SECTION 1

INTRODUCTION TO LAW AND SURVEYING

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1.1 The Legal Context and an Introduction to Statutory Interpretation

1.1.1 Introduction to the Law for Surveyors

A surveyor in the practice of his profession, or the conduct of his business, as he may see it, must be aware of the legal context in which he operates.

Every person in our society lives in a legal environment and is affected in whatever he or she does by rules imposed by that society. Those who wish to engage in any profession or business will be affected by the particular rules applicable to that profession or business. No single book and certainly no chapter in a book can turn a surveyor into an instant lawyer.

This section aims to help surveyors to be more aware of that legal context through an introduction to the nature of law and the history of our particular legal system, a brief explanation of the doctrine of precedent and our courts and an introduction to the interpretation of statute law.

1.1.2 Definition of 'The Law"

"The law" may be defined, but inadequately, as a system of rules of conduct imposed on members of a society and enforced by that society. While it is to be hoped that those rules will be just and morally based, this cannot be assumed, though religion has played a considerable part in the development of most legal systems, and our legal system is no exception. Some of those rules may be the result of the exercise of power to protect particular interests.

1.13 Our Legal System

Our legal system is a common law system, based on English law, as is that of most of the United States and Canada, New Zealand and other former British Colonies and Israel. Civil law systems, based upon Roman Law, apply in France, West Germany, Spain and their former colonies and Scotland. Much of the Middle East is subject to Islamic Law and the U.S.S.R. and China and other Communist Countries are subject to Communist Law. There are also other systems of law including customary law, such as Aboriginal customary law. A legal system can be identified as a legal system by its recognition as an independent system by other legal systems, each legal system having its own geographical territory or jurisdiction.

Our legal system, like the English system from which it has developed and quite recently gained independence, consists of the common law and equity and statute law. The common law and equity have been and are being developed in the Courts. Statute law consists of legislation made by Parliament and subordinate legislation.

1.1.4 Common Law

The Common Law was the law which was common to the whole of England, called common law originally to distinguish it from local law. It was based upon the customary law of the people and decisions of the judges who delivered the King's justice throughout England. Having a common background, through education in the Inns of Court in London and experience as barristers in the Courts before appointment as judges, these judges developed a uniform system of law based upon previous decisions or precedents, the reporting of which has become more and more reliable through the centuries.

1.1.5 Equity

During the Middle Ages these courts became too inflexible and failed to provide remedies where justice would have provided a remedy and petitions were addressed to the King who could provide extraordinary relief. He delegated this power to his Chancellor and subsequently the Court of Chancery and equity came into being. This equitable system also hardened into law and has
really become part of the common law, though it is important to know whether a remedy is legal or equitable as there are limits on the availability of equitable remedies which do not apply to legal remedies despite the fusion of law and equity. This fusion was effected at the end of the nineteenth century by the *Judicature Act* pursuant to which equitable principles prevail over legal principles in the case of "conflict or variance". The major area to which equity applies is the law of trusts, but the remedies of specific performance and injunction are also most important. These remedies are not available to a person who does not come to court "with clean hands" or who delays too long in seeking a remedy.

### 1.1.6 Classification of Common Law

Within the common law there are a number of classifications, the major ones of which are as follow:

(a) Criminal law - punishable offences ranging from murder to traffic offences;
(b) Civil wrongs or torts - actionable in the civil courts e.g. negligence, nuisance, trespass;
(c) Contract law - relating to agreements between persons and between persons and the State, and their interpretation and enforcement;
(d) Property law - the ownership of property, interests in property and dealings with property;
(e) Constitutional law - the power of Commonwealth and State Parliaments to make laws, the delegation of powers to statutory authorities, institutions and government departments;
(f) International law - the relationships between nations and the relationships between persons of different countries.

These classifications are not mutually exclusive. For instance a person who steals somebody's property may be subject to criminal prosecution for theft and the tortious remedy of conversion. Property law contains many applications of contract law and tortious remedies e.g. trespass.

### 1.1.7 Courts

The hierarchy of Courts in Victoria is as follows:

(a) Federal  
High Court of Australia  
Federal Courts  
Family Courts

(b) State  
High Court of Australia  
Supreme Court of Victoria  
County Court  
Magistrates Court

Appeals generally lie from lower courts to higher courts in the hierarchy. Most appeals are limited to questions of law rather than being by way of rehearing where the facts would have to be decided upon again.

Appeals are, since the passing of the *Australia Act* 1986, no longer available from Australian Courts to the Judicial Committee of the Privy Council.

State Courts may be invested with Federal jurisdiction.

### 1.1.8 Tribunals

The Commonwealth and the State have set up, by legislation, tribunals of various kinds. These tribunals are not courts of law but do exercise quasi-judicial functions.

Their powers and duties are set out in the relevant legislation. Many are concerned with the issue of licences to carry on certain types of business or with pensions or taxation. There are also appeals tribunals to consider appeals from administrative decisions or the decisions of administrative
tribunals. Some legislation provides for appeals against decisions of administrative tribunals to the courts, but in any case there is general recourse to the courts by way of prerogative writ where a tribunal is exceeding its power or failing to fulfil its duties.

While such tribunals are not bound by the strict rules of evidence which apply in the courts, they have a duty to follow the laws of natural justice and their decisions may be set aside by the courts if they fail to act impartially or to give each party the right to be heard.

There has been a development in Victoria towards bringing all administrative appeals within the jurisdiction of the Administrative Appeals Tribunal whether they relate to town planning, local government, subdivision of land, valuation of land or state taxation.

1.1.9 Precedent

The common law doctrine of precedent which applies in Australia is based upon the English system where each court is bound to follow decisions of a higher court and may be bound by its own decisions. If it is not bound by its own previous decisions a court will not readily depart from a previous decision and will need to be convinced that the previous decision was wrong.

It is not the whole of a previous decision or all the reasons given by the court for the decision that is binding. What is binding is what the later court sees to be the ratio decidendi of the decision, the principle of law upon which the decision was based. In making a subsequent decision, therefore, the court decides what the material facts are and if those material facts are the same as those in a previous decision of a higher court, the court is bound by the principle of the previous decision of the higher court. It may be very difficult to establish what the ratio decidendi of a particular case is, especially if, for instance, all five High Court judges give differing reasons for the decision.

Any statement of principle which is not necessary to decide a particular case is described as obiter dictum. Obiter dicta may be most persuasive in subsequent cases, particularly where the statement of principle is made by a judge of stature.

In Australia the High Court is not bound by its previous decisions as has been the English High Court, and so there has been less tendency here to avoid difficult precedents by distinguishing them on the facts, i.e. by saying that the previous decision is not binding because the fact situation was different.

The basic method of argument or reasoning using precedent is by analogy, and often a decision has to be made as to which of two or more lines of authority is applicable to the particular matter to be decided. Many more cases are decided on the facts than are decided on the law. Some cases involve decisions as to both facts and law. Almost all cases at first instance, as distinct from appeals, involve a determination after considering all the evidence before the Court of what the material facts are and then the application of the relevant law to those facts.

The system of precedent does allow for a reasonable degree of flexibility and generally enables the judge to come to the decision he feels justice requires, though this is not always the case and sometimes judges plead in their decisions for amendments to be made to the law, whether common law or statute, which they felt bound to follow. The development of the law from one precedent to another may be recognised as being judge-made law and in this century in particular there have been some very significant judge-made developments in the law. The most significant would be the case of Donoghue v Stevenson in the House of Lords (1932) A.C. 562 which established the modern law of negligence upon which claims for damages arising out of motor and industrial accidents have been based.

The system of precedent has achieved a reasonable degree of certainty in resolving disputes and provides a reasonably sound basis upon which parties can plan their activities to accord with the law.

"The binding judicial precedents include:

(a) English judicial decisions (both as to common law and statute law) up to 1828;
(b) New South Wales judicial decisions on New South Wales law up to the date of separation, (1851);
(c) State judicial decisions on State law since the date of establishment as a separate colony, (1851);
(d) Judicial decisions of the Privy Council, of the High Court of Australia, and of State Courts, on the law of the Commonwealth of Australia since 1901;
The doctrine of precedent is dependent upon having available the important decisions of the courts to refer to when making a decision. Judges are required to set down their reasons for decision in a written judgement, and if the case is thought sufficiently important by the law reporters the decision will be included in the law reports.

The published law reports in Australia include the following:

Commonwealth Law Reports (C.L.R.) - High Court and Privy Council decisions,

Victorian Reports (V.R.) - State Supreme Court,
Local Government Reports of Australia (L.G.R.A.) Administrative Appeals Reports (A.A.R.)
Australian Planning Appeal Decisions (A.P.A.)

There are a number of other specialised reports. Very few decisions of courts lower than the Supreme Court are published. References are sometimes made to English reports which are now persuasive only or to reports from U.S.A. or other common law jurisdictions. Textbooks covering particular topics may be helpful to judges in decision making but also have only persuasive authority.

Australia has since 1901 been a federation of States under a constitution which provides for the division of authority and statute making power between the Commonwealth and the State.

Some powers are exclusive to the Commonwealth, some are exercisable by both Commonwealth and State, the Commonwealth Law taking precedence in the event of overlapping and the States retaining the balance of the powers. Both Commonwealth and State Parliaments are dependent upon legislation of the United Kingdom Parliaments for their powers which in each case are set out in constitutions. The Commonwealth Constitution is able to be amended only by referendum whereas the Victorian Parliament has power to alter the Victorian Constitution.

Statute law consists of Acts of Parliament and rules, regulations and by-laws made pursuant to delegations of power contained in Acts of Parliament. Statute law is interpreted by the courts and decisions of the courts on the meaning of legislation become part of the common law. Statute law may at any time modify or abrogate any common law or equitable principles established in the case law.

Statute law applicable in Victoria consists of the following:

(a) English statutes up to 1828 in so far as they were applicable to the condition of New South Wales at that time;
(b) English statutes expressly applying to Australia since 1828;
(c) New South Wales statutes passed between 1828 and the date of separation from New South Wales (1851);
(d) Statutes enacted by the Colonial, subsequently State legislature since the date of its separate establishment;
(e) Commonwealth of Australia statutes since 1901;
but all these, of course are only in force to the extent that they have not been amended or repealed by a
competent parliament since they were first passed.”(2)

1.1.13 Interpretation of Statute Law

1.1.13.1 Common Law Principles

In the course of decision making, judges will need to interpret the statute law applicable in the particular case.
They will in such interpretation make use of the common law principles of interpretation, as modified quite
recently by both Commonwealth and State statutes.

Two primary approaches apply:

(a) the literal or plain meaning and
(b) the purpose of the legislation.

The recent modifications weigh the balance in favour of the purposive approach and against legalism.

It is not possible for a judge to ask the Parliament what it meant when it passed an Act of Parliament when
deciding whether or not the words of that Act extend to cover a particular fact situation. These facts may or
may not have been within the contemplation of the parliamentary counsel who drew the legislation or the
politicians who debated the bill in Parliament and possibly amended it before it was enacted and became law.
The function of the Court is to give effect to the intention of Parliament but it is sometimes difficult to work
out which of a number of possible meanings was actually intended. The plain meaning - the literal approach
will ordinarily be adopted; but not if it is likely to lead to an absurd or obviously unintended result in which
case a meaning will have to be ascertained which does not have the absurd or unjust result. (“Manifest
absurdity or repugnancy or injustice” - the Golden Rule approach) The meaning has to be elicited in the light
of the whole context of the word or expression in the particular sentence, section, division or part and having
regard to the special meaning contained in any relevant definition clauses, which may apply to the whole or
particular parts of the Act.

Sometimes a plain meaning is not obvious either from the wording of the section or expression or from the
whole context of the Act. Here it is necessary to apply the purpose approach - to endeavour to ascertain what
“mischief the legislation was endeavouring to overcome or the social or economic purpose it was intended to
achieve.

Courts will tend to interpret statutes more generously to the legislation than has been their habit of earlier
times where they tended to guard the common law more jealously from incursion. On the other hand they will
still adopt an interpretation which avoids any retrospective application of legislation unless the legislation
makes such retrospective intention quite plain.

To determine the purpose recourse may be had to the title, the preamble or introductory sections setting out
the objects of the legislation, the whole context of the statute, extrinsic materials which reveal the intention of
the legislation - Hansard (the verbatim records of parliamentary debates), explanatory memoranda or other
documents laid before the Parliament and reports of Royal Commissions and the like or to "the social
economic moral and other consequences of a particular interpretation (our courts are fairly cautious in this
regard) and questions of justice effectiveness and common sense that may lead to a wise decision.”(3)

1.1.13.2 Maxims

There are other maxims and aids to interpretation which are really keys to the way parliamentary counsel are
supposed to draft legislation. These maxims and aids are of doubtful assistance as they tend to go in pairs; for
example "every word and clause must be given some effect” as against "if be rejected as surplusage” leave the
judge considerable latitude.
Unfortunately experience shows that counsel are not always adept at understanding the practical aspects or the technology of the area in respect of which legislation is made. They do not always have sufficient time to master the situation and so legislation frequently has to be amended to cover matters which consultation with relevant institutions and affected parties might have avoided. There has, except in the case of revenue legislation and politically sensitive legislation, tended to be more consultation in recent years with a greater degree of success in avoiding error, ambiguity, unintended results and injustice.

1.1.13.3 Statutory Modification of Common Law Principles

Section 35 of the Interpretation of Legislation Act 1984 (Victoria) reads as follows:

"In the interpretation of a provision of an Act or subordinate instrument -

(a) a construction that would promote the purpose or object underlying the Act or subordinate instrument (whether or not that purpose or object is expressly stated in the Act or subordinate instrument) shall be preferred to a construction that would not promote that purpose or object; and

(b) consideration may be given to any matter or document that is relevant including but not limited to -

• all indications provided by the Act or subordinate instrument as printed by authority, including punctuation;
• reports of proceedings in any House of the Parliament;
• explanatory memoranda or other documents laid before or otherwise presented to any House of the Parliament; and
• reports of Royal Commissions, Parliamentary Committees, Law Reform Commissioners and Commissions, Boards of Inquiry or other similar bodies."

Section 15AA of the Acts Interpretation Act 1901 (Commonwealth) is to the same effect as section 35(a). It was passed in 1981.

1.1.13.4 Interpretations Implied by Statute

There are some other provisions of the Interpretation of Legislation Act 1984 (Victoria) which may be of some assistance as they are implied into all State legislation (including subordinate legislation such as regulations by-laws and ordinances) unless the contrary intention appears in the particular Act.

(a) Headings to Parts Divisions or Subdivisions or Schedules and Schedules form part of the Act but marginal notes or footnotes do not, though marginal notes and footnotes can pursuant to section 35(b) be considered in interpretation - section 36.

(b) Words importing the feminine gender include the masculine gender and vice versa; words in the singular include the plural and vice versa - section 37.

(c) Among other definitions the following are contained in section 38:

Document” includes, in addition to a document in writing:

• any book, map, plan, graph or drawing;
• any photograph;
• any label, marking or other writing which identifies or describes anything of which it forms part, or to which, it is attached by any means whatsoever;
• any disc, tape, sound track or other device in which sounds or other data (not being visual images) are embodied so as to be capable (with or without the aid of some other equipment) of being reproduced therefrom;
any film (including a microfilm), negative, tape or other device in which one or more visual images are embodied so as to be capable (with or without the aid of some other equipment) of being reproduced therefrom; and

anything whatsoever on which is marked any words, figures, letters or symbols which are capable of carrying a definite meaning to persons conversant with them.

"Land" includes buildings and other structures permanently affixed to land, land covered with water, and any estate, interest, easement, servitude, privilege or right in or over land.

"Person" includes a body politic or corporate as well as an individual.

"Writing" includes all modes of representing or reproducing words, figures or symbols in a visible form and expressions referring to writing shall be construed accordingly.

(d) Section 43 provides -

"In the measurement of a distance for the purposes of an Act or subordinate instrument, the distance shall, unless the contrary intention appears, be measured in a straight line on a horizontal plane."

(e) Section 44 provides -

• Where in an Act or subordinate instrument a period of time is expressed to begin on or to be reckoned from, a particular day, that day shall not be included in the period.

• Where in an Act or subordinate instrument a period of time is expressed to end on, or to be reckoned to a particular day, that that day shall be included in the period.

• Where the time limited by an Act or subordinate instrument for the doing of any act or thing expires or falls on a day that is a holiday the time so limited shall extend to, and the act or thing may be done, on the day next following that is not a holiday.

• In sub-section (3) "holiday" means -

  • a Saturday or Sunday;
  • a day appointed under the Bank Holidays Act 1958 as a bank holiday in the place in which the act or thing is to be or may be done; or
  • a day appointed under section 71 of the Public Service Act 1974 as a public holiday in the place in which the act or thing is to be or may be done.

• Subject to section 4 of the Summer Time Act 1972, whenever an expression of time occurs in an Act or subordinate instrument, the time referred to shall, unless the contrary intention appears, be deemed to be standard time throughout Victoria as declared by section 80 of the Supreme Court Act 1958.

• In an Act or subordinate instrument, unless the contrary intention expressly appears:

  • a reference to midnight, in relation to a particular day, shall be construed as a reference to the point of time at which that day ends;
  • a reference to a month shall be construed as a reference to a calendar month;
  • a reference, without qualification, to a year shall be construed as a reference to a period of twelve months;
  • a reference to a financial year shall be construed as a reference to the period of twelve months ending at midnight on 30 June; and
  • a reference to a calendar year shall be construed as a reference to the period of twelve months ending at midnight on 31 December.
In a provision of an Act or subordinate instrument the expression “now”, “heretofore” or “hereafter” shall be construed as referring to the time when the provision in which the expression occurs came into operation.

(f) Section 53 provides -

Where a form is prescribed by an Act or subordinate instrument for any purpose, any form in or to the like effect of the prescribed form shall, unless the contrary intention appears, be sufficient in law.

(g) Section 11 provides -

Subject to sub-section (2) and to section 71 of the Constitution Act 1975, an Act or a provision of an Act comes into operation:

- where a particular day is fixed (whether in the Act or in a proclamation made under the Act) for it to come into operation, at the beginning of that day; and
- where no day is so fixed for it to come into operation:
  - in the case of an Act reserved by the Governor for the signification of Her Majesty’s pleasure, at the beginning of the day on which a proclamation by the Governor that Her Majesty has been pleased to assent to the Act is published in the Government Gazette.
  - in the case of an Act that received the Royal Assent before the commencement of this Act and was not reserved by the Governor for the signification of Her Majesty’s pleasure, at the beginning of the day on which the Act received the Royal Assent; and
  - in any other case, at the beginning of the twenty-eighth day after the day on which the Act received the Royal Assent, unless the contrary intention appears in that Act.

Where an Act provides that the Act or a provision of the Act shall come into operation on a day to be fixed by proclamation of the Governor in Council published in the Government Gazette, the publication of the proclamation in the Government Gazette shall be a condition precedent to the coming into operation of the Act or provision in question but, if the proclamation is made on or before the day fixed by it for the coming into operation of the Act or provision in question and is not published until after that day, the proclamation shall not wholly fail but the Act or provision in question shall come into operation at the beginning of the day on which the proclamation is published in the Government Gazette.

The date of the passing of an Act is the date on which the Act receives the Royal Assent or, in the case of an Act reserved by the Governor for the signification of Her Majesty's pleasure, the date on which a proclamation by the Governor that Her Majesty has been pleased to assent to the Act is published in the Government Gazette.

1.1.13.5 Index - Table of Provisions

Commonwealth Acts of Parliament provide an Index but unfortunately Victorian Acts of Parliament do not. Reference must therefore be made initially to the Table of Provisions which sets out the headings of the various Parts Divisions and Sub-divisions into which the Act is divided and the headings of the various sections to endeavour to find the section or part which is relevant to the particular inquiry.

1.1.13.6 Further General Principles of Interpretation

To be sure what a particular provision means it is necessary to read it in context, even to the extent of reading the whole Act; but the reading of the whole Act should not obscure the meaning of a section if it is clear by itself. If pressed for time it will generally be sufficient to read the particular section carefully, then scan the other sections in the sub-division or part, noting particularly any definition clauses relevant to the particular section. If any words are unfamiliar, in all probability clarification can be obtained by use of a good quality English dictionary, or if available a law dictionary.
Words used in a statute should be used only with one meaning and if specifically defined in the statute should be read with that special meaning only. This is not always the case and the context may have to be considered if the definition does not seem to apply.

Definitions may be inclusive or exclusive.

e.g. "amended" includes altered or varied; "statutory rule" means (a) a regulation... but does not include....., the former being intended to extend the meaning of the word and the latter, using the word "means", being intended to limit the meaning of the word to a very specific meaning.

In the rare event that there are two inconsistent sections in a statute, the specific provision will prevail over a general provision if such a distinction can be made; if not the later provision prevails.

Punctuation should be ignored if the meaning is clear without reference to the punctuation, but used if necessary.

Where things which might have been dealt with by legislation have not been included these omissions cannot be written in by the court which interprets the legislation as if those things were intentionally excluded.

A useful rule is "eiusdem generis" whereby a general word following two or more specific words is limited by the genus of the particular words e.g. "any house, flat, villa unit or other building" would be read as being limited to residential buildings.

Another useful rule, but to be used cautiously is the one known as "expressio unius est exclusio alterius" - to state one thing is to exclude the other - if a list of permitted uses is given, other uses will generally not be permitted.

Courts have always interpreted narrowly any statutes which impose a penalty, a rate, tax or charge or take away vested rights but this approach is affected now by specific legislative provisions to the contrary and by section 35 of the Interpretation of Legislation Act 1984.

An Act of Parliament does not bind the Crown (the Government) unless the Act expressly says it does or it is a necessary implication from the words used. Statutory authorities are generally regarded as distinct from the Crown.

1.1.14 Caveat Surveyor

It is hoped that this brief introduction to the law and to statutory interpretation will help surveyors in their everyday references to statutes and subordinate legislation which become more prolific from year to year. The surveyor should always bear in mind, however, that he has not been trained as a lawyer and that there will be times when it will be wise, when doubtful, not to rely on his own judgment but to refer the problem to a solicitor for advice. By doing this the surveyor will pass on or minimise his risk of responsibility for loss arising out of an incorrect interpretation.

Further understanding may be gained by referring to the bibliography.

1.1.15 Footnotes


1.1.16 Bibliography


1.2 Introduction to Surveying

1.2.1 Development of the Profession

The surveying profession embraces a diverse and wide range of professional responsibilities. In keeping with other professions these responsibilities are constantly varying in respect of their direct relationship to the aspirations of the community. They are also governed in part by the technological advancements that are being achieved in society.

The profession finds itself at the leading edge of many investigations and activities that set the scene for future decisions on development and infrastructure which is normally associated with an expanding western society. By the same token, the profession has a significant responsibility to ensure that it maintains a most responsible and vigilant attitude in highlighting issues which should receive careful deliberation by decision makers, so that no unwise or injudicious actions are taken.

Since the early days of settlement, the surveying profession has provided this form of service to the community. It investigated the character and quality of the newly discovered continent; it undertook the parcellation of both rural and township lands observing earlier directives by Governors and adding a degree of personal perspectives; it performed large control surveys with a high sense of dedication under adverse conditions and little positive Government backing. It drew upon a range of scientific knowledge to seek a high degree of accuracy; it measured and assessed data such as tidal ranges and other hydrographic information; it was associated with the consequential infill of development as Victoria's population surged with gold discoveries and other pressures of settlement.

As the early settlement patterns became more consolidated and a sense of sophistication emerged, Surveyors Boards began to appear to establish qualifications necessary to gain official registration and to lay down prescribed performance standards. These Boards, whose composition has changed over the years, have made a most significant contribution to the profession, and its continuing presence today, together with its active participation and promotion in matters such as reciprocity between States and other overseas countries together with prescribing practising standards as set out in this Handbook, serve to indicate its continuing value both to the profession and the general community.

The First and Second World Wars saw the surveying profession making a significant contribution to the war effort and particularly in the Second World War, the evolution of innovative mapping and surveying techniques aided forces in invasion programmes. A reflection of the value of the profession is best illustrated by the number of Field Survey Companies established within the Australian Survey Corps, and the post-war grant of the title "Royal" to the Corps in 1948.

Both World Wars had far reaching effects upon the profession as they lead to an immense broadening of outlook and a breaking down of State parochialism as surveyors from all States were banded together with resultant close bonds being established. These bonds fostered, and finally achieved the unanimous decision of the various long-established State Institutions of Surveyors to federate and form the Institution of Surveyors, Australia, in 1952. The previously independent State bodies then became the Divisional bodies in each State answerable to a Federal Council. Prior to this situation most States maintained their own individual State professional body with little concerted activity occurring on an Australia wide basis.

Another major feature of both World Wars was the opportunity to gain insight into the rapid technological advancements which inevitably accompany war. Immediately after the First World War a number of Australian surveyors had the opportunity to attend the AIF Survey School at the headquarters of the British Ordnance Survey at Southhampton U.K. This intensive course was of
some four months duration and provided an opportunity for an injection of high quality scientific knowledge which consequentially found its way to Australia. Many of the surveyors who attended this School later made outstanding contributions to both the profession and the community at large, as it undoubtedly awakened an awareness of their ability and potential to have an input on a wide range of fronts.

The Second World War again gave the ability for contact with the latest in technology and possible future trends. It gave an impetus to the need to ensure that full time educational programmes were conducted in virtually every State of Australia. The full effect of this move is now being realised as all academic bodies offer vigourous research programmes and the profession now finds members of its profession holding Masters and Doctoral academic qualifications. This period also generated a greater interest in the area of mapping as the Second World War revealed the extremely unco-ordinated approach to mapping existing amongst the Australian States. This situation arose as surveying and mapping experienced severe constraints imposed by Governments in depressed economic conditions. Much needed long-term programmes were then set to one side. Out of the revived interest in mapping following the termination of the Second World War, the Australian Institute of Cartographers emerged, and this profession initially had the existing surveying courses as a major background to its own academic programmes.

Since these events the surveying profession has made great strides, aided through developments such as electronic distance measuring devices and the modem computer which is capable of rapidly analysing large amounts of land related data. This advancement has been further fostered by professional conferences, special interest groups such as the Australian Photogrammetric and Remote Sensing Society and association with international bodies such as the Federation Internationale des Geometres, (International Federation of Surveyors), and the International Society for Photogrammetry and Remote Sensing.

Brief resumes of areas of interest currently embraced by the profession are summarised below. The depth and range of diversity in each of these areas reveals the dynamism of the profession. It is of interest to note that the Surveyors Act 1978 gives the Surveyors Board power to grant registration in many of these areas.

### 1.2.2 Cadastral Surveying

This form of surveying is primarily concerned with the laws relating to the ownership of land and the definition on the ground of property boundaries and the recording of such information on plans and maps. This latter feature of ground definition results in some aspects of cadastral surveying being an integral component of estate development which is referred to in a later resume.

In many ways the cadastral surveyor acts as an arbitrator of a range of historical and current evidence and overlays this base information with an understanding of legislative principles to arrive at a definition of a title boundary. The effectiveness of the profession in this role is best appreciated by the fact that virtually no boundary litigation occurs in the State. All cadastral surveys can only be performed by a surveyor who is registered, and licensed to practise as a cadastral surveyor by the Surveyors Board. The Board prescribes survey accuracies and monitors adherence to these standards.

### 1.2.3 Estate Development

The surveyor will often play a major co-ordinating role and emerge as a team leader in this area. Some members of the profession extend their service to advising on the potential of properties and negotiating money flow.

In this area it is important to have a sound background of planning and the preparation of documentary material to support development proposals. Initially a detailed site analysis is required and this may even extend to the preparation of an Environment Effects Statement which will necessitate the formation of a team of experts on environmental matters.

Once basic data has been amassed, conceptual designs are performed and it is necessary to evaluate the total benefits of each design in terms of fiscal, social and community levels. Close liaison is required with a range of statutory and planning bodies, and in some instances it is necessary to seek public input to ensure that possible public objections are sensibly addressed. The use of computer based land information and computer generated perspectives provide a valuable communication device in presentations at these levels.
Critical paths analysis is necessary to minimise delays and ensure that project deadlines are met. Appearance may be necessary before Councils or Appeal Tribunals, and in these instances detailed submissions would be prepared with supporting graphic information together with any necessary supplementary statements from other professionals such as traffic engineers, landscape architects and environmental scientists.

Virtually all estate development will have an engineering component, and an increasing trend will be the inter-related construction of buildings. These matters again require the surveyor to have sufficient knowledge to be able to co-ordinate the contributions of other professions.

1.2.4 Land Management

The ability to gather a range of land data and to evaluate this information makes the surveyor a valuable contributor in the area of land management. This ability is particularly valuable where close assessment is being made of the environmental impact of either some past or possibly pending future event. Modern technology has provided some excellent tools in the form of aerial photography and remote sensing from satellite imagery. As further refinements are being made in the quality of definition from remote sensing, its inherent ability to provide updated data promises unlimited potential in this area.

Society is tending to place a greater emphasis upon conservation and it is anticipated that this area will receive greater emphasis in future professional tasks.

1.2.5 Precise Measurement

The surveyor is capable of performing precise measurement and position fixing over extremely small distances to very large distances embracing many tens of kilometres. This ability involves the surveyor in a wide range of diverse activities covering the precise positioning of machinery which may require alignments to decimals of a millimetre; the control and vertical alignment of huge tower buildings which possess extremely constrained structure tolerances; the fixing of position for large construction projects covering significant areas of the State such as major powerlines; the monitoring of movement of structures such as dam walls; the positioning of oil and gas rigs and their supporting pipelines; measuring of various parts of continents to record continental drift and crustal plate movement; and many other similar projects. In many instances a high degree of innovation is required due to restraints imposed by construction or natural impediments.

This form of work requires careful planning in many instances and involves a detailed preliminary analysis of the manner in which the observations are to be undertaken and of the appropriate equipment which should be utilised. This approach is necessary so that mathematical models can be formed to evaluate whether the desirable accuracy criteria are being obtained or if some additional techniques should be introduced to obtain the required result. It should be remembered that the surveyor's marks or records in most of these instances are associated with costly projects and in many cases prefabrication of materials is undertaken on the basis that all design criteria are met.

1.2.6 Topographic Surveying and Mapping

This is a classic form of surveying and involves the fixing and representation of the physical features of the earth's surface. It involves a mixture of field surveying and office processing and is a coalescing of the skills of the surveyor and the cartographer. Extensive use is made of aerial photographs and more recently, remotely sensed data. Large control networks are set out and positioning over long distances can be achieved with scientific equipment such as a Global Positioning System which fixes position with extremely high accuracy from orbiting satellites.

Infill data may be gathered with equipment that records data directly in electronic data banks which can be directly converted to imagery, either on a visual display unit or in hard copy form.

Topographic information acts as base reference material for all forms of decision making, encompassing areas such as planning, conservation analysis, major project preliminary design, recreational pursuits and military purposes.
The ability to hold topographic information in the form of a "digital terrain model" i.e. as computed base data, opens up the way for extremely flexible and efficient use of this data and it will overcome many of the inefficiencies formerly encountered in endeavouring to keep a topographic base of high integrity.

1.2.7 Engineering and Mining Surveying

Some aspects of engineering surveying have been elaborated upon in earlier resumes. It involves preliminary site analysis, and a careful gathering of data at this stage is necessary as the final design decision may be related to this initial data.

This form of surveying often has to be conducted under extreme pressure, as construction works are directly related to the fixing of major control marks or assessment of works as they progress. The surveyor must be prepared to be extremely positive and maintain very close liaison with the engineers supervising the project. Preferably the surveyor should hold a position as a member of the supervising team.

In mining and tunnelling works the surveyor has a major responsibility as all drives and the relationship between different levels of Underground activity are all entirely dependent upon the survey control lines. The transference of position down vertical shafts demands extreme care and the fixing of direction may involve the use of gyroscopic equipment which picks up the forces associated with the spinning of the earth and transforms this input to provide a relationship of direction with the axis of the earth's rotation i.e. a true north-south alignment. As many tunnelling projects are undertaken in a series of initially physically separated stages it is evident that extreme care, precision and attention to detail is necessary.

1.2.8 Hydrographic Surveying

This surveying involves discovering information about waterways, rivers, harbours and the ocean. It will involve the measurement of the depth of the sea bed and the preparation of hydrographic charts which record the pattern of the sea bed. In addition, these charts will normally incorporate details such as buoys, lighthouses and beacons which may be used in visual navigation. This form of surveying now involves sophisticated electronic position fixing from either transmitting ground stations or satellites and will be associated with a form of electronic echo sounding device. Again it is now possible for this information to be recorded in electronic data banks and be presented as a graphic screen display or in hard copy form.

Another area of hydrographic surveying is the recording of tidal ranges, and as society becomes more aware of the "Greenhouse Effect", data in this area becomes extremely important in attempting to determine finite parameters of this phenomena.

Hydrographic surveying also involves the measurement of stream and current flow. This information is particularly important in water resource assessment and in measuring the impact of varying types of developments. It also aids in preparing design criteria for engineering works which may be associated with the movement of water, either for irrigation purposes or as run-off into a drainage system.

1.2.9 Spatial Information

This area is experiencing a significant thrust as advancements have occurred in the amount of data that can be handled and manipulated by computer - even the smaller personal computer.

The establishment of land related data in land and geographic information systems represents the opportunity for increasing the efficiency of land registration systems, ease of updating of rating and taxing systems which are related to land values, the overlaying of information such as planning, geologic, topographic and a host of other data. In the area of land development it will provide a dynamic portrayal of this diverse range of data, and it is considered that it will enhance decision making.

The establishment, enhancement and maintenance of these systems draws upon the skills of the surveyor and it is envisaged the surveying profession will play a key role in the operation and management of these systems.
1.2.10 Scientific Measurement

Mention has been made in part to this form of measurement in other resumes. In this area a sound scientific knowledge is necessary and this is best indicated by reference to geodetic surveying and geodesy. This form of surveying requires recognition that the earth not only somewhat resembles an oblate spheroid and does not possess a pure mathematical shape, but it is also subject to variations in gravity and other physical phenomena which have an influence upon observations, and computational processes.

1.2.11 Education and Training

As an important and critical component of the surveying profession and industry, education and training has and continues to play a significant role.

Prior to the Second World War the education of surveyors rested almost exclusively with a four year article or apprenticeship system and the passing of examinations conducted by the Surveyors Board in each State and New Zealand. These examinations were conducted concurrently across Australia and the Tasman Sea, with the papers being identical for each subject in each State and New Zealand on any one occasion.

Since the Second World War surveying courses have developed within the university system to the point where two major universities in Victoria, the University of Melbourne and the Royal Melbourne Institute of Technology (RMIT), offer four year bachelor degrees in surveying and related disciplines.

The satisfactory completion of one of these courses is now the minimum entry qualification into the profession of surveying. Satisfactory completion of an appropriate para professional qualification such as an Associate Diploma provides entry into the surveying industry with an opportunity to articulate to a professional level qualification.

In addition to undergraduate qualifications, these universities also offer a variety of post-graduate qualifications ranging from Graduate Diplomas to Masters degrees by coursework, to Masters degrees by research, and Doctor of Philosophy degrees. Both the University of Melbourne and RMIT have active and expanding programmes at the post-graduate level. Both universities are also extensively involved in collaborating with the surveying profession and industry in research projects, consultancies and technology transfer.

1.2.12 Surveyors' Roles and Responsibilities

The above resumes indicate in part the range of professional skills that the surveyor draws upon in everyday surveying activity. They also highlight the responsibility which accompanies this activity and how the resultant decisions act as a base upon which the community at large relies for sound decision making. This role has been the key element of surveying since its inception, and the profession must ensure that it will continue to fulfil this role in a conscientious and responsible manner.

The future holds many challenges and opportunities for the professional surveyor especially in the generic area of spatial information. Much information, not only that which is related to land, is in some way related to its location. For instance, it is considered that the non-financial assets of a company or organization are important to the economic performance of that company or organization and as a consequence, the spatial management of those assets are critical.

New technology development has created a range of opportunities for the professional surveyor, such as those mentioned above, but it also allows the surveyor to work more closely with a range of other professionals and their organizations.

The future role of the professional surveyor will be broader and more diverse than in the past as the surveyor develops additional decision making skills and attributes for the benefit of the community.