

State of play of Geodetic Infrastructure
Niue

SIDS Symposium

18th – 21st September 2013
Suva Fiji

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Niue

Land Management and Survey Division
Department of Justice, Lands and Survey

The Division is responsible:

- Surveys, mostly cadastral
- GIS
- House the Land Registry section
- Management of Crown Land and Properties

Division staff by

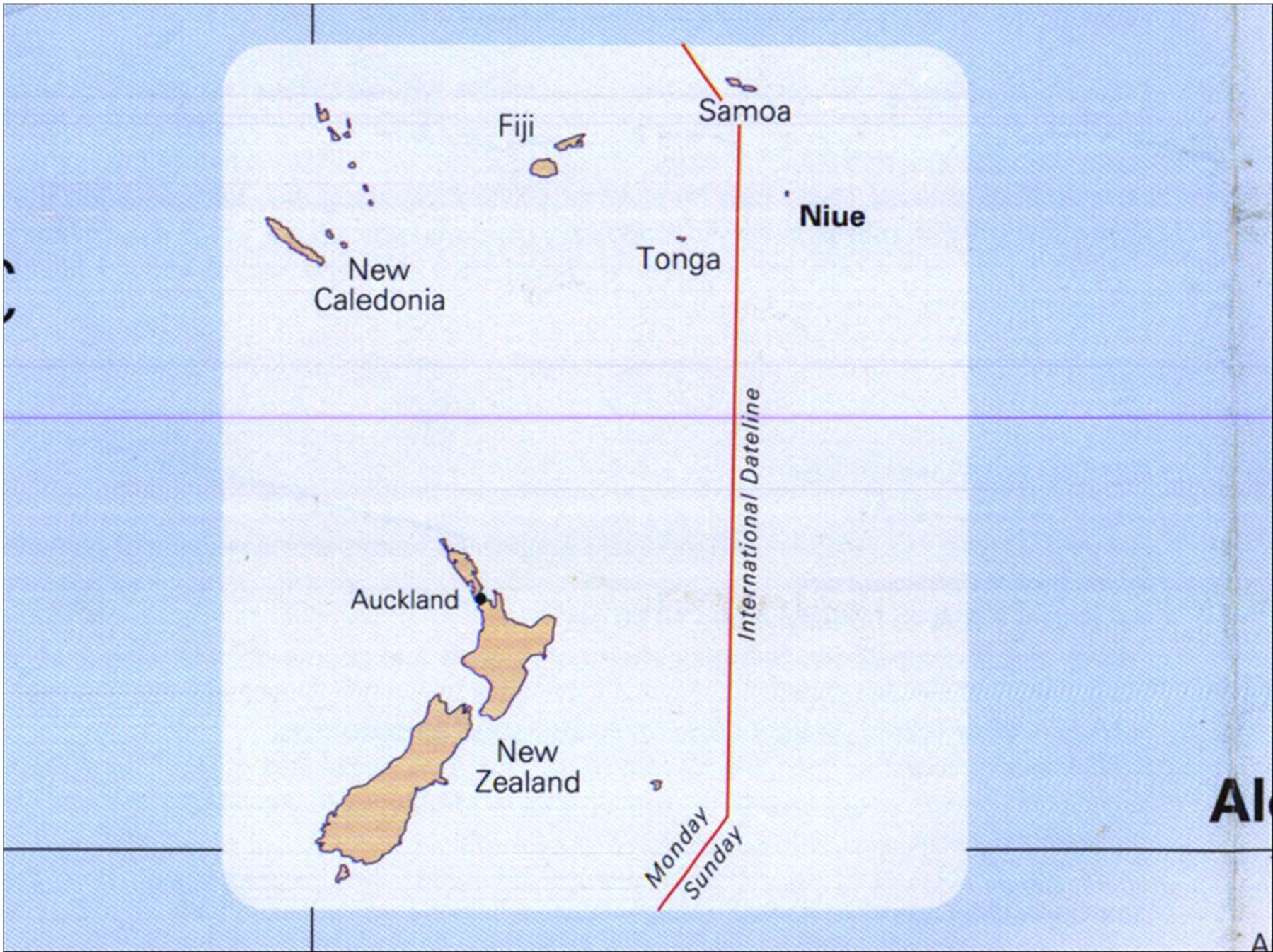
- 1 surveyor, 1 technician, 1 GIS technical officer, two cadets and 5 other supporting staff.

Niue geography and location

A raised atoll consist of three terraces

- the first is the existing reef formation
- the second at about 25 to 35 metres height and
- the third at 70 metres which is the outer edges of the former lagoon.
- The centre of the island is lower than the top terrace at about 35 metres above MSL.
- Niue Total land area is 260 sq km
- Population about 1 300

Niue was first discovered by Capt. Jame Cooks in 1774 and he called the island Savage Island.



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Niue brief Surveying history and experience

The first ever survey was introduced back in 1901 – 1903 by Harzard - District Surveyor from NZ

- he established the Origin Station or Datum – Tomb Point.
- determined the first geo-reference position for Tomb Point at 19° 01' 42" south and 169° 55' 15" west (Clark?)
- the road surveys around the island and

Harzard produced one Plan for all his survey for Niue where he noted on his plan that “ *the island is wholly of rock formation and there are no streams upon it whatsoever*”

After Harzard there was no record of any survey until late 1930's

In 1939 to 1942 a very extensive survey was undertaken by A A Bailey – Chief Surveyor from NZ

- Survey Control Traverses along all the main roads
- Cadastral surveys
- Re-determined the Geodetic Coordinates of Tomb Point at **19° 03' 15"** south and **169° 55' 15"** west (Clark?)
- Stellar observations for controlling horizontal
- Produced over 50 plans for all his survey

Most of the current survey now relied on Bailey's excellent survey traverses as the base for all surveys.

Note: All roads are 50 links wide.
Coastline adopted from Plan 1.

Plan of
Centre-line Road Traverse
for Survey Control
NIUE ISLAND

Surveyed by A.A. Bailey. 1939, 1940. & 1941.

Scale: 20 chains to an inch.

A.A. Bailey
Registered Surveyor

Note: All old marks were from a survey
by T. D. M. Howard, 1903

Tapu Point

Avatele Village

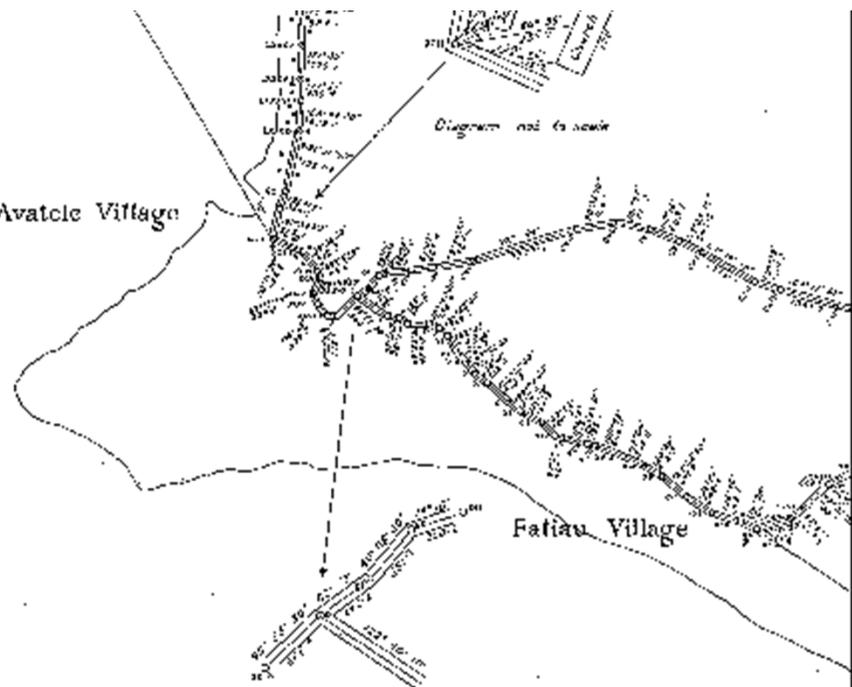
Fatiau Village

Diagram not to scale

Diagram not to scale

SLU NOCK	1, 4-20
	2, 6, 20, 24, 27
	3, 4, 14, 22, 32
TRAVEL NOCK	20, 21, 16-25,
	22, 31-32
EXPLANATION	
REFERENCE PLANS	

C. D. Meadows June 1955



1942 to 1965 little survey was ever done and mostly by locals and by compass survey.

In 1955 **vertical control** was established and determined by the visiting surveyor from NZ – MSL as datum.

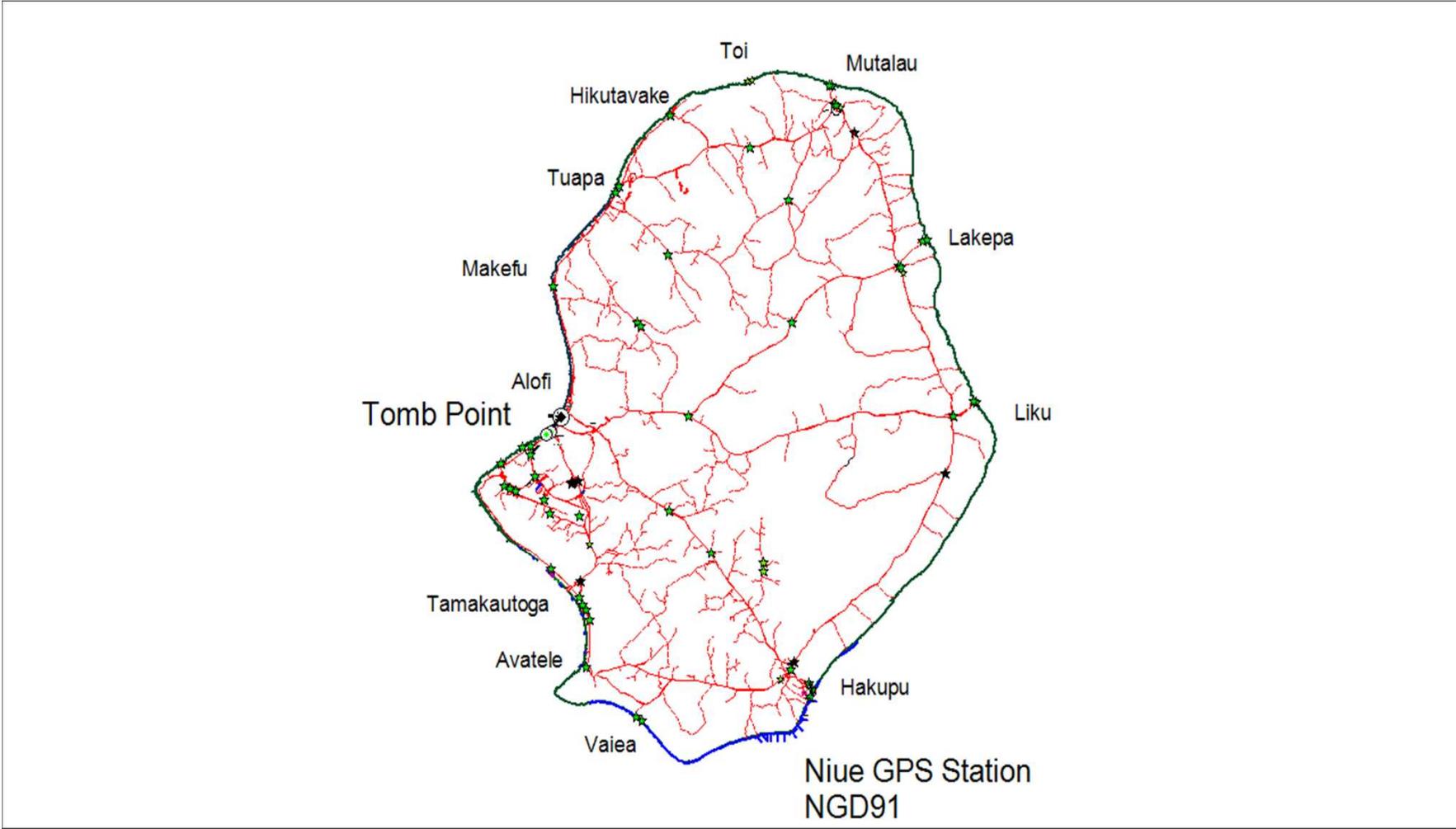
1965 to 1980 numerous surveyors from NZ visited Niue and assist with mostly cadastral and title surveys and some improved control traverses.

Thereon-after from 1980 local surveyors took over with all survey activities with the support of two UNV surveyors in the mid 1980's.

All surveys before 1991 are in terms of Niue Map Grid with the coordinates of Tomb Point at
0.00 links N and 0.00 links E to 1980 and
15 000 m N and 5 000 mE from thereon-after.

Latest Improvement – Geo-reference by GPS

April 1991 NZ department of Survey and Land Information of NZ, on request by the Niue government, undertook a Geodetic Survey using GPS of existing survey control marks, cadastral survey marks, bore holes and isolated new GPS stations scattered around the island. The outcome of this survey, besides bringing Niue onto an earth centred datum, was to establish a specific geodetic datum – Niue Geodetic Datum 1991 (NGD91) and can refer to as the same as GRS80 and WGS84.



Total of more 40 GPS stations

Projection

"Niue Map Grid (NGD1991-GRS80)",
-169.92087533,-19.053878,1,5000,15000
(Tomb point: -169° 55' 15.15" & -19° 03' 13.96")

"Niue, UTM Zone 2(62)(NGD1991-GRS80)"
189,0,0.9996,500000,10000000

- Satellite imageries, land parcels, topographical, forestry coverage, soil and all GIS layers etc... by MapInfo software
- Maritime Delimitation baseline
- GPS station with Met

Way Forward

- Improved data and verification of data currently in use support by the latest technology available.
- GPS Survey to cover isolated and remote areas around the island.
- Complete re-computation of all old survey traverses and control in terms of NGD91 – available software?
- Funding, regional collaboration and availability of resources to implement all of the above.

Monu moe Fakaue