

GENERAL GUIDELINES

FOR SURVEYORS

UNDERTAKING CADASTRAL SURVEYS
& operating in the
SAMOAN GEODETIC REFERENCE SYSTEM 2005
(As newly defined under SIAM2)

Introduction

As a result of Component C5 - Land Administration and Survey, of the Second Samoan Infrastructure and Asset Management Project (SIAM II), there have been significant changes introduced into the survey and spatial information systems of Samoa.

The immediate broad changes included a complete upgrade of the Geodetic Survey Network using GPS technology and the reform of the Land Registration System from a deeds system to a title system (often referred to as a Torrens System).

The changes were commenced in 2005 and will continue to be developed and refined over time as the legislative program prepared under the project comes into force.

The following are in draft form at the time of manual preparation:

- *A Land Title Registration Law ;*
- *A Survey Act (to replace Survey Ordinance 1960);*
- *Survey Regulations under the Survey Act; and*
- *A Spatial Information Act.*

This manual is not designed to be a fully comprehensive list of guidelines for every regulatory, technical and administrative element of the conduct of cadastral and geodetic surveys in Samoa. It should be regarded as a working document which will be subject to amendment as dictated either by revision to draft or existing law or by operational experience.

The purpose is to provide surveyors, and others who have a need to operate directly or indirectly within the cadastral and geodetic survey frameworks of Samoa with guidelines which specifically reflect the changes mentioned above. Nothing in the Manual is in conflict with the Act and/or the Regulations.

To this end the manual anticipates the enactment of the new legislation – in particular the Survey Act and enabling Survey Regulations.

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Abbreviations and Definition of Terms Used

CEO	The Chief Executive Officer of the Ministry
Coordinated Cadastre	A system where the boundaries of land parcels are legally described by coordinates expressed in the Samoa Map Grid
Development Plan	A plan depicting a proposed subdivision and prepared to conform to Part V of the Planning and Urban Management Act 2004.
DCDB	The Digital Cadastral Database is a computer based cadastral map compiled from registered survey plans. It is the basic reference framework in the SMG for most spatial applications in Samoa. It is not a legal cadastre.
Digital Cadastral Dataset	Cadastral data presented in digital form. Designed to facilitate maintenance and upgrade of the DCDB.
GPS	The Global Positioning System
Minister	The Minister responsible for the Ministry.
Ministry or MNREM	The Ministry of Natural Resources, Environment and Meteorology
SGRS 2005	Samoan Geodetic Reference System 2005. A system which enables positions on the surface of the earth to be determined by reference to a mathematical model that best describes the shape of the earth as it relates to Samoa.
SMG	Samoan Map Grid – as defined

1. BACKGROUND

1.1 Legislative Powers

Cadastral and Geodetic surveys within Samoa are controlled by legislation. The Survey Ordinance 1960 has been revised and a draft Survey Act (2006) and enabling Survey Regulations (2006) are pending. The new Survey Act vests wide powers and responsibilities for the conduct and quality of cadastral and geodetic surveys in the CEO, Ministry of Natural Resources, Environment and Meteorology. Key powers influencing practice include:

1.1.1 Licensing of Surveyors

The CEO may license surveyors to perform cadastral surveys subject to appropriate qualifications and approval of the Minister.

Such licence may be cancelled or revoked for unprofessional conduct as defined in the (draft) Survey Act.

1.1.2 Annual Practicing Certificates

An Annual Practicing Certificate will be issued and renewed if the CEO is satisfied that the surveyor complies with current standards and regulations

1.1.3 CEO to set Rules for Cadastral Survey

Specifically under Part 6: Section 19 of the (draft) Survey Act (2006), there is provision for the CEO to "*specify rules for the conduct of cadastral surveys*" within specified areas. The rules may further require "*surveyors to provide cadastral survey data sets, or specified parts or classes of cadastral survey datasets, to the CEO as digital cadastral survey datasets*".

The Regulations Part 2; Section 5 further provide that:

- *A surveyor making any survey under these Regulations shall comply with all rules and directions issued by the CEO supplementary to these Regulations and not contrary thereto, and shall conform to accepted good survey practice where procedure is not laid down by these Regulations.*
- *A surveyor shall also conform to the **survey manual** as approved by the CEO from time to time.*

PROVIDED THAT it shall be the duty of the surveyor to recommend amendments to the survey manual where in his or her judgment amendments would improve field practice.

1.2 Geodetic Network

The original geodetic network was established between 1983 and 1990 to support mapping activities. Over time the system has deteriorated. The destruction of permanent survey marks and the inherently low precision of the network meant that the existing horizontal network was not adequate to support the basic spatial framework nor the sustained management and development of Samoa's environment and natural resources.

The incompatibility of the existing geodetic datum and the Global Positioning System (GPS) was creating confusion amongst users. Accordingly it was appropriate to upgrade the network to provide a world standard high precision network on a datum compatible with the GPS system to enable users to take full advantage of this powerful technology and avoid future confusion over geodetic datums.

One of the primary aims of these guidelines is to regulate the connection to the Permanent Survey Marks and provide a tighter link between the geodetic and cadastral systems, so that over time this will result in more accurate map grid coordinates for cadastral boundaries.

For the time being the connection to the geodetic network is primarily to facilitate the maintenance of the *Digital Cadastral Database (DCDB)* which has been developed by staff of the MNREM, Technical Services Division. The concept of a fully *Coordinated Cadastre* is not contemplated under this manual.

1.3 Samoan Geodetic Reference System

The new Samoan Geodetic Reference System 2005 (SGRS2005) has been established using the GPS system. It is the basic reference framework for all surveying, mapping and land related information in Samoa. It is constructed at three basic levels:

- The *primary*, or initial, network is national in scale and consists of stations separated by distances of 15 -20 kilometres. It is complete and covers the whole of Samoa.
- The *secondary* network is not a continuous framework as its main purpose is to break down the primary network to a suitable density for controlling localised projects. Distances between stations are typically 5 kilometres.
- The *tertiary* network, or third level of breakdown, is the working level for most project work including large scale mapping, cadastral coordination and land information control. Survey stations at this level are planned to be progressively introduced at a separation of approximately 250m depending on locality and land use.

1.4 Information Brochure

An information brochure on the creation of the SGRS2005 has been prepared for general reference¹.

1.5 Responsible Government Agency

The responsibility for establishing and maintaining these networks lies primarily with the CEO, Ministry of Natural Resources, Environment and Meteorology (MNREM). Operational responsibility for measurement configurations and the survey database of station values for the SGRS 2005 has been delegated to the Survey Section of the Technical Services Division of MNREM.

It has been recommended that a Geodetic Unit be established to take responsibility for the SGRS 2005.

¹ See TA Report Number 29

1.6 Samoa Survey Database

This has been established and is maintained by the Technical Services Division to:

- Store information for control points from the Geodetic Network Upgrade;
- Store information about all survey marks in Samoa;
- Provide information about the status of survey marks;
- Provide cross referencing between marks and plans;
- Provide a graphical interface for searching;
- Provide access to mark data for surveyors, govt agencies etc.

An example extract from the Survey Database can be seen in the attached Geodetic Network Upgrade Information Brochure.

2. CADASTRAL SURVEYS

The guidelines must be used in conjunction with, and will be compliant with, the (draft) Survey Regulations 2006 under the (draft) Survey Act 2006.

2.1 Survey Information

Survey information suitable for lodgement with the CEO, through the relevant section of MNREM, shall be prepared in hardcopy and/or digital form. Survey information includes metadata, such as location of the survey, surveyor's statement that these guidelines have been followed, other statutory statements; dimensional data – including boundary measurements, connections and discrepancies with previous data; supporting data such as nature of marks, nature of boundaries, disturbed or destroyed marks, nature and position of occupations and identification of abutments and other relevant interests; and other elements required by the CEO.

2.2 Surveyor's Responsibilities

It is a primary professional responsibility of the surveyor to disclose all information and to act in the interests of the State. Some particular examples of information may include:

- Easements
- Presence of encroaching power lines
- Encroachments, including position of fences, and
- Other irregularities which may affect title.

2.3 Minimum Acceptable Re-establishment

Sufficient permanent marks should be found to provide enough redundancy to:

- prove that none of the adopted marks could have moved;
- prove that there is not a mistake in the original work and to allow distribution of the errors in that work, and
- detect any mistakes in your own work and manage the errors.

2.4 Priorities of Acceptable Re-establishment

The following order of priority of evidence is recommended in establishing street corners:

1. Reliable marks or monuments (including connections to buildings etc) on the subject alignment;
2. Reliable marks or monuments on the other side of the road;
3. Proportioning distances (while maintaining alignment) over two or more sections. This method is usually only reliable when the sections are part of the same original survey, but it is the only method to be used when deficiencies are involved.
4. Proportioning distance while maintaining original angle(s) within the street section ;
5. Maintaining original distances;
6. Maintaining straight street alignments;
7. Producing street alignments;
8. Maintaining original angles

2.5 Discrepancies with Original Surveys

All discrepancies with original data outside regulatory limits must be fully investigated with adoptions, measurements, offsets and calculations checked. Where re-established corners do not fit with improvements, such as fences, there is a risk that an error has been made and it is therefore recommended that a check be made.

Discrepancies should be reported in the Survey Report (see part 2.10 below and the attached survey report template).

2.6 Field Notes

Surveyors are required to maintain a permanent record of all observations and measurements taken during the course of a cadastral survey. Section 10 (1) of the Survey Regulations 2006 require that: *field notes shall be recorded on approved loose leaves or in an official field book and shall accompany the plan when lodged with the CEO.*

Potentially the field notes have a number of uses:

- As an original record of field observations they may be required during legal proceedings in relation to the defined boundaries.
- They will be requested by the CEO during any Audit Survey program the CEO may order.
- It may be necessary to refer to original field observations to rectify discrepancies subsequently discovered in a cadastral survey.
- Field notes often contain additional information not shown on a plan of survey. It may be necessary to refer to this in the future.

The person referring to the field notes may not necessarily be the original surveyor, so it is important that they are presented in a form that can be readily interpreted by other surveyors.

The following guidelines describe in more detail the desirable standards of presentation for recording of field observations:

- a. Record all measurements as observed on the survey, and show the reduced horizontal distances, angles or bearings on traverses, connections and boundaries.
- b. Sketches must be uncluttered, all entries being clear, concise, unambiguous and sufficient to allow another person to prepare a complete plan of the survey without verbal explanation. Adequate use should be made of enlargements.

- c. Connections to survey marks or occupation should clearly indicate the point of measurement and, where relevant, the age and description of the object.
- d. Describe the point of measurement for river boundaries i.e. top of bank, pool level, edge of water, centre line etc., and for sea boundaries i.e. medium high water mark, edge of rocks, top of cliff, second seaweed line, etc. Record how the medium high water mark was determined e.g. by time and tide tables, levelling, or visual evidence.
- e. The connections to all survey marks emplaced are to be recorded, and described, so that there can be no doubt about the action taken.
- f. Where a search for a reference mark is unsuccessful, the calculated position laid from the traverse station should be recorded. The measurement can be labelled as 'Calc' and the result of the search noted, for example, 'GIP Gone'.
- g. Unclosed traverses or radiations are to show the methods taken to check measurements and minimise the possibility of mistakes.
- h. Traverse and boundary lines should be clearly distinguishable. Offsets and radiations to occupation and reference marks should be dashed lines.
- i. Sketches should show parcel numbers, abuttals and street names.
- j. Each page must show the north point, cross referencing to other pages when there is a continuation of traverse or other information, and be signed and dated.
- k. The first page should show the locality and EDM reference number.
- l. It is preferable for entries to be made in ink. There should be no erasures or use of correction fluid; errors should be struck out and corrections written adjacent.
- m. Each observation should be entered as soon as made; no reliance should be placed on memory.
- n. Automatic data recordings must be accompanied by field notes (either manual or automatic) showing a sketch and descriptive information sufficient to make sense of the digital data. The raw automatic observations may be retained in either digital or hard copy form for the required 10 years, along with any related manual records.

2.7 Plan Examination

Survey Plans lodged with the CEO for examination shall be in good order and condition, and the CEO may refuse to receive any plan which has been damaged by folding or in any way which impairs its legibility. Plans shall be submitted to the Draughting and Plan Examination Section of MNREM, in accordance with the Act and Regulations (draft 2006).

2.8 Plan Distances

All distances shown on lodged survey plans will be plane distances as measured or derived in the field without adjustment to the Samoan Map Grid.

2.9 Plans the Property of the State

All plans received by the CEO from a surveyor or other person for examination, shall be deemed to be held on behalf of the surveyor responsible for the plan until approved by the CEO;

After approval by the CEO all plans become the property of the State.

2.10 Survey Reports

A Survey Report should accompany a plan of survey or survey data set when lodged for examination. The report shall include such information as will assist in the examination of the plan: For example - details on origin or origins of bearings and co-ordinates; details of how a definition of each boundary was arrived at; details of any differences or irregularities relevant in underlying surveys and any other information that will help future surveys.

The processing of a survey plan will generally be delayed until a report is received.

2.11 Survey Report Template

A Survey Report should include the information required, and be in a form approved, by the CEO. A suggested Report Template is included in this Manual as Attachment 1.

By way of elucidation a Survey Report provides the surveyor with a convenient method of conveying information relating to boundary redefinition to the survey examiner. For example:

- Where a survey discloses significant differences in measurements or description against previous surveys these should be detailed. The steps taken to verify the Surveyor's own work should also be included in the report. Some examples of situations where a report can be useful in explaining a redefinition are:
 - the proportioning of excess or shortage.
 - the adjustment of data between more reliable corners.
 - adoption of occupation as the boundary.
 - errors in the previous survey resulting in new fixings to reference marks found.
 - any survey redefined from occupation and significantly differing from previous data.

The report should explain how the survey has been redefined and why there are disagreements with previous survey data.

- Where a tertiary or other geodetic reference mark is shown as gone, the surveyor shall present a report which describes the steps taken to locate the mark and any information on how the mark may have been destroyed.
- During the course of a survey the Surveyor may gather evidence which is relevant to the location of boundary points but has not been disclosed on the plan submitted. This may take the form of information gained from residents or unregistered documents. It is important that this be included in a report to support the lodged plan.
- The survey may disclose doubts and discrepancies. These may include significant differences against existing title dimensions, incorrect reference mark fixings, possible reasons for reference marks not found, or differences to occupation descriptions.
- Finally, a report accompanying a survey will enable the survey examiner to better understand the principles and process that the surveyor has adopted in arriving at the boundary definition. This should reduce the level of examination required and speed up the processing and approval of the survey.

3. GEODETIC SURVEYS

The geodetic network of Samoa has been significantly upgraded and a network of permanent survey marks established to define the Samoan Geodetic Reference System 2005 (SGRS 2005). The purpose of this upgrade is to provide a homogeneous, accurate and accessible reference framework for the integration and interchange of all spatially related information in Samoa.

As a result more reliance will be made in future on map grid coordinates and on the more permanent Survey Marks which define the SGRS2005.

3.1 The Samoa Geodetic Reference System 2005

The horizontal datum for Samoa is defined as follows:

Horizontal Datum	Samoan Geodetic Reference System 2005 (SGRS2005)
Reference Frame	International Terrestrial Reference Frame 2000 (ITRF2000)
Epoch	2016.0
Ellipsoid	GRS80
Semi-major axis (a)	6,378,137.0 metres
Inverse flattening (1/f)	298.257222101
Reference Frame - The Samoan Geodetic Reference System 2005 is realised by the coordinates of the following high precision fundamental geodetic stations referred to the GRS80 ellipsoid determined within the International Terrestrial Reference Frame 2000 (ITRF2000) at the epoch of 2016.00.	
102 – Faleolo CGPS	Latitude S 13° 49' 55.95916"
Longitude	W 171° 59' 58.32189"
Ellipsoidal Ht	47.600m
104 – Fagalii CGPS	Latitude S 13° 50' 57.14900"
Longitude	W 171° 44' 18.34120"
Ellipsoidal Ht	76.875m

SGRS2005 is defined on the Geodetic Reference System 1980 (GRS80) Ellipsoid. The GPS satellite system operates on the World Geodetic System of 1984 (WGS84). There are very small differences between the GRS80 and WGS84 Ellipsoids, but for all intents and purposes they have the same parameters and accordingly SGRS2005 and WGS84 are considered to be based on the same ellipsoid. WGS84 is regarded as coincident with ITRF2000.

3.2 Samoa Map Grid

The map grids to which authorised cadastral surveys are to be connected are those for which accurate, precise and reliable coordinates can be maintained by MNREM as the responsible Government Agency. This will be the Samoan Map Grid (SMG2), based on the Samoan Geodetic Reference System 2005.

The following parameters define the Samoan Map Grid:

Name:	Samoa Map Grid (SMG)
Projection:	Universal Transverse Mercator
Longitude of Origin:	Central meridian = 171 degrees West
Latitude of Origin:	Equator
False Easting:	500,000 metres
False Northing:	10,000,000 metres
Central Scale Factor:	0.9996
Zone width:	6 degrees
Note:	Samoa lies in Zone 2 (ie SMG 2)

3.3 Geodetic Connections

The MNREM has established the Samoan Geodetic Reference System 2005 which is capable of supporting cadastral coordination. This is primarily done by connection of the cadastral system into the SGRS tertiary level network (see section 1.3). The immediate benefit will be to facilitate the maintenance and progressive upgrade of the DCDB by the MNREM.

In order to facilitate connection the MNREM will progressively establish the Tertiary Geodetic Network over Apia. To date the network has been established over the area known as the **Apia Tertiary Geodetic Control – Area 1²**. This area will be used as a pilot within which all new cadastral surveys will be connected to the tertiary network.

3.4 Connection to Tertiary Network

It will be considered good survey practice in future that surveyors connect to any permanent geodetic mark that is passed in the course of any survey as this will:

- provide a cadastral fixing for new tertiary network marks;
- facilitate and encourage the integration of surveys;
- assist survey examination through the availability of a reliable tertiary mark network.

On all new surveys within **Area I**, and other areas which may be defined by the CEO from time to time, surveyors are required to connect to a minimum of two tertiary marks.

The overall objective is to ensure that all surveys are adequately tied to geodetic survey marks that will be preserved by the CEO. As a minimum two of the tertiary marks should straddle the subject land.

However, even when the minimum connection to the tertiary network has been made surveyors are still required to connect to any geodetic mark passed in their survey that is within 250 metres of their subject land in urban areas and within 500 metres outside urban areas.

3.5 Extension of the Tertiary Network

The general priority for extension of the tertiary network will be in locations such as:

² In the first instance a pilot area, known as Area 1, has been established and defined in Apia. The area is defined on Registered Survey Plan to be lodged with MNREM

- Broad-acre and urban fringe areas that will be the focus of major subdivisional activity.
- Rural areas of intensive cultivation where there has been a progressive loss of the cadastre.
- Areas of concern, identified by surveyors or government, where the cadastre is degraded or where it is known that a large proportion of survey marks remain undisturbed under roads or other construction;
- Established urban areas that are undergoing general redevelopment, involving significant survey activity.

The tertiary network enables surveys to be tied to the SGRS and thus to be interrelated by the common survey framework. The principle which will be followed is to progressively expand the tertiary network *on a user-needs basis*. This will be done by linking the establishment of the coverage of tertiary level survey marks into the normal land development process in Samoa.

3.6 Guidelines for Extension by Private Sector

The following guidelines will assist surveyors in the extension of the tertiary network as part of the normal land development and survey plan approval process:

3.6.1 Proposed Development Applications for Division of Land

Development Plans³ should be referred to MNREM before cadastral surveys are commenced. The plans will be examined by the staff of the Survey Section to determine suitable locations for new tertiary marks. The selected locations are to be based on the subdivision design, existing and proposed subdivisions and the surrounding framework of tertiary marks. The objective is to ensure that the new marks contribute to the tertiary network aims.

The process of final survey plan approval will be expedited by early reference to MNREM for evaluation of tertiary survey mark requirements

Surveyors are notified by letter of the required tertiary mark locations; queries or problems should be directed to the Assistant CEO, Technical Services Division.

3.6.2 Placement of New Tertiary Marks

Surveyors will be responsible for the installation of tertiary survey marks so notified.

No additional tertiary marks are to be placed in tertiary network areas, except those approved by the CEO. This approval is most obviously given in the case of new subdivisions. Another common exception for approval will be where a new tertiary mark is placed in lieu of one removed for road widening.

3.6.3 Connection to new Tertiary Survey Marks

Provision of adequate connection to SGRS2005 will be provided by MNREM.

³ "Development Plan" means a plan depicting a proposed subdivision and prepared to conform to Part V of the Planning and Urban Management Act 2004.

Surveyors will be responsible for ensuring that all parcels in the new subdivision are connected to the installed tertiary survey marks with sufficient accuracy to enable the integration of the survey into the Samoa Map Grid.

In the case of large development subdivisions, and any other major survey works in Samoa, it is desirable that the new tertiary survey marks are used as part of any local coordinate system which may be established to control the development. or works.

3.6.4 Tertiary Survey Mark Preservation

Notwithstanding the locations defined by MNREM on the development plan, the surveyor should locate tertiary survey marks to maximise security and protection of the mark.

Long term preservation of new marks will be enhanced by siting the mark where it is least likely to be disturbed. The following factors are relevant to preferred sites:

- For marks along roads, within the road reserve.
- At road bends, on the outside of the curve.
- Clear of fencing operations.
- Clear of intended or foreseeable earth or construction work.
- When placed near internal boundaries, adjacent to an occupied bend or boundary intersection.

New tertiary survey marks should if possible also be sited for more direct connection by placing in a position which allows:

- direct occupation of the mark
- intervisibility to other tertiary marks or prominent reference objects.

To minimise confusion and expedite mark security and maintenance it is preferable to use an existing non-cadastral tertiary mark or convert a cadastral reference mark rather than site a new tertiary mark nearby.

In situations where an existing tertiary survey mark could be endangered by the creation of a cut corner a new mark shall be placed in a safe location back from the cut. This requirement does not apply where the cut corner is created without survey, or the survey does not redefine the corner being cut. If there is no tertiary mark at the corner and one is to be placed then it must be placed in a safe location, not adjacent to the old intersection corner.

3.7 Location Sketches

The surveyor responsible for the survey plan will submit a location sketch suitable for identification and recording of the survey marks in the Survey Database. A sketch will be submitted for each new tertiary survey mark established.

3.8 Specifications for Geodetic Survey Marks

Construction: New monuments constructed as part of the extension or maintenance of the geodetic network will be constructed to the following specifications:

- (i) Unless part of substantial concrete structures, new control points will be concrete monuments, poured on-site, with dimensions as follows:

Primary Mark 0.3m x 0.3m cross section at the top;
0.4m x 0.4m cross section at the base;
0.7m long;
protruding 0.2m above ground level (normally).

Estimated quantity of concrete required is **0.1m³**.

Secondary Mark 0.25m x 0.25m cross section at the top;
0.35m x 0.35m cross section at the base;
0.5m long;
protruding 0.1m above ground level (if set in a footpath, the mark is to be flush with the footpath).

Estimated quantity of concrete required is **0.05m³**.

Tertiary Mark 0.20m x 0.20m cross section at the top;
0.30m x 0.30m cross section at the base;
0.4m long;
protruding 0.1m above ground level (if set in a footpath, the mark is to be flush with the footpath).

Estimated quantity of concrete required is **0.025m³**.

- (ii) If bedrock is reached before the hole is excavated to the required depth, it is permissible to attach the mark to the bedrock provided that the surface of the bedrock is properly keyed and cleaned to ensure that the monument is properly attached to the bedrock.
- (iii) In some situations where an above ground mark may be dangerous or a nuisance to local people or vehicles, consideration must be given to constructing the monument flush with the surface.
- (iv) In some situations, where the stability of the ground is questionable, a larger monument may be appropriate.
- (v) All concrete monuments will have a brass plaque or rod (subject to availability) set in the centre and be inscribed with the appropriate point number. If brass plaques or rods are unavailable then an alternative non-corroding substitute should be used to denote the exact position of the control point.
- (vi) If established on substantial concrete structures or solid rock, new control points may be:
- copper or concrete nails in cement patties, inscribed with the point number;
 - drill holes, marked with the point number;
 - screws, bolts or "tut tut" nails set in drill holes.
- (vii) To enable a GPS antenna to be set securely over the mark when using a range pole and tripod set-up on fast static surveys, it is essential that the rod, nail, screw or bolt used to mark the point is punched with a centre punch, or has a cross cut in it or some other suitable alternative is provided to prevent the tip of the range pole slipping from the point during the observation.

3.9 Mark Numbering

Every point in the SGRS must be allocated a unique number. Compliance with this requirement will enable the simple integration of all data for all control points into the Survey Database.

MNREM will assign numbers to new tertiary survey marks which are required to be installed by surveyors in the course of development.

Survey Report Template

- to accompany each cadastral survey dataset (manual or e-survey)

	<p>Survey report headings and general summary of detail required to complete your report.</p> <p>All information required to demonstrate your survey is correct and, in terms of the Survey Regulations, must be included in your survey report.</p> <p>The text under each heading below is a general description of the items to be covered in the survey report.</p> <p>Further information on requisitions and content is provided in the supporting document with explanations.</p> <p>The descriptive text below the headings may be retained in the report, changed to hidden text or deleted.</p>	<p><i>Notes for completing report:</i></p> <p>Please address all headings in your survey report to be presented with each Survey Plan lodged. Where no response is appropriate against a particular heading, annotate with 'not applicable' to confirm all headings have been addressed.</p> <p>Number and present your headings (1 – 20) in the same order as set out in this template to facilitate data consistency and the plan examination process.</p> <p>Complete your report with your comments either adjacent to the heading (as in this template) or, alternatively, you may present your comments under each heading, utilising the full width of a page.</p>
<p>1.</p>	<p>SURVEY DESCRIPTION:</p> <p>Clearly identify all the subject parcels and intent for each parcel.</p> <p>Confirm that all parcels to be extinguished or that are affected, as well as the parcels being created, are clearly and correctly identifiable on the plan.</p> <p>Check this survey report description against the title panel on the plan to ensure consistency.</p>	
<p>2.</p>	<p>SURVEY PURPOSE:</p> <p>Explain the purpose for which the survey has been conducted. Make sure the intent is clear.</p> <p>Confirm the dataset type: survey, compiled, or computed. (Note: if the plan is Compiled or Computed this information must be shown on the plan face).</p> <p>If survey is to support Gazettal or Statutory action the supporting statutory authority must be referred to in the report.</p>	
<p>3.</p>	<p>SURVEY COMPONENTS – COMPLETENESS OF INFORMATION:</p> <p>State and confirm that the survey is in terms of the Survey Regulations for completeness and accuracy.</p> <p>State and confirm the number of pages contained in each set of documents</p>	

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	<p>supplied.</p> <p>Highlight and explain any items that might indicate ambiguity or conflict with the Survey Regulations.</p> <p>Reference all dispensation, decisions, consents, consultation and other relevant documents.</p>	
4.	<p>SURVEY CLASS:</p> <p>Confirm the Class of survey shown on the plan face.</p> <p>Where there is more than one Class on the survey, confirm the correct Class is assigned and clearly identified against the appropriate parts of the survey.</p> <p>Confirm and reference any dispensations obtained for lower accuracy classes of surveys.</p>	<p>For example - a survey may be (i) city (ii) urban or (iii) rural survey to which relevant accuracy standards apply.</p>
5.	<p>EQUIPMENT AND METHOD USED:</p> <p>State the survey equipment and method used in the survey.</p> <p>Where observations have been made using different types of equipment other than by theodolite/EDM or total station, e.g. compass or GPS, clearly state methodology and on which boundaries and observations the alternative equipment has been used.</p>	
6.	<p>DATUM:</p> <p>State the datum and coordinate system used.</p> <p>If you have not used Samoan Geodetic Reference System 2005 clearly state the reasons why it was not practicable to do so.</p> <p>Confirm and reference any dispensation obtained.</p>	
7.	<p>ORIGINS: MARKS, BEARINGS & COORDINATES:</p> <p>Identify and confirm the marks used to prove the survey's reliability, orientation and scale.</p> <p>Provide details of the source of the origin of bearings and coordinates.</p>	
8.	<p>BEARING CORRECTION:</p> <p>Describe how you determined and justified any bearing corrections you applied to</p>	

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	adopted work.	
9.	<p>OLD MARKS:</p> <p>Provide details of:</p> <ul style="list-style-type: none"> • old marks found and discuss the reasons for either relying or not relying on them • all old marks searched for but not found and document any evidence explaining possible destruction of marks • old marks that might be assumed relevant to your definition, but not searched for, and document the reasons for not searching for them. 	
10.	<p>DEFINITION, BOUNDARIES AND MONUMENTATION:</p> <p>Fully describe your definition methodology. Describe how you have determined the underlying boundaries and how you have connected to the cadastre to ensure no resulting gaps or overlaps of parcels, and how you have resolved any conflict.</p> <p>For other than natural boundaries, where you are accepting any boundary not defined as a right line or arc, discuss in detail your rationale, including why no dispensation has been sought.</p> <p>Confirm all new boundaries are marked and witnessed in terms of the Survey Regulations.</p> <p>Describe how you have addressed any issues with respect to boundary monumentation.</p>	
11.	<p>OCCUPATION:</p> <p>Confirm nature and description of occupation relative to the parcel boundaries.</p> <p>Confirm whether or not there are buildings or eaves that encroach or closely approach a boundary.</p> <p>Where a building encroaches or closely approaches the boundary, confirm how the building position was determined so that it could be delineated.</p> <p>Explain any differences between boundaries and occupation that are material to the definition.</p> <p>Report any other occupation factors influencing the determination of</p>	

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	boundaries, or discrepancies and conflicts between occupation and boundary.	
12.	<p>NATURAL BOUNDARIES</p> <p>Report method used to determine natural boundaries.</p> <p>Describe reasons for differences between new or redefined boundaries and the current record, e.g. whether the new, different, position is due to:</p> <ul style="list-style-type: none"> • accretion/erosion • avulsion, or • more accurate fix. <p>Confirm and report that any adopted natural boundary is currently in the position depicted on this survey.</p>	
13.	<p>PLAN PRODUCTION:</p> <p>Describe how you have produced the plan (CAD / manual draughting) and how this approach is of a sufficient standard to ensure no detail is lost when the plan is scanned and after approval.</p> <p>Identify any detail not shown on the plan face but which is available through Supporting Documents lodged with the plan such as Field Notes and Occupation Details.</p>	
14.	<p>ACCURACY CHECKS:</p> <p>Describe how you have ensured your cadastral survey complies with accuracy requirements required by the Survey Regulations.</p>	
15.	<p>AREAS & PARCEL CLOSURES:</p> <p>Confirm areas are shown on the title plan for all new parcels and balance parcels.</p> <p>Provide details of differences between existing and new parcel areas. This is especially important where the total area difference is outside the tolerances of the Survey Regulations.</p> <p>Explain parcel closures (RF and misclose dimension) that are outside survey tolerances for the Class of Survey,</p>	
16.	<p>CONFLICT WITH UNDERLYING BOUNDARIES AND EXISTING SURVEY OBSERVATIONS:</p> <p>Describe any conflicts with both underlying parcel boundaries and associated survey</p>	

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	<p>observations in the vicinity of your survey or that you have connected to as part of your new survey.</p> <p>Describe in detail all conflicts and clearly document how each conflict was resolved.</p>	
17.	<p>EASEMENTS/COVENANTS:</p> <p>When easements/covenants are to be surrendered or released, provide details of:</p> <ul style="list-style-type: none"> • any existing rights of way, and • other easements or covenants. 	
18.	<p>ADDITIONAL INFORMATION AND LEGAL:</p> <p>Provide any additional information that will assist with the:</p> <ul style="list-style-type: none"> • processing and validation of the survey, or • issue of title. 	
19.	<p>SURVEY SYSTEM MAINTENANCE:</p> <p>Record Map and DCDB discrepancies:</p> <ul style="list-style-type: none"> • list all issues and discrepancies that require investigation by MNREM staff <p>Physical survey network</p> <ul style="list-style-type: none"> • identify any marks or survey structures that need maintenance (for possible addition to the MNREM annual programme for survey maintenance) • suggest possible, new survey control in the vicinity of your survey that would enhance the survey system (for possible addition to the MNREM annual programme for survey control) 	
20.	<p>INTERNAL QUALITY ASSURANCE:</p> <p>Describe what QA measures have been used for this plan to ensure it meets the Survey Regulations with respect to both field practices and office procedures (search routines, survey calculations, plan production, completeness and correctness of survey definition).</p>	
21.	<p>ADDITIONAL NOTES</p> <p>Any additional information which may be of use in the examination and approval of the survey plan; or in the preservation and maintenance of the cadastral or tertiary network system</p>	

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