Kowloon HONG KONG	McLachlan, Glen.....	TIMARU 7940	Panckhurst, Guy.....	HASTINGS 4156
Lew, Hoi Thong.....	SINGAPORE 486198	McLachlan, Peter.....	WAIKOUAITI 9471	Parker, Mark.....	AUCKLAND 0650
Lewis, John.....	TE PUKE 3153	McLeod, Alexander G.....	Sydney 2023 AUSTRALIA	Parton, Alexander.....	WARKWORTH 0983
Light, Selwyn.....	MOTUEKA 7143	McLeod, Arthur B.....	NSW 2119 AUSTRALIA	Pascoe, Sarah.....	WHANGAREI 0140
Lin, Zhenchao.....	AUCKLAND 1542	McLeod, Bruce.....	QUEENSTOWN 9349	Paterson, Kenneth.....	WANAKA 9305
Lindbom, Tony.....	NELSON 7010	McLeod, Roger.....	UPPER HUTT 5019	Paterson, Murray.....	DUNEDIN 9054
Lindsay, Graeme.....	Manama KINGDOM OF BAHRAIN	McMillan, Julie.....	CHRISTCHURCH 8141	Paterson, Russell.....	PORIRUA 5240
List, Kevin.....	TAURANGA 3141	McPherson, Peter.....	HAMILTON 3200	Paton, Justine.....	N. S. W. 2065 AUSTRALIA
Locke, John.....	AUCKLAND 1150	Mead, Dion.....	JOHNSONVILLE 6440	Patterson, Robin.....	WANAKA 9343
Locke, Keven.....	ROTORUA 3010	Meikle, Kevin.....	AUCKLAND 1140	Patterson, Ryan.....	PETONE 5012
Longley, Robert.....	LEVIN 5510	Meldrum, Edward.....	WAIKANA E 5250	Payne, Henry.....	WANGANUI 5001
Lovegrove, Warren.....	HAMILTON 3240	Menzies, Stephen.....	NORTH HARBOUR 0751	Peacock, Michael.....	CHRISTCHURCH 8141
Low, Kewwa.....	HAMILTON 3216	Metcalf, Glenn.....	AUCKLAND 0740	Pearse, Merrin.....	WELLINGTON 6140
Low, Roger.....	AUCKLAND 2155	Milburn, Christopher.....	DUNEDIN 9054	Perrin, Jayne.....	BLenheim 7240
Lucas, Duncan.....	PAPAKURA 2244	Millar, Bruce.....	THAMES 3540	Perwick, Maurice.....	CHRISTCHURCH 8140
Lucas, Michael.....	AUCKLAND 2014	Millar, Donald D.....	AUCKLAND 1024	Petrie, Stewart.....	DUNEDIN 9011
Lucas, Ronald.....	LOWER HUTT 5040	Miller, Dallas.....	TE PUKE 3153	Phillips, David.....	Renmark 5341 AUSTRALIA
Lumb, Stephen.....	NEW PLYMOUTH 4340	Miller, Edwin.....	AUCKLAND 2010	Pickett, Vernon.....	HAMILTON EAST 3247
Lynch, James.....	QUEENSTOWN 9348	Miller, Ross.....	AUCKLAND 0632	Pinker, Stephen.....	AUCKLAND 1071
Lysaght, Bruce.....	TAURANGA 3141	Millington, Frank.....	THAMES 3540	Pinkerton, Michael.....	TAURANGA 3140
Macdonald, Ross.....	QUEENSTOWN 9300	Mills, Keith.....	CHRISTCHURCH 8140	Pirie, Philip.....	PALMERSTON NORTH 4440
Macfarlane, Ashley.....	CHRISTCHURCH 8061	Mills, Steven.....	AUCKLAND 0630	Pitts, Nigel.....	DUNEDIN 9054
Mackie, John.....	NELSON 7011	Milne, Alan.....	PARAPARAUMU 5032	Player, Brent.....	TAUPO 2730
MacLean, Ian.....	WELLINGTON 6035	Milne, Bernard.....	HAMILTON 3240	Plunkett, Scot.....	LOWER HUTT 5040
Maday, Christopher.....	AUCKLAND 0600	Moffat, Walter.....	AUCKLAND 2014	Pollitt, Malcolm.....	ALEXANDRA 9320
Madsen, Craig.....	TAURANGA 3147	Moffitt, Richard.....	Dhahran 31311 SAUDI ARABIA	Pope, Grant.....	RAETIHI 4646
Madsen, Dan.....	PUKEKOHE 2340	Mohamad, Borhan.....	Sarawak 93400 MALAYSIA	Poppelwell, Michael.....	TAUPO 3351
Maggs, John.....	PUKEKOHE 2340	Moir, Donald.....	INVERCARGILL 9810	Pothan, Kenneth.....	WHANGAREI 0112
Maguire, Merryn.....	PALMERSTON NORTH 4414	Mollard, Brian.....	MT MAUNGANUI 3149	Potter, Martin.....	TAKAKA 7142
Mahony, Keith.....	MANUKAU 2014	Molloy, Rex.....	WARKWORTH 0941	Prentice, Ian.....	JOHNSONVILLE 6440
Manners, Bruce.....	WELLINGTON 6140	Monaghan, Bradley.....	WELLINGTON 6440	Pullar, Neil.....	UPPER HUTT 5019
Manson, David.....	INVERCARGILL 9840	Moody, Hudson.....	WELLINGTON 6140	Purdie, Bruce.....	WELLINGTON 6012
Manson, Patrick.....	PALMERSTON NORTH 4410	Moody, Richard.....	Townsville 4812 AUSTRALIA	Rabbidge, Andrew.....	TIMARU 7940
Maplesden, Jonathan.....	MANUKAU CITY 2241	Moran, Peter.....	AUCKLAND 2014	Radcliffe, Alan.....	GISBORNE 4010
Marr, Andrew Peter.....	DUNEDIN 9010	Morris, Michael.....	WELLINGTON 6140	Rainford, John.....	NEW PLYMOUTH 4372
Marshall, Jamie.....	CROMWELL 9342	Morrison, Bruce M.....	WAIHI 3681	Rait, Evan.....	WELLINGTON 5024
Marshall, Kevin.....	AUCKLAND 1144	Morrison, Bruce W.....	NORTH SHORE 0745	Randle, Robin.....	NELSON 7011
Marshall, Phillip.....	DUNEDIN 9010	Mortell, Mathew.....	AUCKLAND 1141	Ranklor, David.....	TAUPO 3351
Marshall, Warwick.....	NAPIER 4182	Mould, Blair.....	GORE 9710	Rattray, Stephan.....	CHRISTCHURCH 8140
Martin, Alexander.....	NELSON 7040	Moulton, Ross.....	CHRISTCHURCH 8053	Ravenscroft, John.....	TE KUITI 3941
Martin, Andrew.....	TAURANGA 3141	Moxham, Curtis.....	TAURANGA 3001	Rawson, Gary.....	LOWER HUTT 5040
Martin, Cameron.....	TAURANGA 3140	Mulder, Albie.....	TAURANGA 3140	Read, Graham.....	ALBANY VILLAGE 0755
Martin, Luke.....	ROTORUA 3040	Munns, Geoffrey.....	AUCKLAND 1149	Read, Terence.....	PAPAKURA 2244
Martin, Michael.....	CHRISTCHURCH 8141	Munro, Joshua.....	DUNEDIN 9010	Redward, Ian.....	PARAPARAUMU 5254
Maseyk, Jeremy.....	HAMILTON 3214	Murray, Daryl.....	AUCKLAND 1141	Reed, Peter.....	AUCKLAND 0630
Matheson, Gordon.....	HAMILTON 3216	Mydlowski, Steven.....	AUCKLAND 0746	Reid, Robert.....	Brisbane 4122 AUSTRALIA
Matterson, Garth.....	KERIKERI 0293	Nalder, Nigel.....	NELSON 7010	Reiher, Simon.....	WHANGAREI 0140
Matthews, Antony.....	AUCKLAND 0604	Nalder, Vicki.....	BLenheim 7240	Reyburn, David.....	WHANGAREI 0112
Mauder, Peter.....	WELLINGTON 6147	Napper, Philip.....	CHRISTCHURCH 8140	Reynolds, Ian.....	TAURANGA 3140
Mawhinney, David.....	CHRISTCHURCH 8140	Needham, Jeffrey.....	WELLINGTON 6141	Rice, Graham.....	NORTH HARBOUR 0751
Maxwell, Simon.....	TAURANGA 3140	Neighbours, Peter.....	AUCKLAND 1011	Richards, Norman.....	HOKITIKA 7810
McAuley, Peter.....	CHRISTCHURCH 8141	Newbury, Peter.....	NELSON 7040	Richardson, Alexander.....	ASHBURTON 7740
McAuslan, Gary.....	DUNEDIN 9054	Newland, Rodney.....	AUCKLAND 1142	Ridge, Alan.....	HAMILTON 3240
McBride, Douglas.....	UPPER MOUTERE 7175	Newton, Paul.....	NELSON 7050	Rimmer, Robert.....	CHRISTCHURCH 8141
McBride, Gregory.....	MANUKAU CITY 2241	Nicholls, Peter.....	AUCKLAND 1541	Rinckes, Dirk.....	WAIKANA E 5036
McBride, Timothy.....	TAURANGA 3140	Nichols, Mark.....	CHRISTCHURCH 8051	Riordan, William.....	FEILDING 4702
McCall, Warren.....	CHRISTCHURCH 8140	Nicholson, Timothy.....	TOKORO A 3444	Ritchie, Peter.....	QUEENSTOWN 9348
McCarthy, Fineen.....	CHRISTCHURCH 8141	Nickles, Wayne.....	AUCKLAND 1042	Roberts, Derek.....	MASTERTON 5840
McCaulay, Alan.....	ROTORUA 3015	Nicklin, Grant.....	CAMBRIDGE 3450	Roberts, Mark.....	LOWER HUTT 5040
McConell, Kevin.....	Suva FIJI	Nijssen, Brent.....	TAUPO 3351	Robertson, Donald.....	TIMARU 7910
McCracken, David.....	HAMILTON 3244	Nikkel, Anthony.....	MOTUEKA 7143	Robertson, William.....	WELLINGTON 5024
McCullough, John.....	AUCKLAND 1022	Norman, David.....	HANMER SPRINGS 7360	Robins, Rogan.....	MANUKAU CITY 2112
McDaid, Daniel.....	HAMILTON 3216	Norton, Hugh.....	WELLINGTON 6012	Robinson, Bruce.....	North Shore City 0757
McDonald, Denis.....	TAURANGA 3140	Norton, Philip.....	BLenheim 7240	Robinson, Thomas.....	FOXTON 4848
McDonald, Neil.....	QUEENSTOWN 9348	Noun, Kol.....	MANUKAU CITY 2025	Roger, Kerry.....	KERIKERI 0245
McDonnell, Michael.....	WAIMAUKU 0881	Oakes, Matthew.....	WHANGAPARAOA 0943	Rogers, Barry.....	NORTH SHORE 0745
McDowell, Ross.....	TAURANGA 3140	Oberdries, Michael.....	AUCKLAND 1024	Rogers, Peter.....	WAIHI BEACH 3642
McElwain, Colin.....	LOWER HUTT 5040	Odinot, Steven.....	NELSON 7040	Ronaldson, Charlotte.....	TAUPO 3351
McFadgen, Bruce.....	WELLINGTON 6012	O'Flaherty, Richard.....	WARKWORTH 0941	Roper, Christopher.....	ROTORUA 3076
McFarland, Rodney.....	AUCKLAND 2010	Ogilvie, Glen.....	AUCKLAND 1149	Ross, Hamish.....	HAMILTON 3240
McFarlane, David.....	INVERCARGILL 9810	O'Hagan, Dennis.....	ROTORUA 3015	Rowe, Glen.....	LOWER HUTT 5012
McGarvey, Lloyd.....	GREYMOUTH 7840	Oldfield, Grant.....	PUKEKOHE 2340	Rowe, Robert.....	AUCKLAND 1005
McGillivray, Grant.....	NELSON 7050	O'Leary, Clinton.....	HASTINGS 4122	Ruegg, Donald.....	AUCKLAND 1141
McGrail, Terence.....	BLenheim 7240	O'Malley, Geoffrey.....	WELLINGTON 6023	Ruffell, Grant.....	HAMILTON 3240
McGregor, Guy.....	WHANGAREI 0140	O'Neill, Geoffrey.....	OAMARU 9401	Russell, Michael.....	BLenheim 7240
McInnes, Craig.....	CHRISTCHURCH 8141	O'Neill, Maurice.....	NGARAWAHIA 3720	Ryan, Vincent.....	CHRISTCHURCH 8443
McInnes, Peter.....	PAPAKURA 2244	O'Neill, Shaun P.....	TE AROHA 3342	Saich, Barry.....	NELSON 7050
McIntyre, Ian.....	AUCKLAND 0627	Orr, Derek.....	AUCKLAND 2144	Salmond, William.....	DUNEDIN 9054
McKay, Donald.....	AUCKLAND 0622	Osbaldiston, Geoffrey.....	OREWA 0946	Sangster, Donald.....	THAMES 3500
McKechnie, John.....	UPPER HUTT 5018	O'Sullivan, Michael.....	WANGANUI 4541	Sarniak-Thomson, Anthony.....	PORIRUA 5381
McKeever, Claire.....	TAURANGA 3118	Otway, Peter.....	TAURANGA 3176	Sawers, Bill.....	PALMERSTON NORTH 4412
McKeever, Gregory.....	MT MAUNGANUI 3150	Overington, Ross.....	WHAKATANE 3158	Sayer, Barry.....	JOHNSONVILLE 6440
McKenzie, Clayton.....	AUCKLAND 1141	Page, David.....	AUCKLAND 1150	Scandlyn, Murray.....	RANGIORA 7440

Schamall, Ulrike.....	AUCKLAND 1061	Strack, Michael.....	DUNEDIN 9010	Warburton, Brian.....	PORIRUA 5022
Scott, David.....	PAIHIA 0247	Straker, Matthew.....	BLENHHEIM 7240	Warburton, Max.....	DUNEDIN 9010
Seville, Edward.....	AUCKLAND 0626	Strang, Rebecca.....	WELLINGTON 6140	Ward, David.....	NELSON 7010
Sewell, Kevin.....	ROTORUA 3040	Stratton, Shane.....	WHANGAREI 0141	Wardle, Stephen.....	RANGIORA 7471
Seyb, Alastair.....	JOHNSONVILLE 6440	Suddaby, Matthew.....	WANAKA 9343	Warner, Gary.....	Queensland 4870 AUSTRALIA
Shand, Mervyn.....	LEVIN 5540	Sutherland, Hamish.....	FEILDING 4702	Warner, Jeff.....	HAMILTON 3210
Shanley, Colin.....	HASTINGS 4156	Sutherland, K Grant.....	KATIKATI 3166	Watkins, Maxwell.....	North Shore City 0626
Shaw, Michael.....	MASTERTON 5840	Sutton, Edward.....	Cardiff CF15 9HJ WALES	Watkins, Walter.....	Thuringowa Central 4817 AUSTRALIA
Shaw, Trevor.....	WHANGAREI 0140	Swift, Donald.....	WHANGAREI 0110	Watson, Lynda.....	HOKITIKA 7842
Shearer, Brian.....	LOWER HUTT 5010	Tagg, Michael.....	AUCKLAND 1149	Watson, Richard.....	PAIHIA 0247
Sheffield, Robin.....	AUCKLAND 1740	Tangata, Nicholas.....	NORTH SHORE 0745	Watson, Stu.....	LOWER HUTT 5040
Sherrit, Dean.....	OHAKUNE 4625	Taylor, Alexander F Joondalup 6025	WESTERN AUSTRALIA	Waugh, Robert.....	NEW PLYMOUTH 4340
Shirley, Ross.....	NELSON 7050	Taylor, Andrew J.....	HASTINGS 4156	Webster, Geoffrey.....	AUCKLAND 1149
Shute, Barrie.....	LOWER HUTT 5010	Taylor, Brian.....	TAURANGA 3112	Webster, Graeme.....	WHANGAREI 0140
Silvester, Barry.....	GREYTOWN 5712	Taylor, Campbell.....	GISBORNE 4010	Weedon, Brian.....	WANAKA 9305
Simpson, Leslie.....	WHANGAREI 0110	Taylor, Graeme.....	Brisbane 4068 AUSTRALIA	Weller, Geoffrey.....	ALEXANDRA 9340
Sinclair, Bruce.....	CHRISTCHURCH 8140	Taylor, John.....	REEFTON 7830	Wells, Brian.....	CHRISTCHURCH 8242
Sinclair, Marton.....	CHRISTCHURCH 8023	Taylor, Kevin.....	GISBORNE 4040	Welsh, Bradley.....	RIVERTON 9883
Singh, Devendra.....	WELLINGTON 6023	Taylor, Robert.....	WAITAKERE 0610	West, John.....	NELSON 7043
Singh, Sanjeev.....	MANUKAU CITY 2105	Telfer, Lyndon.....	CHRISTCHURCH 8141	Wey, Anthony.....	NEW PLYMOUTH 4312
Siu, Ivan.....	AUCKLAND MAIL CENTRE 1142	Tercel, Francis.....	AUCKLAND 0620	Whitaker, Cyril.....	HASTINGS 4130
Smales, Richard.....	WHANGAREI 0140	Thomas, Steven.....	MORRINSVILLE 3340	White, Antony.....	QUEENSTOWN 9349
Smedley, Timothy.....	AUCKLAND 0622	Thompson, Brian.....	MANGAWHAI 0540	Whiting, Robin.....	ALEXANDRA 9340
Smidt, Peter.....	NAPIER 4140	Thompson, Craig.....	CHRISTCHURCH 8140	Wicks, William.....	CHRISTCHURCH 8140
Smirk, Adrian.....	AUCKLAND 0640	Thompson, David.....	TAURANGA 3112	Wigley, Graham.....	LOWER HUTT 5040
Smith, Brendon I.....	WARKWORTH 0941	Thompson, John.....	ALEXANDRA 9320	Wild, Phil.....	Padbury 6025 WESTERN AUSTRALIA
Smith, Brian.....	CHRISTCHURCH 8005	Thompson, Leslie.....	Queensland 4069 AUSTRALIA	Wilde, I G Peter.....	PALMERSTON NORTH 4412
Smith, David.....	ASHBURTON 7740	Thompson, Mack.....	WELLINGTON 6145	Wilkinson, Alan.....	WHANGAREI 0143
Smith, Gordon G.....	AUCKLAND 1149	Thomson, Darrell R.....	DUNEDIN 9058	Williams, Daniel.....	NORTH HARBOUR 0751
Smith, Graeme D.....	WARKWORTH 0941	Thomson, Denis M.....	KERIKERI 0245	Williams, Mark.....	AUCKLAND 1141
Smith, Ian.....	WARKWORTH 0941	Thomson, Duncan H.....	AUCKLAND 0752	Williams, Murray.....	DUNEDIN 9001
Smith, Kevin.....	UPPER HUTT 5018	Thomson, Stuart.....	WELLINGTON 6145	Williams, Peter F.....	MOSGIEL 9076
Smith, Malcolm.....	CHRISTCHURCH 8140	Thorn, Benson.....	Queensland 4670 AUSTRALIA	Williams, Peter G.....	CHRISTCHURCH 8024
Smith, Mark C.....	CHRISTCHURCH 7676	Thorn, Kenneth.....	NAPIER 4147	Williams, Rex D.....	KAITAIA 0441
Smith, Richard.....	London E14 9QZ ENGLAND	Thornley, Robert.....	AUCKLAND 0640	Williams, Scott.....	CHRISTCHURCH 8141
Smith, Stephen W.....	HAMILTON 3204	Thorpe, Cecil.....	AUCKLAND 1042	Williams, Trevor.....	WANAKA 9305
Smith, Terence.....	AUCKLAND 2112	Thurlow, Ross.....	AUCKLAND 0753	Williamson, Nicholas.....	WHANGAREI 0140
Smith, Tracy.....	WARKWORTH 0941	Timms, David.....	AUCKLAND 2142	Willis, Belinda.....	OAKURA 4345
Smythe, David.....	NELSON 7040	Tobin, Jim.....	NAPIER 4112	Wilson, George.....	CHRISTCHURCH 8041
Snelson, Christopher.....	DRURY 2578	Todd, Alexander.....	WANAKA 9305	Wilson, Glenn.....	KERIKERI 0245
Snow, Adrian.....	QUEENSTOWN 9348	Todd, Nicola.....	PARAPARUMU 5254	Wilson, Vergne.....	WANAKA 9343
Snow, Michael.....	WELLINGTON 6140	Toms, Brent.....	CHRISTCHURCH 8083	Wingate, Frederick.....	TAKAKA 7142
Sole, Patrick.....	NEW PLYMOUTH 4340	Tong, Peter.....	WELLINGTON 6141	Winmill, Ralph.....	WELLINGTON 6012
Sollner, Mark.....	AUCKLAND 1141	Topham, Ross.....	JOHNSONVILLE 6440	Winter, Stephen.....	QUEENSTOWN 9348
Soo, Darren.....	DUBAI UNITED ARAB EMIRATES	Townsend, Murray.....	KERIKERI 0295	Wisker, John.....	AUCKLAND 0650
Speedy, Jock.....	TAURANGA 3140	Trafford, Brian.....	AUCKLAND 1050	Withy, Alan.....	TAURANGA 3112
Spence, Paul.....	HAMILTON 3204	Trail, Brent.....	TAURANGA 3140	Wong, Michael.....	AUCKLAND 1024
Spooner, Stacey.....	TE AROHA 3320	Treize, Ian.....	AUCKLAND 1010	Wong, Thien-Nyen.....	TSUEN WAN. N.T. HONG KONG
Stace, Warren.....	HAMILTON 3216	Trotman, Peter.....	PARAPARAUMU BEACH 5032	Wood, Derek.....	TAUPO 3330
Stamm, Symon.....	ROTORUA 3040	Truebridge, Roger.....	LEVIN 5510	Wood, Donald L.....	AUCKLAND 1141
Stanger, Andrew.....	NELSON 7042	Turner, Donald.....	AUCKLAND 0744	Wood, Philip.....	CHRISTCHURCH 8023
Stayt, Christopher.....	NEW PLYMOUTH 4310	Turner, Gerald.....	AUCKLAND 0630	Wood, W Daniel.....	UPPER HUTT 5018
Stening, Paul.....	CHRISTCHURCH 8140	Turner, Paul.....	WAIKANAЕ 5250	Woodward, Bryce.....	WHANGAREI 0140
Stephenson, John.....	TAURANGA 3114	Tynan, Antony.....	HAMILTON 3240	Worrall, John.....	AUCKLAND 0620
Stern, Bruce.....	FEILDING 4740	Valpy, Clive.....	AUCKLAND 1542	Wratt, Colin.....	NELSON 7175
Stevens, Michael.....	AUCKLAND 1150	van den Berg, Willem.....	CHRISTCHURCH 8022	Wright, Alexander.....	AUCKLAND 1346
Stevenson, Mark.....	AUCKLAND 0626	van Nugteren, Peter-John.....	DUNEDIN 9018	Wright, Murray.....	KERIKERI 0230
Stewart, Callum.....	WHANGAMATA 3643	Verrall, Mike.....	NELSON 7040	Wyatt, Warwick.....	WAIKANAЕ 5391
Stewart, David H.....	AUCKLAND 1742	Verryt, Joseph.....	AUCKLAND 0650	Wylie, Andrew.....	TE PUKE 3153
Stewart, David J.....	NORTH SHORE CITY 0748	Vos, Reuben.....	CHRISTCHURCH 8242	Yardley, Philippa.....	ROTORUA 3015
Stewart, Ross.....	WHANGAMATA 3643	Wade, David.....	CHRISTCHURCH 8141	Yearsley, Garrick.....	AUCKLAND 1025
Stewart, Tony.....	ALEXANDRA 9340	Walker, Christopher.....	CHRISTCHURCH 8140	Yeoman, John.....	AUCKLAND 1347
Stirling, Andrew.....	AUCKLAND 0746	Walker, Ian.....	AUCKLAND 1144	Yetsenga, Bart.....	ROTORUA 3040
Stoff, Toby.....	DUNEDIN 9012	Walker, John.....	QUEENSLAND 4223 AUSTRALIA	Young, Glenn.....	PALMERSTON NORTH 4442
Stone, Barry.....	NORTH SHORE 0632	Wallace, Murray.....	HAMILTON 3240	Young, Rodney.....	TE AROHA 3342
Stone, David.....	HAMILTON 3240	Wallace, Stuart.....	MOTUEKA 7143	Zeeven, Eric.....	London E14 9YA ENGLAND
Stott, Michael.....	TAURANGA 3141	Waller, Bevan.....	AUCKLAND 0626	Zwartz, Ben.....	WELLINGTON 6021
Stougie, Carl.....	AUCKLAND 1541	Walsh, Kevin.....	HAMILTON 3248		

# Associate Members

Allen, Luke.....	TARANAKI 4340	Gilbert, Perry.....	BLenheim 7240	Moore, Bryan.....	WANAKA 9382
Allomes, Mark.....	BLenheim 7240	Golding, Stephen.....	CHRISTCHURCH 8061	Morgan, Ian.....	BALCLUTHA 9274
Archer, Nathan.....	QUEENSTOWN 9348	Gore, Keith.....	NAPIER 4183	Morpeth, Grant.....	AUCKLAND 1051
Armstrong, Brien.....	AUCKLAND 1010	Gosling, Charles.....	CAMBRIDGE 3450	Morton, Philip.....	BLenheim 7240
Arnold, Christopher.....	NORTH SHORE 0745	Gosling, Thomas.....	AUCKLAND 2010	Morunga, William.....	WHANGAREI 0140
Ashley, Geoffrey.....	CHRISTCHURCH 8441	Green, Mark.....	AUCKLAND 0740	Moss, Anthony.....	TAUPO 3330
Babbage, Anne.....	AUCKLAND 0930	Greening, Robert.....	CHRISTCHURCH 8141	Mueller, Terry.....	LOWER HUTT 5010
Baidon, Caleb.....	NAPIER 4140	Greer, Stuart W.....	AUCKLAND 1141	Muir, Andy.....	WELLINGTON 6022
Baker, Mervyn.....	CHRISTCHURCH 8141	Greig, John.....	AUCKLAND 1149	Nadan, Nathan.....	LOWER HUTT 5011
Barnes, Chey.....	AUCKLAND 1141	Gulliver, Trent.....	TAURANGA 3141	Ncube, Ian.....	Queensland 4746 AUSTRALIA
Barnston, Derek.....	WHANGAREI 0140	Gunn, Neil.....	AUCKLAND 1141	Neal, Stephen.....	BLenheim 7201
Batt, Robert.....	WELLINGTON 6012	Gweshe, Shepherd.....	Queensland 4870 AUSTRALIA	Nelson, Luke.....	ROTORUA 3040
Batty, Mark.....	ROLLESTON 7614	Gwilliam, Kate.....	PALMERSTON NORTH 4440	Nettlingham, Dean.....	TAURANGA 3143
Baume, Geoffrey.....	London E11 4DE UNITED KINGDOM	Hamant, Jeremy.....	AUCKLAND 1149	Neville, David.....	NORTH SHORE 0116
Beard, Hayley.....	TAURANGA 3140	Harold, Aaron.....	WHANGAREI 0140	Ng, Otto.....	PARAPARAUMU 5254
Beattie, Grant R.....	WELLINGTON 6011	Harper, Freda.....	London SW65EA ENGLAND	Nikolaion, Niels.....	NAPIER 4145
Beck, George.....	AUCKLAND 0740	Harper, Mel.....	NEW PLYMOUTH 4310	Norton, Claire.....	NORTH HARBOUR 0751
Becker, Scott.....	HASTINGS 4156	Harris, Gregory I.....	THAMES 3540	Ogden, Ross.....	CHRISTCHURCH 8140
Beedell, Nigel.....	PALMERSTON NORTH 4412	Hedges, Raymond.....	CROMWELL 9310	Oldman, Jeffry.....	TAURANGA 3112
Bell, Roger.....	GISBORNE 4010	Hesseling, John.....	WHAKATANE 3158	Ormandy, Craig.....	JOHNSONVILLE 6440
Benns, Christopher.....	CHRISTCHURCH 8051	Hick, Aaron.....	HASTINGS 4156	Orr, Philip.....	NORTH SHORE 0944
Bland, Mark.....	NEW PLYMOUTH 4340	Hill, Andrew.....	LOWER HUTT 5040	Overend, Simon.....	BLenheim 7240
Breen-Rickerby, Richard.....	AUCKLAND 0622	Hills, Graham.....	NEW PLYMOUTH 4340	Parker, Steven.....	NELSON 7011
Britton, Lorraine.....	AUCKLAND 1149	Hodson, Johnathan.....	INVERCARGILL 9840	Parkinson, Neil.....	TAUGANGA 3140
Broughton, Stephen.....	CHRISTCHURCH 8140	Holdaway, Henry.....	DUNEDIN 9054	Paterson, Michael.....	CROMWELL 9342
Burgess, Maxwell.....	WHANGAREI 0140	Holswich, Keith.....	NEW PLYMOUTH 4312	Peacock, Boyd.....	WELLINGTON 6140
Burrows, Kenneth.....	CHRISTCHURCH 7675	Holyoake, Mark.....	NELSON 7050	Pearson, David.....	WAIKANA E 5250
Burrows, Campbell.....	AUCKLAND 1149	Hope, Oliver.....	AUCKLAND 2140	Perry, Andrew.....	WELLINGTON 6140
Cairns, Lawrie.....	PALMERSTON NORTH 4440	Horley, Max.....	AUCKLAND 0746	Peters, Mark.....	CHRISTCHURCH 8042
Candish, Sonya.....	CHRISTCHURCH 8014	Hoult, Peter.....	KAITAIA 0441	Petrie, Graham.....	KERIKERI 0295
Capstick, Glenn.....	PALMERSTON NORTH 4410	Hughes, Barry.....	WELLINGTON 6140	Petty, Mark.....	CHRISTCHURCH 8140
Carew, Karl.....	NAPIER 4112	Hughes, Martin J.....	EAST OTAGO 9443	Phillips, Paul.....	MANUKAU CITY 2014
Carley, Scott.....	JOHNSONVILLE 6440	Hyslop, Chris.....	QUEENSTOWN 9348	Popenhagen, Stephen.....	QUEENSTOWN 9348
Carnaby, Guy.....	CHRISTCHURCH 8140	Ioane, Vaomu.....	PALMERSTON NORTH 4440	Porter, Jennie.....	Oxon OX9 2DN ENGLAND
Cech, Samuel.....	CHRISTCHURCH 8140	Jacobs, Stephen.....	CHRISTCHURCH 8083	Prasad, Arun.....	AUCKLAND 2105
Chainey, Michael.....	London SW17 0QH ENGLAND	Jacobsen, Ephraim.....	QUEENSTOWN 9348	Prasad, David.....	TE AWAMUTU 3840
Chandra, Krishna.....	AUCKLAND 1041	James, Michael.....	AUCKLAND 0931	Proude, Michael.....	RAETIHI 4646
Charlie, Tereapii.....	Rarotonga COOK ISLANDS	James, Paul.....	WELLINGTON 6140	Quigley, Andrew.....	DUNEDIN 9016
Churchill, Adam.....	AUCKLAND 1141	Jaspers, Marc.....	AUCKLAND 1149	Rainey, Eben.....	AUCKLAND 1141
Clements, Owen.....	AUCKLAND 0627	Jelley, Ashley.....	CHRISTCHURCH 8141	Ramnauth, Nandlall.....	NORTH SHORE 0751
Coalter, Darryl.....	Brisbane 4066 AUSTRALIA	Jones, Andrew.....	WANGANUI 4540	Reddy, Nitya.....	WAITAKERE 0600
Cochran, John.....	CHRISTCHURCH 8141	Jones, Harley.....	SOUTH AUSTRALIA 5253	Redshaw, Vaughan.....	NEW PLYMOUTH 4310
Cookson, Scott.....	MOSGIEL 9053	Kelly, Michael.....	WANAKA 9343	Rendall, Karl.....	TAUPO 3330
Cooper, Patrick.....	TAUPO 3351	Kelly, Paul.....	WINTON RD 1 9781	Rivers, Andrew.....	Queensland 9726 AUSTRALIA
Cottee, Duane.....	WHANGAREI 0140	Kelsall, Byron.....	CROMWELL 9342	Roach, Matthew.....	DUNEDIN 9054
Cotton, John.....	NELSON 7020	Kemeyts, Michael.....	TE PUKE 3153	Roberts, Stuart.....	TAURANGA 3141
Cox, Jeremy.....	WHANGAMATA 3643	Kemphorne, Samuel.....	WELLINGTON 6140	Robinson, Clive.....	HAMILTON 3240
Cox, Jim.....	CHRISTCHURCH 8022	Kennedy, Christopher.....	Victoria 3192 AUSTRALIA	Robinson, Jason.....	CHRISTCHURCH 8140
Cross, Brendon.....	NELSON 7040	Khan, Razeem.....	AUCKLAND 0614	Rodgers, Christopher.....	HASTINGS 4156
Dale, Roy.....	WELLINGTON 6012	Lal, Angina S.....	HAMILTON 3204	Rodie, Daniel.....	WELLINGTON 5028
Davies, Rhys.....	AUCKLAND 0630	Lange, Maurice.....	WAIKANA E 5250	Ronke, Timothy.....	GISBORNE 4040
D'Evereux, Paul.....	NORTH SHORE CITY 0630	Lapwood, Simon.....	AUCKLAND 1446	Ryder, Matthew.....	NELSON 7040
Dick, Grant.....	INVERCARGILL 9812	Liggett, Alexander.....	CHRISTCHURCH 8141	Salmons, Carl.....	PUKEKOHE 2340
Dickey, Ian.....	NEW PLYMOUTH 4340	Lines, Nathan.....	NELSON 7010	Samuelson, Adrian.....	Queensland 4573 AUSTRALIA
Dickey, Stephen.....	WANAKA 9305	Linnell, Geoffrey.....	WELLINGTON 6145	Sanford, Keith.....	TAUPO 3351
Dickinson, Lloyd.....	GISBORNE 4010	Lister, Jack.....	WANAKA 9343	Saunders, Lawrence.....	NELSON 7040
Donaldson, Conrad.....	TAURANGA 3140	Loughlin, Victoria.....	WANGANUI 4540	Saxton, Clifford.....	NELSON 7040
Donnelly, Nic.....	WELLINGTON 6145	MacColl, Alastair.....	DUNEDIN 9054	Sellars, Lauren.....	TIMARU 7940
Drabble, Martin James.....	NORTH SHORE 0745	MacLean, Hamish.....	HASTINGS 4122	Shaw, Mark.....	AUCKLAND 0632
Drake, Bruce.....	Perth 6149 AUSTRALIA	Marsden, John.....	HAMILTON 3244	Sinclair, Andrew.....	CHRISTCHURCH 8140
Duckett, Blair.....	JOHNSONVILLE 6440	Marsh, Murray.....	HOKITIKA 7842	Sloane, Keith.....	AUCKLAND 1140
Dyer, Andrew.....	HAMILTON 3210	Marshall, Andrew.....	NELSON 7040	Smales, Brent.....	MILTON 9291
Elrick, Jeremy.....	DUNEDIN 9054	Martin, Darryl.....	AUCKLAND 1141	Smillie, Mark.....	DUNEDIN 9011
Endicott-Davies, Cynthia.....	AUCKLAND 1141	Martin, Glenn.....	Westminster CO 80021 U. S. A.	Smit, Dirk.....	CHRISTCHURCH 8140
Ferguson, John.....	CHRISTCHURCH 8141	Martin-Smith, Alan.....	NAPIER 4140	Smith, Anthony V.....	AUCKLAND 0630
Fisher, Mark.....	AUCKLAND 1149	Mason, Paul.....	WHANGAREI 0140	Smith, Brett.....	WELLINGTON 6023
Fleming, Helen.....	WAITAKERE CITY 0650	Mathews, Bradley.....	KAUKAPAKAPA 0873	Smith, Christopher.....	INGLEWOOD 4330
Fleming, Mark.....	AUCKLAND 1142	Mawson, Graeme.....	WHANGAREI 0140	Smith, Gregory D.....	CHRISTCHURCH 8140
Flood, Wayne.....	PAIHIA 0247	McConnell, Peter.....	WANGANUI 4540	Smith, Naomi.....	PAPAKURA 2244
Foote, Clare.....	HASTINGS 4156	McDonald, Stuart.....	TIMARU 7910	Stanbury, Timothy.....	AUCKLAND 1348
Francis, Christopher.....	AUCKLAND 0629	McGuire, Murray.....	NELSON 7011	Standish, Matthew.....	NELSON 7010
Francis, Nicole.....	HASTINGS 4172	McKean, Christopher.....	WAITAKERE 0650	Stenning, Mark.....	GISBORNE 4040
Fraser, Daniel.....	JOHNSONVILLE 6440	McLauchlan, David.....	CHRISTCHURCH 8024	Stewart, Duncan B.....	TAUPO 3351
Frith, Bruce.....	AUCKLAND 2102	McMillan, Jeremy S.....	NEW PLYMOUTH 4340	Stewart, Helen.....	Virginia 23507 U. S. A.
Frizzell, Peter.....	HASTINGS 4120	McWha, James.....	CHRISTCHURCH 8440	Subritzky, Allan.....	Queensland 4163 AUSTRALIA
Gates, Colin.....	WANGANUI 4501	Mead, Adam.....	AUCKLAND 2155	Sullivan, Liam.....	NELSON 7040
Geary, Michael.....	DUNEDIN 9016	Meehan, Patrick.....	DUNEDIN 9035	Sutherland, Allan.....	PORT CHALMERS 9050
Gell, Robert.....	LOWER HUTT 5040	Megget, Wendy.....	HAMILTON 3244	Swan, Timothy.....	WELLINGTON 6140
Gibellini, Lisa-Maree.....	NELSON 7040	Mitten, Zane.....	WHANGAREI 0140	Tait, Alexander.....	NAPIER 4110
Gibson, David.....	WELLINGTON 6022	Moller, Bradley.....	NEW PLYMOUTH 4342	Taylor, Arthur.....	NELSON 7022

Thirkettle, Jamie.....NELSON 7010	Walker, Naomi.....JOHNSONVILLE 6440	Willems, John A.....DUNEDIN 9054
Thomas, Anna.....CENTRAL OTAGO 9340	Walker, Scott.....ROTORUA 3040	Williams, Christopher J.....BLenheim 7240
Thomas, Geoffrey.....CAMBRIDGE 3450	Wallace, Ann-Maree.....WELLINGTON 6140	Wilson, Charles.....DUNEDIN 9018
Thomas, Luke.....CENTRAL OTAGO 9340	Ware, Jason.....AUCKLAND 0931	Wilson, Roderick.....GREYMOOUTH 7805
Thompson, Nigel.....CHRISTCHURCH 8141	Watson, Carolyn.....DUNEDIN 9054	Winefield, Rachelle.....WELLINGTON 6145
Thomson, Boyd.....CHRISTCHURCH 8141	Watson, Kurt.....KAITIAIA 0441	Woodcock, Craig.....INVERCARGILL 9879
Todd, Emily.....NEW PLYMOUTH 4342	Watts, Andrew.....CAMBRIDGE 3450	Wright, Angus C.....TE AWAMUTU 3840
Trist, Jason.....RANGIORA 7440	Webster, Vicki.....TAUPO 3351	Wyatt, Philippa.....BLenheim 7201
Uzunov, Todor.....California 90024 USA	Wheeler, Garth.....DUNEDIN 9054	Wylie, Mark.....DUNEDIN 9054
Van Der Zwet, David.....QUEENSTOWN 9348	Whiterod, Stuart.....NAPIER 4140	Young, Norman.....New South Wales 1680 AUSTRALIA
Waite, Lucan.....WANAKA 9343	Wild, Shannon.....WELLINGTON 6140	
Walker, Bruce.....AUCKLAND 1344	Wilkes, Andre.....WAIKANAe 5250	

## Honorary Members

Elwood, Sir Brian.....WAIKANAe 5036
Holland, Prof Peter.....DUNEDIN 9054
Holm, Janet.....CHRISTCHURCH 8053
Laing, Duncan.....WELLINGTON 6140
Zame, Dominic.....WELLINGTON 6140

### NEW ZEALAND INSTITUTE OF SURVEYORS RESULT OF ENQUIRY

On 8<sup>th</sup> August 2008, the Council of the New Zealand Institute of Surveyors conducted an enquiry to consider whether the actions of a member had placed him in breach of the rules of the Institute in terms of rule 20 relating to professional conduct.

The complaint was from an Incorporated Society and alleged that the member had issued an inaccurate certificate in respect of certain accommodation units at least 20 metres from the line of mean high water springs in accordance with a condition of a resource consent imposed by the Environment Court.

The complaint was initially investigated by the Complaints Sub-Committee of the Institute which considered that a prima facie case had been established against the member for a breach of rule 20 of the rules of the New Zealand Institute of Surveyors for the following reasons:

- (i) The member had failed to recognise his own professional or technical limitations and/or experience in ascertaining water boundaries and did not appear to appreciate the dynamic nature of the line of MHS in the vicinity of the buildings that he set out and/or certified the position of.
- (ii) The member had relied on an adopted position of mean high water mark from a 1932 survey without carrying out a physical measurement between the buildings and the water's edge to verify compliance with the 20 metre set back, which he clearly understood was the minimum clearance.
- (iii) The member was aware that there was an Environment Court hearing of the land use application to erect accommodation units in the coastal margin at the said location as he was involved in the process. Failure to enquire as to the outcome of that process and any implications that it may have had for the siting of the units was considered to be inexplicable and a prima facie breach of a duty of care owed to his client and the Court.

As a result of the enquiry Council found that:

Whilst the actions of the member were not sufficiently serious as to place him in breach of Rule 20 of the Institute's Rules relating to professional conduct they were nonetheless not up to the standard or conducted in a manner required of members.

The Council resolved:

- (i) That a formal reprimand be issued to the member in accordance with Rule 23.5.
- (ii) That in accordance with Rule 24.2.4 the member be required to pay 50% of the fixed costs incurred by Council in investigating and hearing the matter in the sum of \$1,230.84.
- (iii) That the decision be published in the *New Zealand Surveyor* but as the member had not been found guilty of unprofessional conduct that the identity of the member be withheld.



