EU-SOPAC (EDF9) Project Report 80
Reducing Vulnerability of Pacific ACP States

NAURU TECHNICAL REPORT

RAINWATER HARVESTING:
ASSET CONDITION SURVEY OF DOMESTIC INFRASTRUCTURE
13th February to 23rd February 2007

Plastic water storage tank emplaced partially below ground level, Buada, Nauru.

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CONTENTS

LIST OF FIGURES

LIST OF TABLES

EXECUTIVE SUMMARY

This document is a record of an in-country technical survey mission to Nauru, completed from 13th February to 23rd February 2007 by the following SOPAC staff:

- Mr Stephen Booth (EDF8/9 Senior Advisor – Water);
- Ms Elizabeth Lomani-Whippy (EDF8/9 Project Intern);
- Ms Arieta Navatoga-Sokota (SOPAC Project Officer – Water); and
- Ms Vilisi Tokalauvere (EDF8 Fiji Country Intern).

The mission was undertaken as an integral part of the Key Result Area 2 (Water) contribution to the SOPAC EU EDF8/9 Project "*Reducing Vulnerability of Pacific ACP States*" with the objective of field surveying the current asset condition status of domestic and community rainwater harvesting infrastructure. Although a little over eight field survey days were achieved on-island, daily progress was compromised by various difficulties, particularly the limited availability of diesel fuel on-island which impacted both ease of transportation and availability of electricity and water. Despite these constraints, two field survey teams visited a total of 308 properties within the districts of Buada, Yaren, Meneng, Anibare and Ijuw, initiating a comprehensive database which can either be fully completed within the remaining island districts at a future date, or used with some confidence as a statistically representative sample for forward interpolation of "whole-of-island" conditions.

The field survey equipment utilised and approach methodology are described in detail in Section 3 of this report, whilst Section 4 presents and analyses the spatial data collected. Section 5 of the report considers current population dynamics and their impact on domestic water demand.

The SOPAC project team is particularly indebted to Mr Bryan Star, Director of Projects, Nauru Department of Commerce, Industry & Resources, and Ms Chitra Jeremiah and Ms Judith Solomon, both of Nauru Aid Management Unit, for in-country arrangements. The invaluable assistance with field survey work, on-site equipment security, and back-up administrative support provided by a variety of other staff within the following organisations is also gratefully acknowledged:–

- Nauru Lands & Survey;
- Nauru Environment Department;
- Nauru Rehabilitation Company; and
- Nauru Police Force.

LIST OF ACRONYMS

ADB – Asian Development

GGD – Grand Assistance for Grassroots to Human Security Projects (Government of Japan)

GoN AMU – Government of Nauru Aid Management Unit

GPS – Global Positioning System

IMR – Infant Mortality Rate

MDG – Millennium Development Goal

MoU – Memorandum of Understanding

NID – Nauru Island Datum

PACC – (UNDP/SPREP) Pacific Adaptation to Climate Change Project

PRAN – Pacific Regional Assistance to Nauru

RoN – Republic of Nauru

RWH – Rainwater Harvesting

SOE – State-Owned Enterprise

SPREP – Secretariat of the Pacific Regional Environment Programme

UNDP – United Nations Development Programme

1. INTRODUCTION

1.1 Background

Despite a considerable body of historic information, technical advisory reports and even a draft National Water Plan(1) concerning recommended water supply and management approaches to resolve Nauru's water problems, negligible positive progress has been witnessed in the sector. Given the extreme limitations of the socio-economic realities of Nauru's current situation compared to its historic affluence, the expensive historic options of large-scale use of desalination (which relied on effective power generation – which by definition requires a reliable fuel supply) and periodic importation of freshwater by boat, clearly no longer represent sustainable options.

There is, and always has been, potential to supply Nauru's freshwater needs from both groundwater and rainwater and it is apparent that conjunctive use of groundwater and rainwater harvesting may well provide the best long-term water supply solution for the whole island. Groundwater investigations, monitoring and protection certainly warrant further study, as does an asset condition survey of the domestic and community rainwater harvesting infrastructure to ascertain what might be required to satisfactorily upgrade system conditions relating to the catchment, transmission and storage of rainwater. Additionally, water conservation and awareness education remain extremely critical issues requiring input, as does the coincident investigation of the viability of (actual) cost-recovery mechanisms. ***It cannot be over-emphasised that the prevailing socio-economic living conditions in Nauru present enormous challenges to the operational viability and maintenance sustainability of any proposals to undertake refurbishment or replacement of rainwater harvesting (or indeed any other) infrastructure.***

1.2 Policy Setting

The water infrastructure sector goal of Nauru's Sustainable Development Strategy (2005-2025) (2) is to provide a reliable supply of water to all households and businesses. Sector strategies, such as better management of water resources, including underground water; improved collection and storage of water at all levels; and restored capacity for water production, are identified. The water sector strategy sets out the following developmental milestones:–

- ***Short-term Milestones (by 2008)*** – Regular supply of water available to each household and business. Refurbishment of national water storage tanks. 100 new household water tanks installed per annum. Desalination plant operational.

- ***Medium-term Milestones (by 2015)*** – Quality water available to households and businesses 24 hours a day. Water storage capacity expanded.

- ***Long-term Milestones (by 2025)*** – Improved access to a reliable supply of quality water.

Whilst these milestones represent admirable temporal focal points, Nauru's MDG Target 10 pragmatically identifies the current reality, in that *"fresh water is available from rain and well water, but desalinated water is no longer available. Constant supply is unreliable due to periodic droughts and quality is questionable. Water use management does not exist. Poor waste management threatens to contaminate the water lens."* In addition, the infrastructure strategy clearly identifies some of the critical constraints and limitations, stating that *"Due to the past lack of maintenance and investment in physical infrastructure over many years, Nauru's current infrastructure is very run down and on the point of collapse in some instances. While investment has been substantial over the past 4 years, ongoing institutional and management problems have contributed significantly to the ongoing poor performance of this system. Major investment, coupled with a new culture of preventative maintenance and forward thinking is required for*

ongoing reliable functionality. In a resource restrained environment the emphasis must be on improving the management and operation of existing facilities."

The SOPAC/EU EDF9 Project was first introduced(3) to Nauru in July 2005, and during the subsequent initial reconnaissance mission(4) by Mr Booth, SOPAC/EU Project Senior Advisor (Water), in early November 2006, exploratory discussions were held regarding the provision of assistance through the current EU-funded programmes of SOPAC, in conjunction with the programming of Nauru's B-Envelope under the 9th EDF. In an endeavour to avoid duplication and ensure synergy with a number of other water sector aid initiatives, these discussions with the PIFS Representative of the Pacific Regional Assistance to Nauru (PRAN) Aid Management Unit, and during the subsequent period November 2006 to February 2007, highlighted the fact that many different aid donors are also currently active, or propose to be in the near future, within the Nauru water sector. Of particular note are:–

- **AusAID** – Essential infrastructure and contingency support in the water sector – undertaken under MoU agreements between Nauru and Australia including the refurbishment of a RVO unit for water supply – AUD 600 000. This is understood *(N. Young & D. Melvin, (AusAID), pers. comms. 2007)* to include procurement and installation of 150 galvanised water storage tanks, each of 18,500 litre capacity, for community use, including support for community gardens.

- **ADB** – Technical assistance, including strategy for reform of the water and power sector. GON to undertake review and reform of water and power sector in consideration of ADB reports and recommendations.

- **Government of Japan** – Provision of 3 x 6000 l plastic water tanks to each of 15 communities = 45 tanks in total – USD100 000 (see Annex A for available details provided by AMU).

- **UNDP/SPREP PACC Project** – USD 500 000 potential input into the water sector.

- **SOPAC** – System of intervention in line with disaster preparedness (drought risk) "B-Envelope" funding – At the donors' roundtable November 2005, EU agreed to provide up to Euros 500 000 for Nauru within the project to be managed by SOPAC.

The above interventions represent a formidable cumulative amount of funds being directed towards Nauru's water sector and an unprecedented opportunity to secure sustainable future water supplies. One factor that will significantly improve the country's resilience to drought risk is to maximise rainwater harvesting opportunities. To enable this, an accurate, high quality spatial database of current infrastructure assets and water demand are essential precursors, both for accurately identifying and targeting immediate specific Aid needs, and for basic confidence in any future water sector management scenarios.

1.3 Rainwater Harvesting

Whilst it is acknowledged that the Japanese (270 m^3) and Australian (2,775 m^3) Aid inputs noted in Section 1.2 above will provide valuable additional rainwater storage tank capacity to the residents of Nauru, there would appear scant detail or understanding concerning actual individual households or community needs or the potential suitability of harvesting sites. *(NB: In April 2007, a survey of community needs was reportedly (D. Melvin, (AusAID), pers. comm. 2007) underway by Eigigu Holdings, a SOE who will construct the AusAID tanks on island.)*

The exploratory discussions noted in 1.2 above, outlined the SOPAC/EU Project's approach philosophy combining the application of high-resolution, remotely sensed (RS) satellite imagery, global positioning systems (GPS), and geographic information systems (GIS) with local capacity

building and training, to provide an accurate spatial database of all domestic and community properties. Identification of associated conditions of rainwater harvesting infrastructure assets such as roofing materials, guttering, down-pipes and storage tanks would formulate the basis of an existing asset condition survey. This would subsequently allow production of engineering specifications and an associated bill of quantities to identify the infrastructure refurbishment and replacement opportunities which could be eminently suitable for consideration for co-funding implementation under Nauru's B-Envelope risk management "drought" funds. Subsequent provision and installation of sufficient domestic and community rainwater harvesting facilities would therefore contribute directly to reducing the vulnerability of Nauru's population to drought risks.

SOPAC's technical Guidelines(5) for the implementation of rainwater harvesting systems, as well as the Manual(6) for participatory training in rainwater harvesting in Pacific Islands, were also provided to Nauru to further assist with application activities under any of its rainwater harvesting initiatives.

2. OBJECTIVE

The ***specific*** survey mission objectives envisaged were originally outlined in proposals submitted by SOPAC for consideration by GoN during January 2007, and this mission proceeded on the basis what is outlined below:

- To introduce and explore the provision of assistance through the current EU-funded programmes of SOPAC in conjunction with the programming of Nauru's B-Envelope funds (see Annex B), also under the 9th EDF. Should a draft plan of action for implementation appears feasible, it was considered that focal areas for development may include one or more of the items listed.

    1) Development of a RS/GIS/GPS database of all properties and associated roof catchments to accurately identify the condition of rainwater harvesting infrastructure assets such as roofing materials, guttering, downpipes and storage tanks.

    2) Conjunctive use of available water resources through maximising rainwater harvesting and groundwater resource abstraction. Firstly, rainwater harvesting and storage improvements can be made in the immediate to short-term, both at the domestic and communal/institutional level and be considered as major components under the B-envelope. Secondly, groundwater abstraction is envisaged as a long-term investment for which a thorough investigation of current aquifer conditions and baseline monitoring is required. A proposal(7) for a groundwater investigation programme, initially developed for AusAID and subsequently being advanced by Nauru Rehabilitation Corporation in 2006/07 could also be considered for implementation under Nauru's B-Envelope

    3) Transfer of SOPAC's Technical Guidelines for the implementation of rainwater harvesting systems as well as the Manual for community participation developed for rainwater harvesting in Pacific Islands.

This technical survey mission was subsequently formalised by GoN on behalf of the NAO, via receipt of letter of approval dated 29/01/07 from the Director of the Aid Management Unit, Department of Finance and Economic Planning.

A summary of the mission itinerary is presented in Annex C.

3. FIELDWORK SURVEY METHODOLOGY

As previously noted in Section 1.3, the SOPAC/EU Project's approach philosophy combines the application of high-resolution, remotely-sensed (RS) satellite imagery, global positioning systems (GPS), and geographic information systems (GIS) with local capacity building and training, to provide accurate spatial databases for development planning applications.

3.1 Satellite Imagery

A recent (2006) QuickBird satellite image (Figure 1) was ordered for the island and used as a reference map during the survey. The 0.6-metre resolution clearly showed buildings and assisted the field surveyors in accurately identifying areas to be mapped. The actual properties visited and the identifying reference number allocated to each of them for the purposes of this survey are identified in the following sequence of eight figures (Figures 2 through to 9).

Figure 1. QuickBird (2006) satellite image of Nauru showing area covered in the survey.

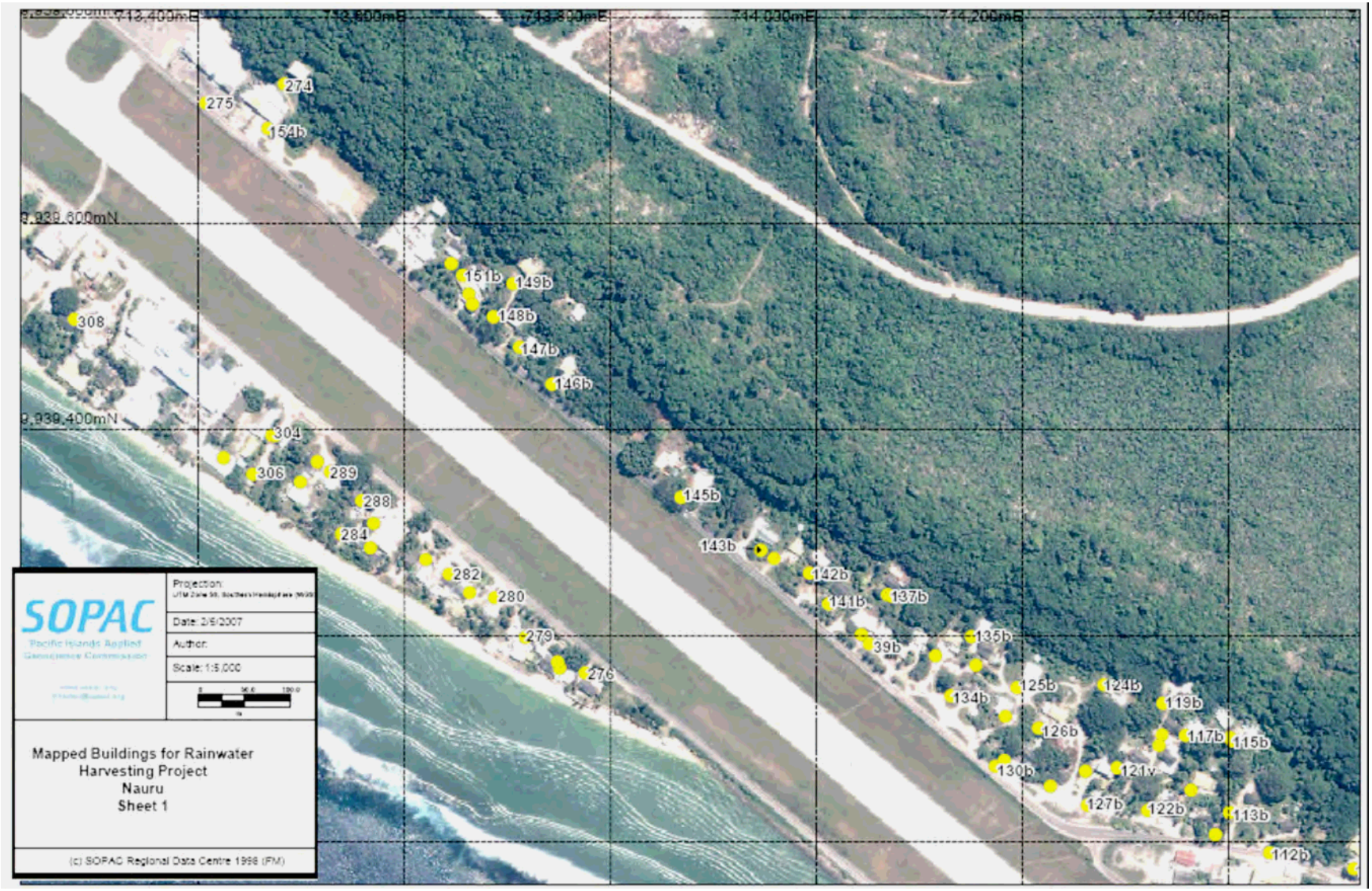

Figure 2. Surveyed properties and reference numbers – Yaren District.

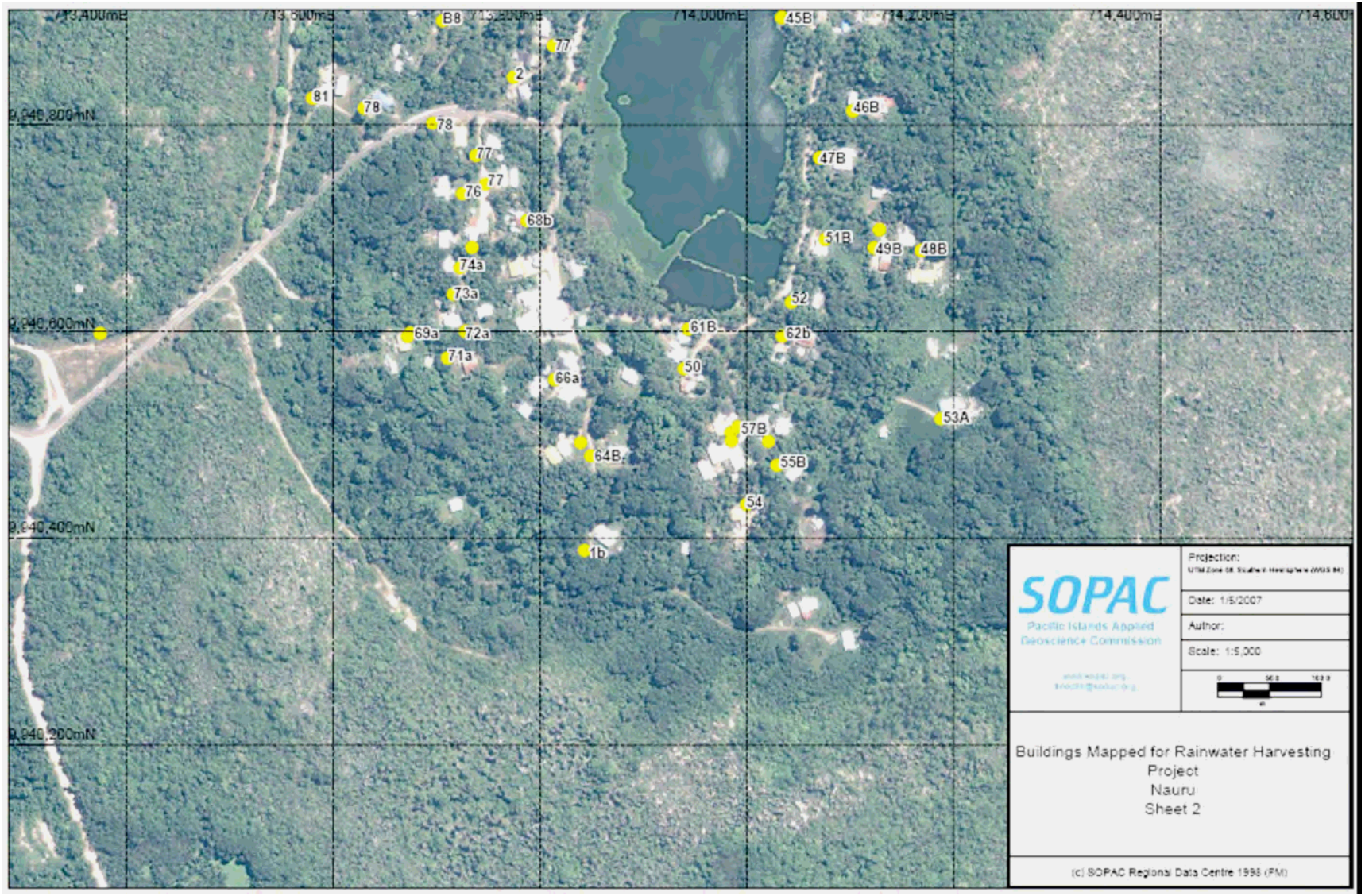

Figure 3. Surveyed properties and reference numbers – Buada (South) District.

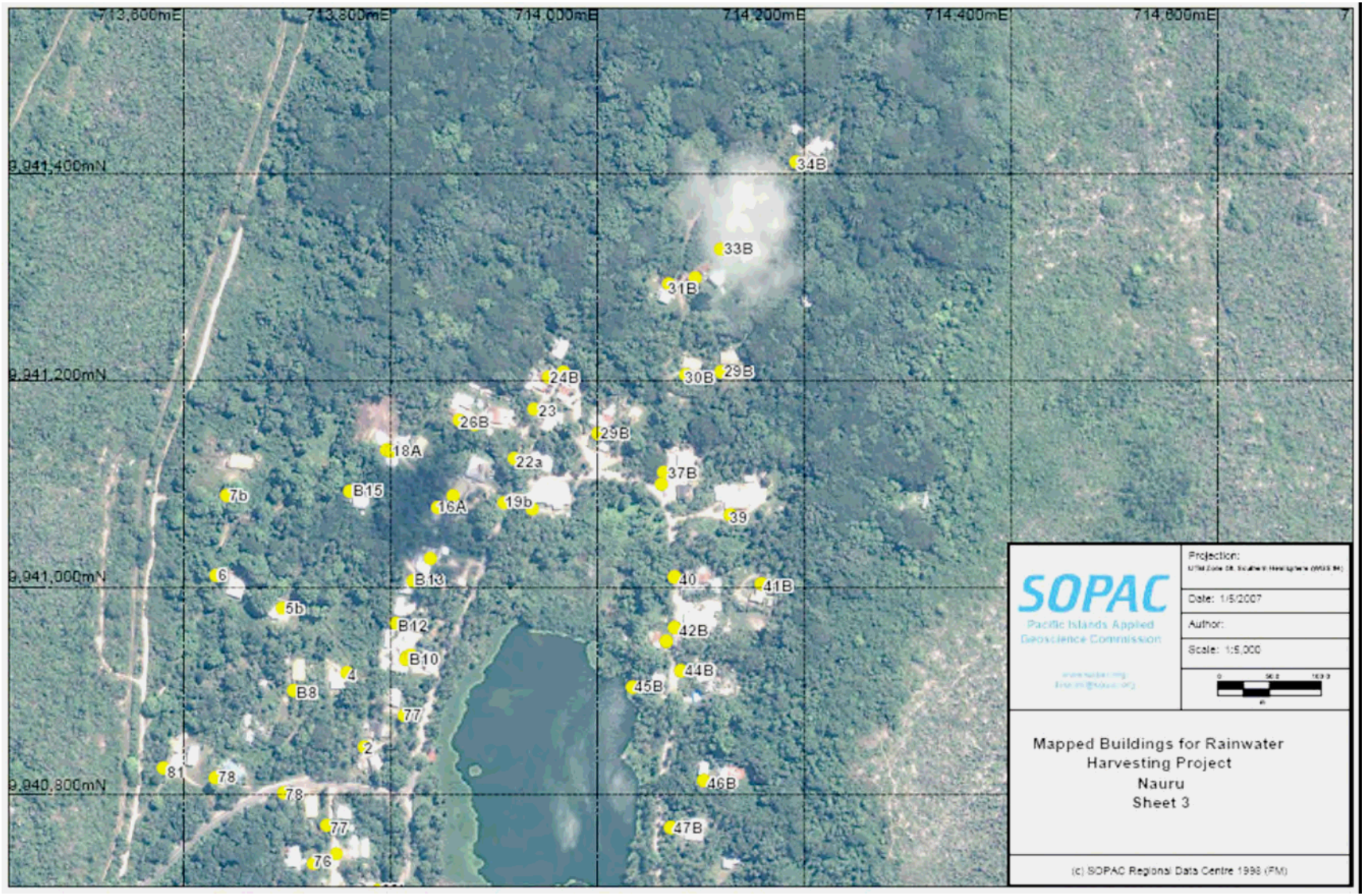

Figure 4. Surveyed properties and reference numbers – Buada (North) District.

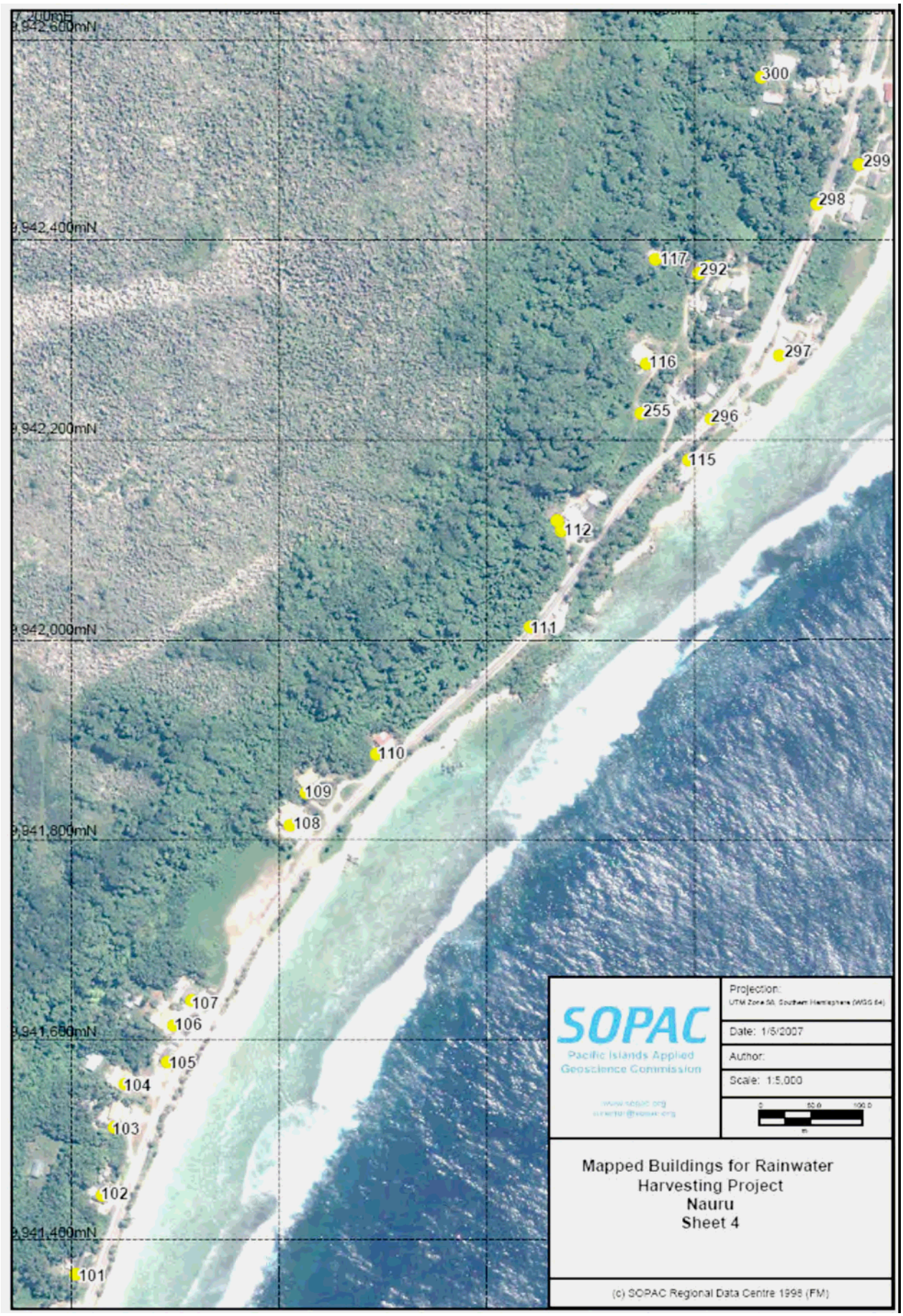

Figure 5. Surveyed properties and reference numbers – Anibare & Ijuw Districts.

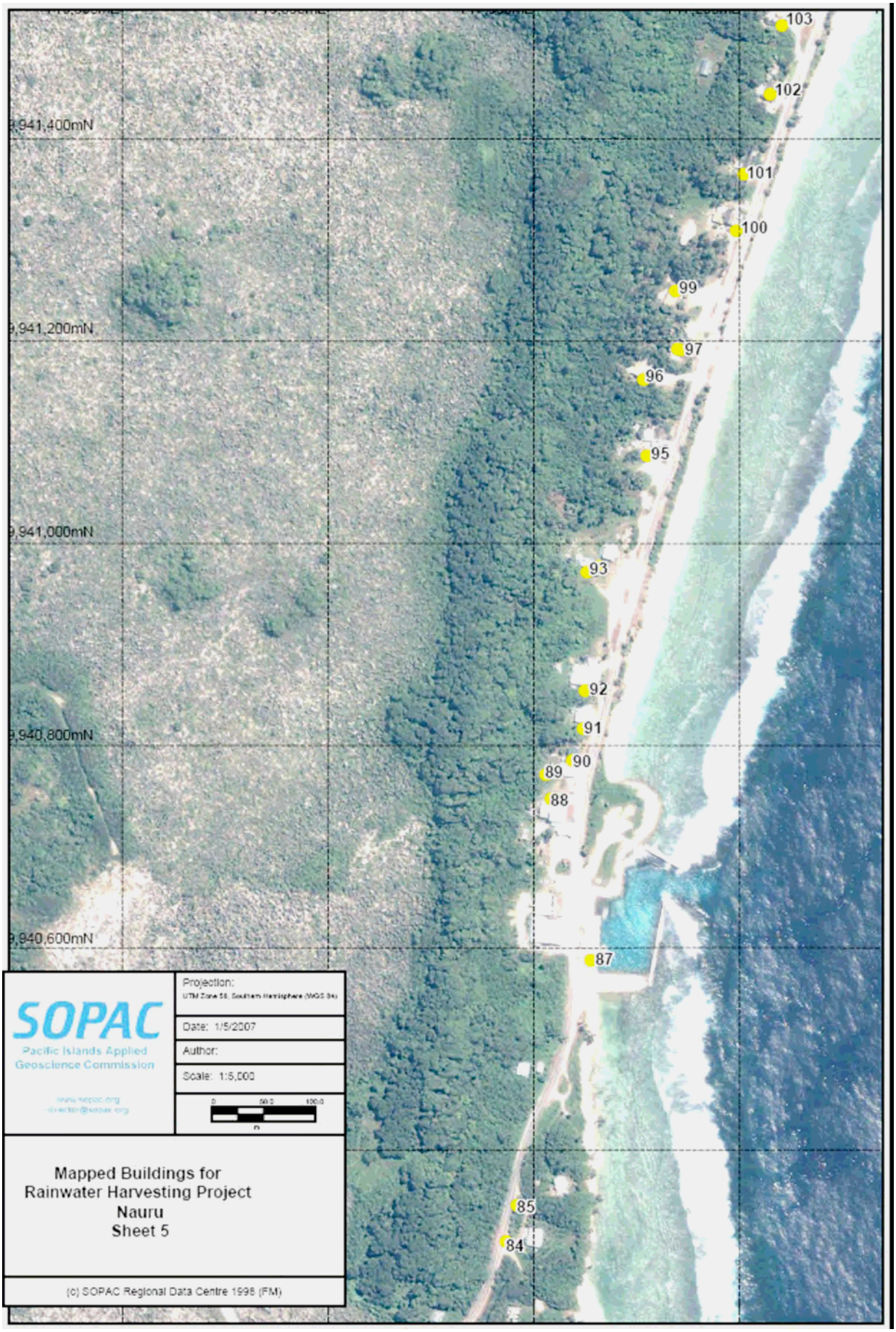

Figure 6. Surveyed properties and reference numbers – Anibare District.

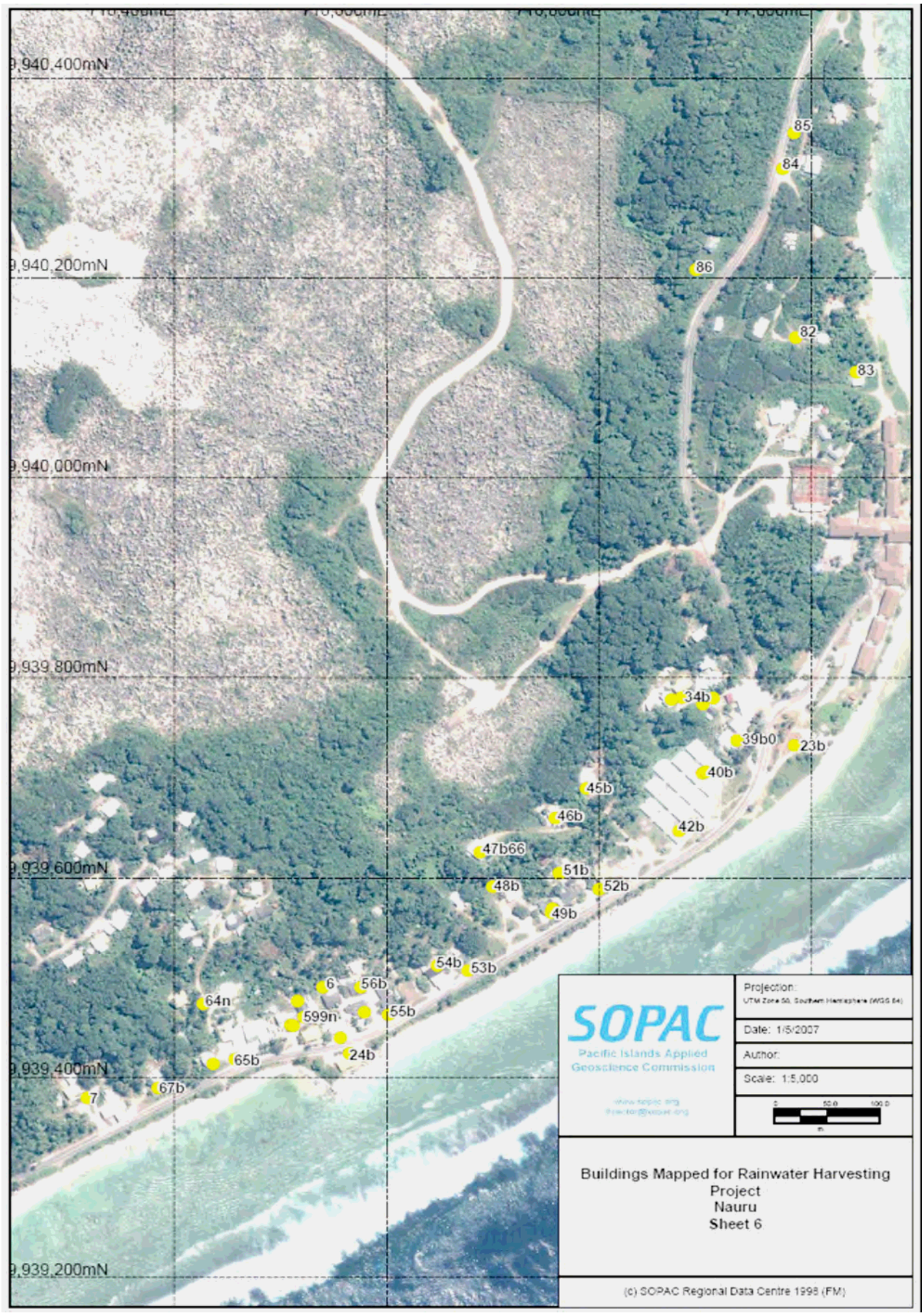

Figure 7. Surveyed properties and reference numbers – Meneng District.

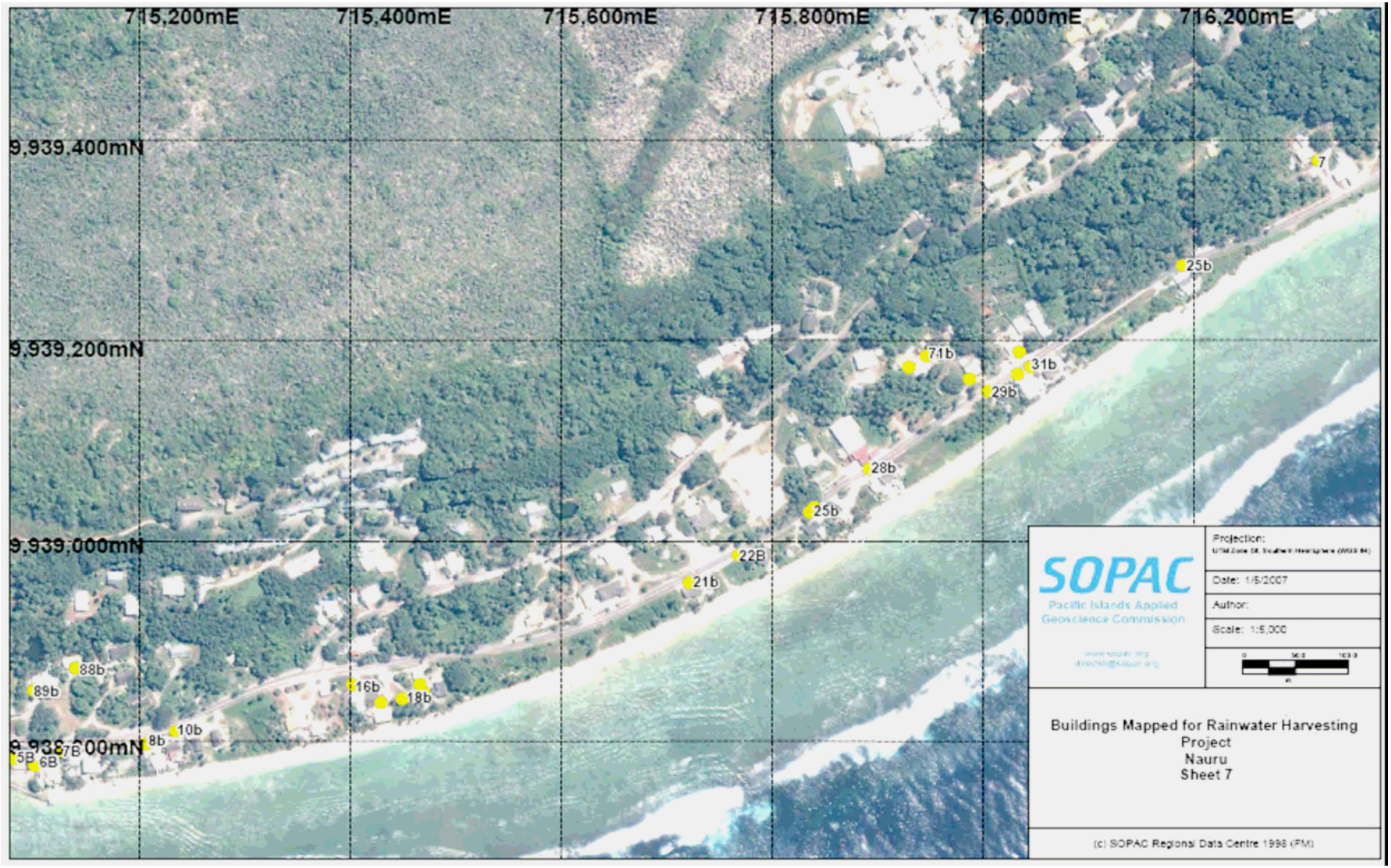

Figure 8. Surveyed properties and reference numbers – Meneng District.

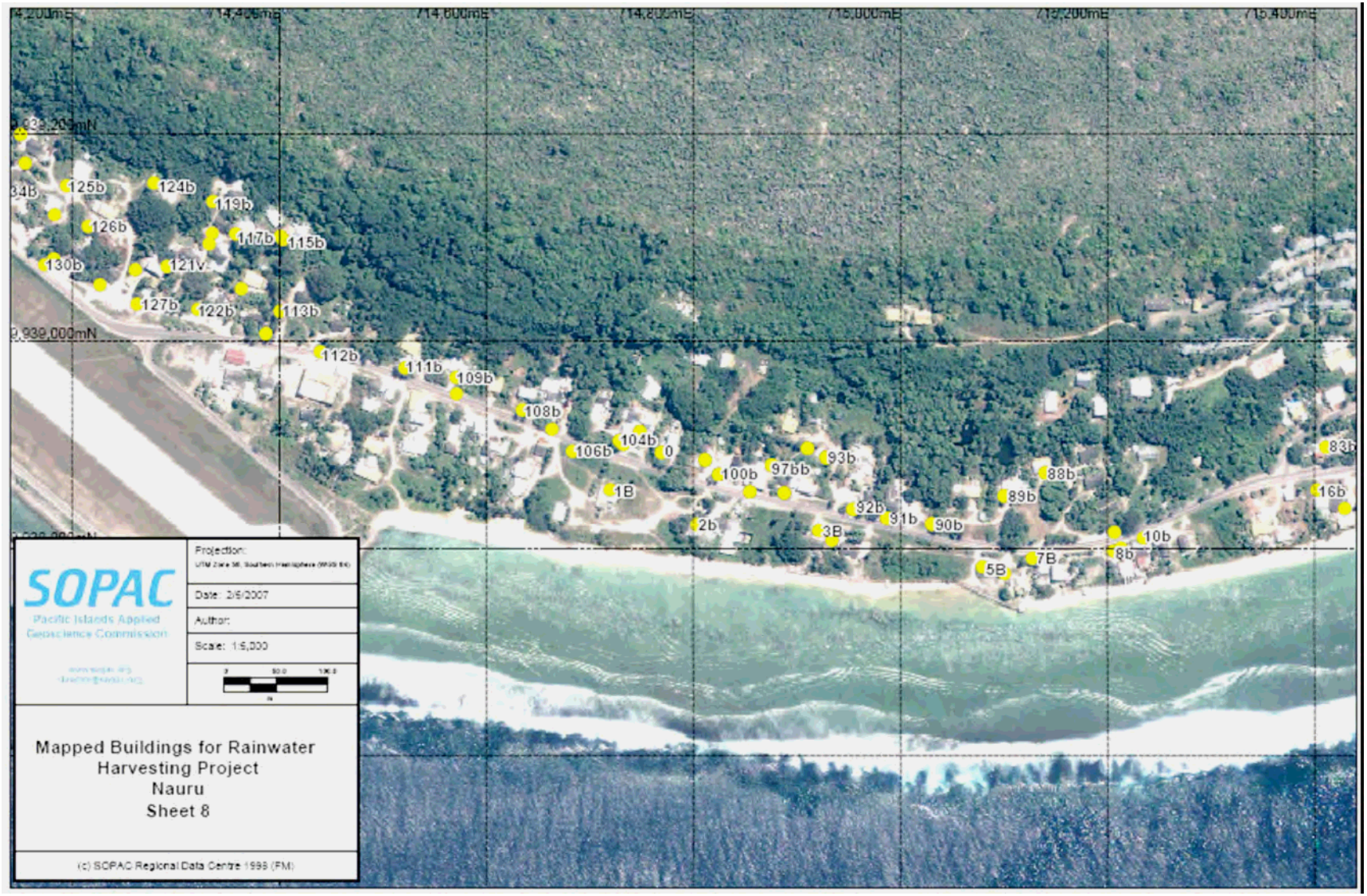

Figure 9. Surveyed properties and reference numbers – Meneng & Yaren Districts.

3.2 Global Positioning Systems

The Project's field survey equipment utilised in Nauru comprised the following:-

- Handheld units (mobile): Trimble GeoXM, (Figure 10) and a
- Base Station (static): Trimble 4600LS (Figure 12)

Figure 10. GeoXM hand held GPS.

Preparations for the fieldwork on Nauru were assisted by reference to a similar Rainwater Harvesting survey undertaken on Tuvalu[8] which also used a GPS/GIS approach for mapping of household assets. This approach was amended to include the information requirements of the Nauru project and a data dictionary was created in GPS Pathfinder Office software (Figure 11). The benefits of using a data dictionary (see Annex D for the full listing utilised) include efficient and effective data collection in the field, which also helps to minimise and cross-check errors that can easily be made when manually filling in survey forms (see Annex E for example of manual form).

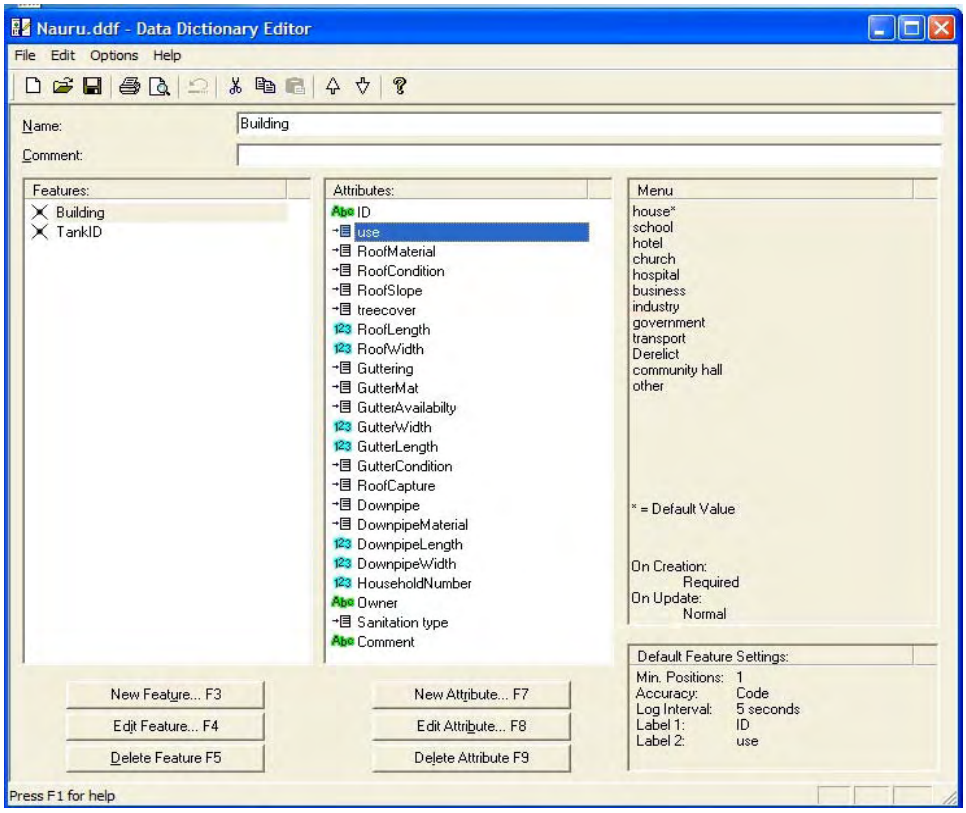

Figure 11. Data dictionary editor created in Pathfinder Office.

Approximately one hour before the start of each day's field survey work, the 4600LS static unit (Figure 12) was set up as a base station on Reference Mark 2 of the Nauru continuous GPS (CGPS) station (Figure 13). It should be noted that the selected benchmark is referenced to the Nauru Island Datum. The base station is powered by a small solar panel and battery assembly and logs a continuous positional record every five seconds.

The base station files are required for differential correction. This increases the accuracy of the handheld GPS units (GeoXM) from 10 m to between 2 m and 5 m, which is sufficiently accurate for the 1:10 000 scale mapping requirements of this Project. The base station was switched off and dismantled at the end of each survey day, approximately one hour after completion of all the field work and once both field teams handheld GPS units had been collected.

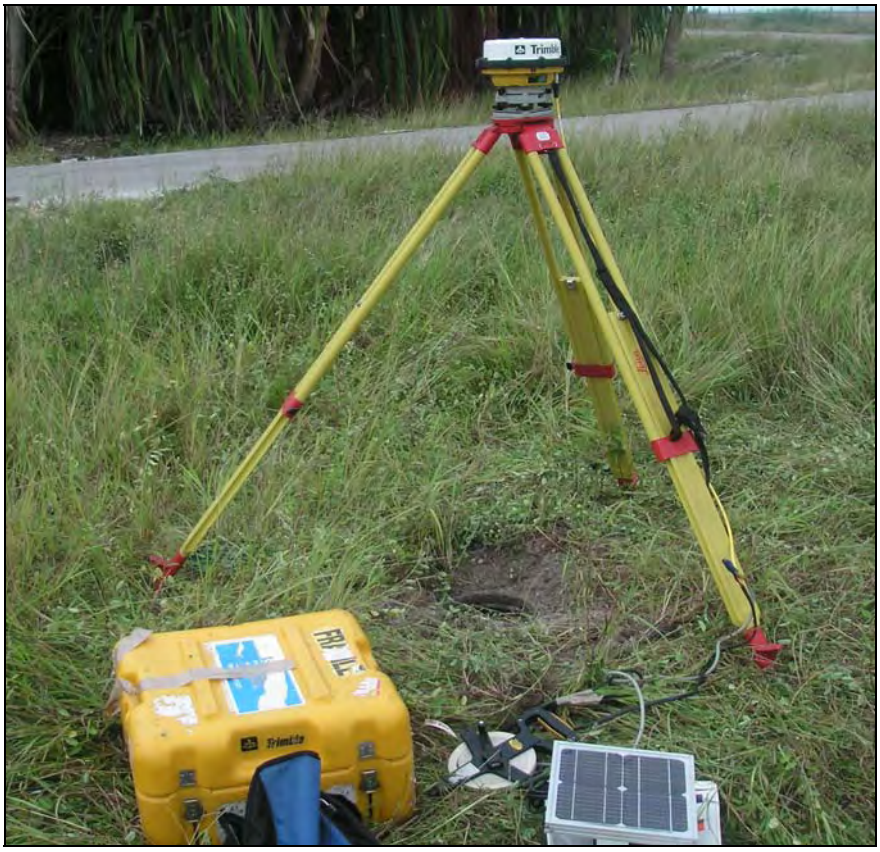

Figure 12. Trimble 4600LS base station set up over RM2 at the Nauru CGPS.

Permission to enter the CGPS site was granted by Mr Steven Yates of National Geospatial Reference Systems, Geospatial & Earth Monitoring Division (GEMD), Geoscience Australia, who also provided the following reference data:–

Table 1. Nauru CGPS Reference Data.

Mark	Latitude	Longitude	Elevation (m)
NAUR	S 0 33 6.23238	E166 55 31.98521	5.2570
RM2	S 0 33 6.89881	E166 55 32.12438	4.3820

NAUR – The Nauru CGPS Reference Point (GPS Monument)
RM2 – Reference Mark No. 2

NOTE – The elevations stated are Nauru Island Datum (NID)

The reference marks had clearly been undisturbed for a considerable time period and with the assistance of Nauru Lands and Survey staff, it initially took about one hour to locate, clear vegetation and "dig out" the valve box lids on first arrival at the site. The CGPS site is unfenced and assistance with security of the base station equipment throughout daily fieldwork operations was provided by a combination of Lands and Survey staff and the Nauru Police Force.

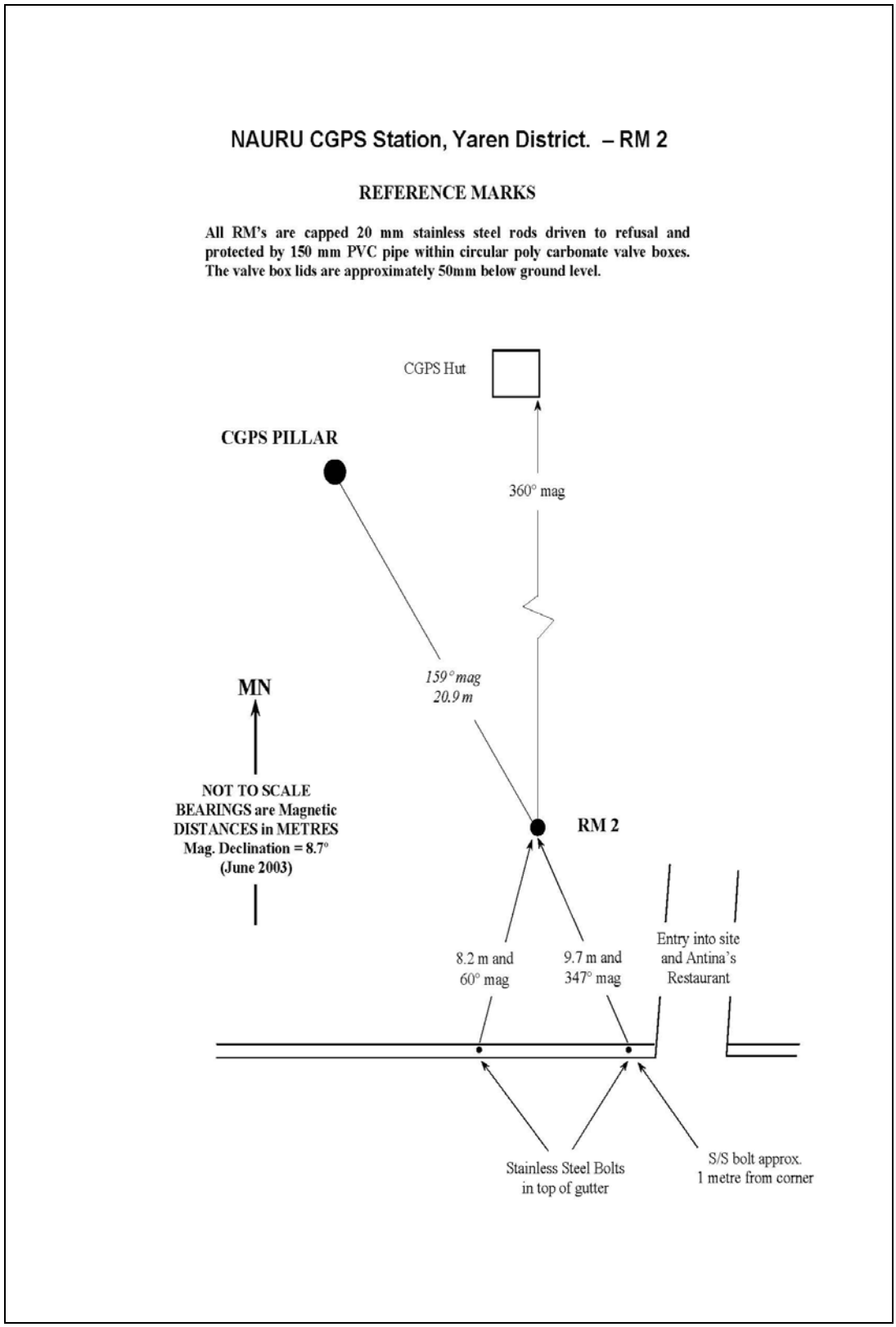

Figure 13. Location sketch of Nauru CGPS and RM2.

3.3 Geographic Information System and Data Processing

The GIS software utilised by the SOPAC/EU Project, supplied to and supported within the Pacific ACP nations is MapInfo Professional v7.0, a comprehensive desktop mapping tool that enables flexible management, analysis and presentation of spatial geographic data and linkage to associated databases.

Data processing was undertaken at the end of each day; the data collected was downloaded and processed in GPS Pathfinder Office and the base station files were also downloaded using GPSurvey. It was important to process the data daily to ensure that the data collected was actually captured.

In GPS Pathfinder Office, field data was differentially corrected and exported as MapInfo Interchange Format (mif). These *.mif files could then be imported into MapInfo and viewed within the GIS.

Due to the limitations of the MapInfo tables, it was decided that the main attributes of the data collected be exported and stored in an Access database. This allows a better management and query process of the data. Within MapInfo only the map objects and spatially related information such as coordinates are stored. The two databases can be linked using a common ID. A benefit of handling data in Access is the ability to carry out queries quite simply. For instance, water tanks can be relationally linked to the appropriate roofs to which they are connected whereas in MapInfo these would show as separate elements without an apparent link.

3.4 Field Survey Personnel

The visiting SOPAC/EU Project team comprised the following personnel:–

- Mr Stephen Booth;
- Ms Elizabeth Lomani-Whippy;
- Ms Arieta Navatoga-Sokota; and
- Ms Vilisi Tokalauvere.

The composition of the Nauru in-country support personnel varied almost daily due to local availability and other job demands, however the following gave primary daily assistance with property access discussions in local Nauruan language, associated English translation services; on-site measurements; CGPS security arrangements; visual, written and electronic data recording; transport and driving services:–

- Mr Nodel Neneiya, Project Officer of Environment Unit;
- Mr Madison Tsitsi and Mr Giovanni, both of Lands and Survey Department; and
- Mrs July Debao, Mr Creedence Halstead, Mr Ricktanson Dade and Mr Dandy, all of Nauru Rehabilitation Corporation.

Secondary assistance and support with fieldwork was received from Mr Wes Tsitsi, Lands and Survey and Mr Raymond Itsimera, Environment Unit.

3.5 Field Survey Techniques

For mapping of the rainwater harvesting assets, two field teams (Teams A & B) of between 3-5 people were assembled from the personnel noted above, utilising two separate rental vehicles. Each team was equipped with two (one operational and one stand-by/spare) GeoXM units (Figure 10), blank paper survey forms (Annex E), imagery printouts of the areas to be surveyed and a 50-m tape for measurement purposes.

To ensure that all personnel were familiar with the field survey objectives, data recording requirements and techniques, a demonstration area in Yaren adjacent to the CGPS was initially piloted utilising all personnel. This introductory exercise was also essential to ensure that the GPS data dictionary was comprehensive enough for Nauru's requirements and that the equipment was fully functional. Amendments were made to the data dictionary at the end of the first day's demonstration – all attributes collected are defined in the data dictionary (Annex D).

At every household property, data was collected on each respective element of the household rainwater harvesting system – represented in simple terms of the relative directional "flow diagram", these are:–

Catchment System (roofing) → **Transmission System (gutters & downpipes)** → **Storage System (tanks & cisterns)**

Subsequent to tank storage might be added other logical "downstream" elements, comprising:–

Household Delivery System (pump/bucket etc) → **Disposal System (wastewater & sanitation methods)**

In terms of the geographic spatial coverage achieved during the eight available field survey days, Team A covered Yaren and Meneng districts (properties symbolised in red on Figure 14) whilst Team B covered Buada, Anibare and part of Ijuw districts (properties symbolised in blue on Figure 14). Given the statistics in Table 2, an average field survey rate of 38.5 households per day was therefore achieved during this mission.

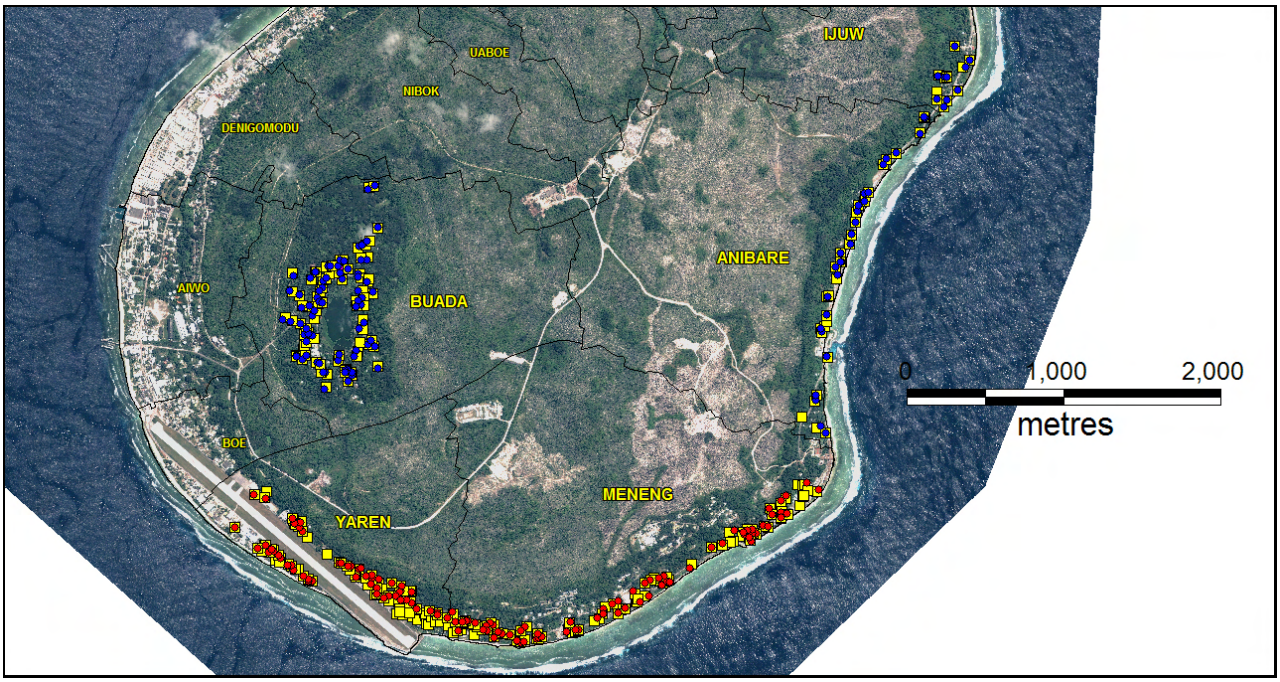

Figure 14. Spatial coverage achieved by survey teams.

Apart from the anticipated slow start up due to initial equipment checks and training of in-country personnel during the first survey day, subsequent progress was also adversely impacted by the interaction of numerous external factors such as extreme mid-day heat, continuous high humidity, occasional heavy rain showers, equipment malfunction, manpower (personnel collection and return was restricted by RoN working hours and clocking-on/off procedures), GPS base station site security issues (the Nauru Police Force eventually provided a constable to remain on-site as a watchman each field day) and general transport and fuel restrictions. Power and water rationing

at the hotel also had intermittent and additionally limiting impacts on the ability of the team to download and process data, recharge GPS unit batteries or operate notebook computers, and attend to personal hygiene and subsistence.

Table 2. Total number of houses and tanks surveyed by team A and B.

Teams	Total Building	Total Tanks
A	180	126
B	128	124
Total	308	250

A number of recommendations for any future field survey work of a similar nature on Nauru are clearly noted below, following these experiences.

- SOPAC personnel need to arrange for a good, dedicated in-country support team well in advance of arrival (this would normally be one of the primary duties of the Project's In-country Intern). The support team needs to include people to carry out actual GPS survey and a watchman for the base station, especially as the base station location is in a public area with no access restrictions to members of the public or animals.
- The survey manpower, transport requirements, time-frame and area to be survey should be realistically balanced given the average progress rate achieved.
- Where local government working practices restrict capacity for working overtime or weekends, financial incentives will be required to encourage and maximise in-country support for "out-of-hours" input.
- If a small team is working to cover a large area within a limited period of time, then it is essential that data collection be simplified as much as possible to ensure rapid field progress.
- If at all feasible, a venue should be arranged and time allowed to provide for data processing, so that the in-country personnel could further gain from capacity building in these issues.

3.6 Nauru Geospatial Content Management System

A Geospatial Content Management System (GeoCMS) or Mapserver is a web application enabling multiple users to put up content on the website using the web itself. It is an all-in-one package for building a full-featured web community and is an open source web application. It holds interactive maps and the viewer can somehow interact with the map. This can mean selecting different map data layers to view or zooming into a particular part of the map that you are interested in. All this is done while interacting with the web page and a map image that is repeatedly updated. This is fundamentally different from static maps because they are really a type of web-based programme or application.

The SOPAC/EU EDF8/9 Project is tasked (KRA 4) with providing up-to-date RS satellite imagery and installing a GeoCMS in each of the Project's 14 ACP countries. The Nauru GeoCMS was installed, with associated local training, on the 29th of May 2006. The server is currently housed within the Office of the Chief Secretary. The Chief Secretary's Department is directly under the President's portfolio as Minister responsible for Public Service. It performs secretariat functions for the Nauru Government. It's core functions fall under respective sections of Presidency, Cabinet Secretariat, Public Administration, Human Resources and Labour, Salaries Section, the Nauruan Affairs Office which handles Registry of Births, Deaths and Marriages and the Government Gazette.

Irrespective of where the server is physically located, it is a web-based application and can be accessed on the internet – http://www.lands.gov.nr/.

The QuickBird satellite imagery and the entire field results obtained during this asset condition survey work have been subsequently uploaded onto the Nauru GeoCMS and are readily accessible to all in-country stakeholders for future use and reference.

4. ASSET CONDITION SURVEY RESULTS

4.1 Catchment Systems – Roofing

Roofing Materials

Rainwater is harvested from the roofs of private houses, storage areas and warehouses. The lack of development and new buildings on Nauru during the last 20 years means that a high proportion of the roofing materials are old and in a highly-weathered state. Reference to Table 3 indicates that only two types of roofing material were encountered during the survey period, with almost one quarter of the roofs surveyed comprising asbestos cement sheeting (presumably dating back to "standardised" importation and installation during the active British Phosphate Company period). The majority of roofs (77%) recorded were of more modern metal sheeting construction.

Table 3. Types of roofing materials.

Roof Materials	Total Properties	Total (%)
Asbestos	70	23 %
Metal Sheeting	238	77 %
Total	308	100 %

Although the IRC International Water and Sanitation Centre of the Netherlands has stated that there is no evidence that rainwater collected from asbestos-cement sheeting on roofs forms a health risk, the airborne fibres from cutting and drilling the sheets do pose a serious health risk, as does any dust generated during breakage which may be associated with removal and replacement (re-roofing) activities. The subsequent safe disposal of old asbestos sheeting is also a significant environmental problem that Nauru faces. Although the dangers associated with asbestos actually relate to inhalation of fibres within the respiratory tract, and not ingestion within the digestive tract, sufficient public health "scare" is perceived to be present amongst the general population to have deterred most people from collecting and drinking rainwater if they have an asbestos roof.

The spatial distribution recorded for the two types of roofing materials is shown in Figure 15. It is immediately apparent that the old asbestos roofing (shown in yellow) interestingly exhibits a significant concentration within the Yaren district.

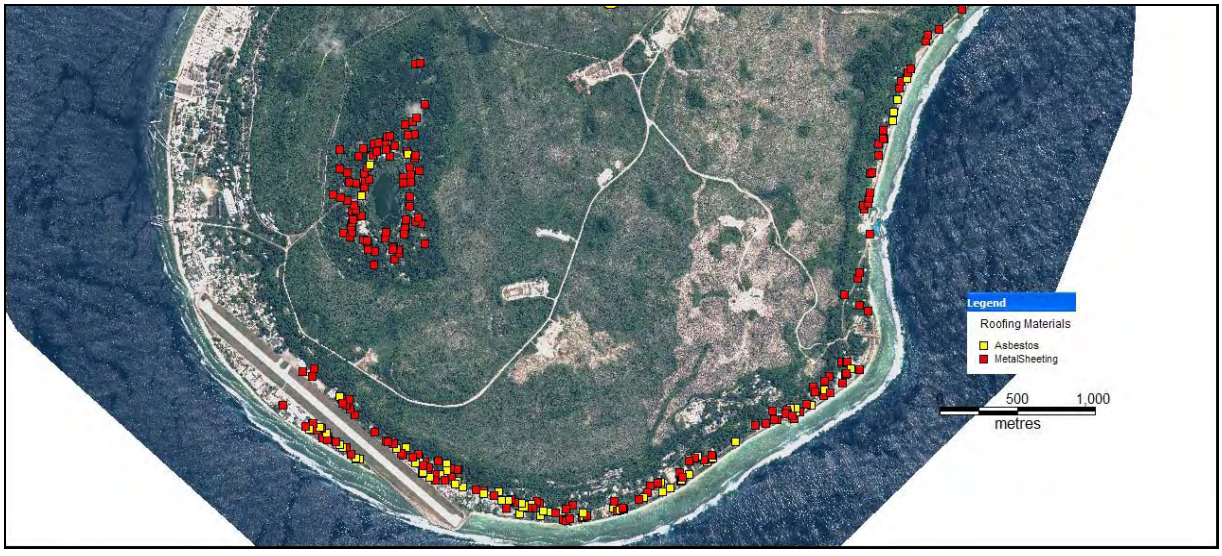

Figure 15. Types of roofing materials.

Roof Condition

The visible external condition of the roofing materials was also recorded as *Good, Fair* or *Poor.* Reference to Table 4 indicates that almost a quarter (23%) of the roofs surveyed were considered to be in a *Poor* condition. The greater majority of roofs examined (it should be remembered that the "examination" only represented a brief visual scan from a distance at ground level) appeared to be in relatively good external condition.

Table 4. Condition of roofing materials.

Roof Conditions	Total Properties	Total (%)
Good	208	68
Fair	28	9
Poor	72	23
Total	308	100 %

The spatial distributions of these categories is shown below in Figure 16 and, whilst there is a suggestion of an apparent correlation of roofing materials in *Poor* condition with the old asbestos roofing concentrated within the Yaren district, the distribution of *Poor* condition roofs also exhibits a relatively general scatter.

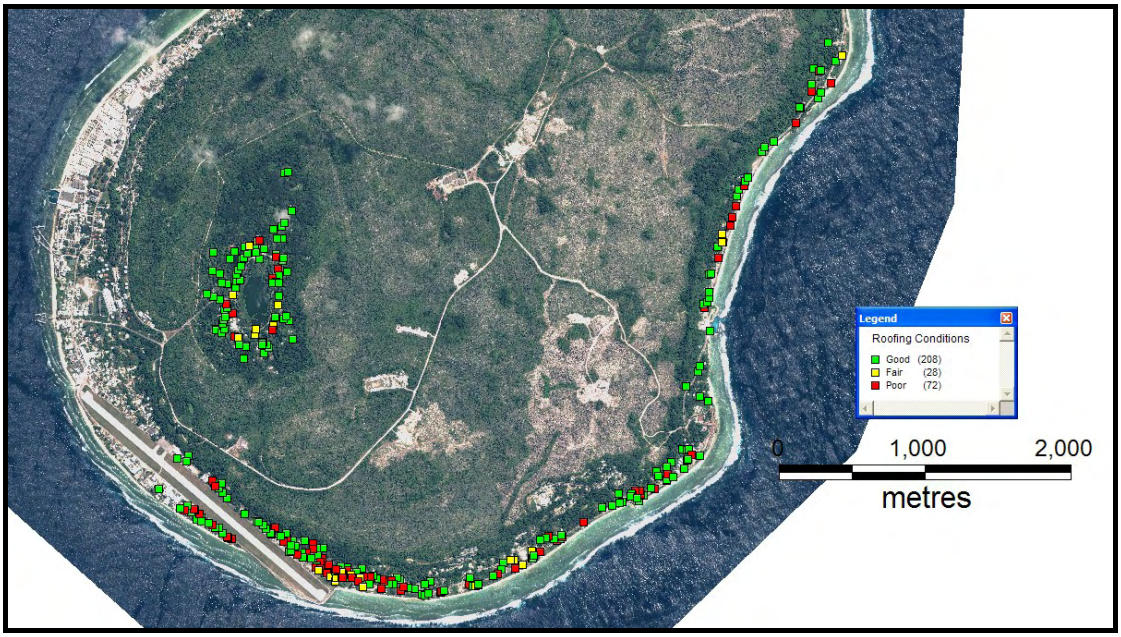

Figure 16. Condition of roofing materials.

Roof Pitch or Slope

The pitch, or slope of the roof from a horizontal plane, was also recorded during the survey, and Table 5 indicates that the overwhelming majority (92%) are of flat to low pitch (shallow slope) construction. The spatial distributions of these categories is illustrated in Figure 17.

Table 5. Pitch (or slope) of roofs.

Roof Slope	Total Properties	Total (%)
Flat	164	53%
Low	121	39%
Medium	18	6%
Steep	5	2%
Total	308	100%

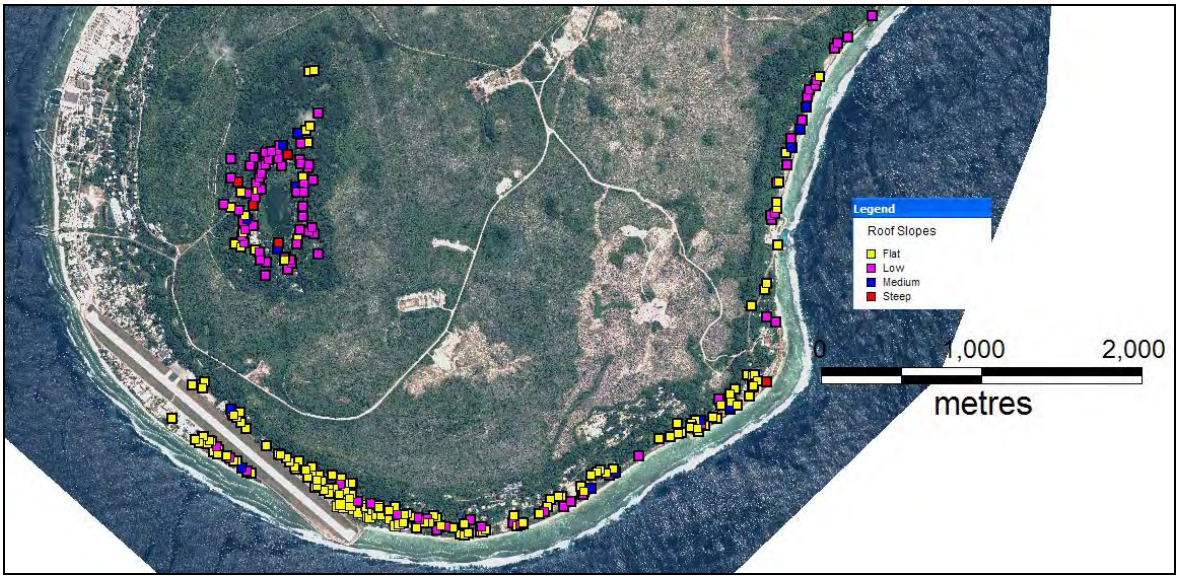

Figure 17. Roofing Slopes.

Vegetation Overhang

The survey also noted when any vegetation was seriously overhanging the roof area, as the close proximity of tree canopy cover not only reduces, via interception, the amount of rainfall that can reach a roof (thereby lessening the potential resource for capture and subsequent storage), but can also create significant other problems due to leaf, fruit or branch debris blocking guttering and downpipes. Adverse water quality impacts can also result due to biological decay (taint/colour/taste) of leaf matter and encouraging microbiological contamination from insects, bird and bat droppings. Ocean salt aerosol carried on the wind can also get concentrated by evaporation on leaf surfaces; this will eventually get taken back into solution during rainfall events, providing an unwanted chemical (salt) input into the roofwater catchment system. Vegetation overhang was recorded by observers as a relative percentage cover. Table 6 indicates that this does not appear to be a significant problem on Nauru, with 80% of properties being free of any vegetation overhang.

Table 6. Vegetation Overhang.

Vegetation Overhang	Total Properties	Total (%)
0 – 25%	252	81%
25 – 50%	52	17%
50 – 75%	2	1%
75 – 100%	2	1%
Total	308	100

The spatial distribution of vegetation overhang is shown in Figure 18. The majority of houses along the south and east coastal strip on Bottomside are sited closer to the road and coastline and tend to lie well clear of the more densely vegetated foot of the Topside escarpment. The un-mined area encircling Buada Lagoon represents perhaps the only significant area of mature, original woodland on Nauru and hence the potential for vegetation overhang is greater for houses constructed there. However, very few properties were troubled by this issue.

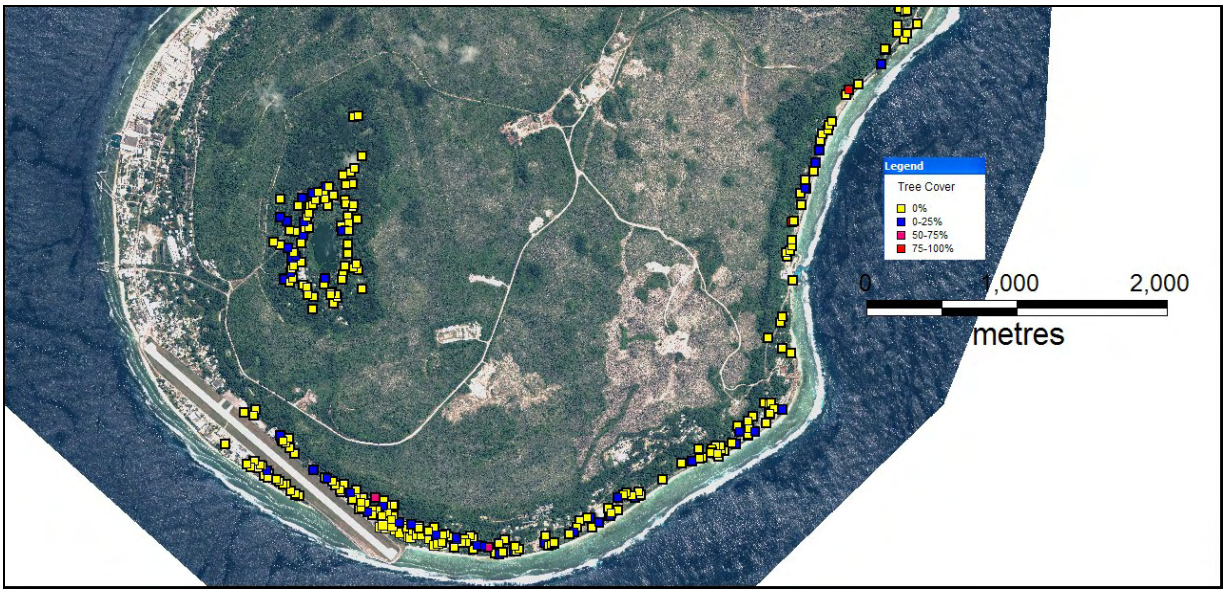

Figure 18. Vegetation Overhang.

Roof Areas

The primary roof areas available on each property were assessed by field measurement of roof length and width and subsequently computed in the database spreadsheet; these are individually and cumulatively presented in Annex F. Of the 308 properties surveyed, the observed mean roof length was 15.35 m and the mean roof width was 11.89 m, representing a mean roof area of 187.67 square metres.

4.2 Transmission Systems – Guttering and Downpipes

Guttering Materials

Table 7 indicates that three primary types of guttering materials were encountered during the survey period, namely metal, PVC plastic and asbestos. Approximately one sixth (16%) of the domestic properties surveyed had no guttering at all affixed to the fascia boarding. Obviously such properties currently exhibit a vital "missing-link" in the rainwater catchment and transmission equation and, because of this relatively simple and basic omission, are currently unable to consider rainwater harvesting and storage.

Table 7. Gutter Materials.

Gutter Materials	Total	Total%
Plastic	62	20
Metal	148	48
Asbestos	49	16
No Guttering	49	16
Total	308	100%

The spatial distribution of gutter materials is illustrated in Figure 19, and it is apparent that there is no particular geographic pattern or concentration that might explain gutter non-availability – the properties with no guttering are well scattered and appear randomly distributed. Asbestos guttering was also observed on approximately one sixth of the surveyed properties and a reasonably distinct "remnant" concentration is again visible in the Yaren District.

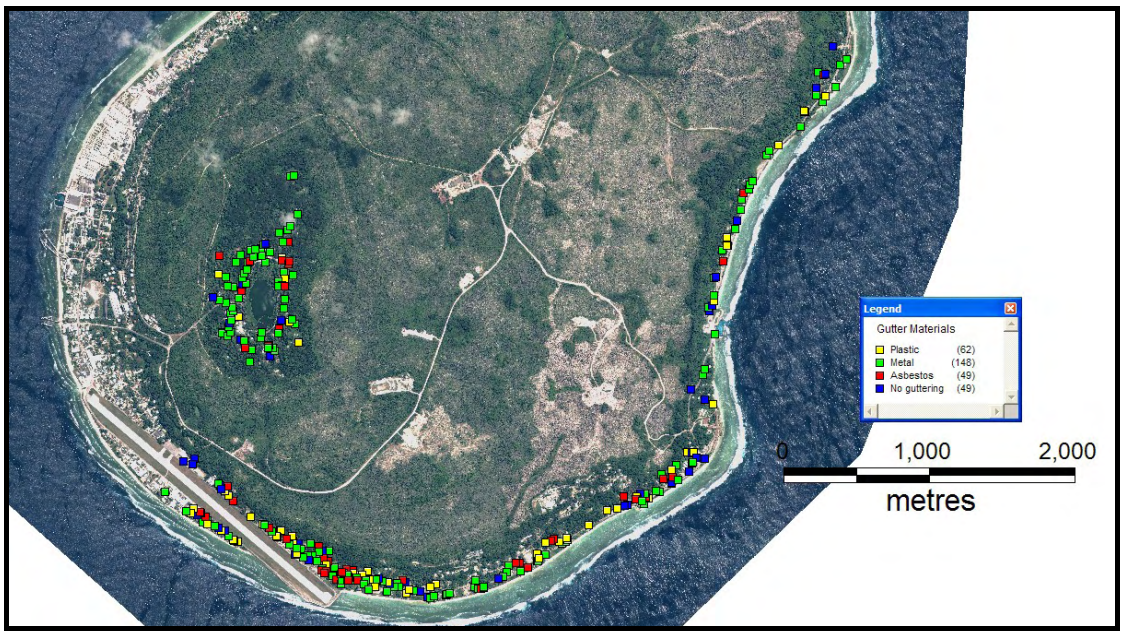

Figure 19. Gutter Materials.

The spatial distribution of the different guttering materials may also suggest a pattern of more frequent use of PVC materials along the coastal strip (eminently sensible in term of proximity to the corrosive marine environment!) compared to a more dominant application of metal guttering in Buada District.

Gutter Condition

The visible external condition of the guttering materials was also recorded as *Good, Fair* or *Poor.* Table 8 indicates a high proportion (38%) of gutters could only be cumulatively considered in *Fair to Poor* condition. This suggests that there is significant scope for improving awareness of domestic maintenance issues.

Table 8. Gutter Condition.

Gutter Conditions	Total Properties	Total%
Good	141	46%
Fair	44	14%
Poor	74	24%
No Guttering	49	16%
	308	100%

The amount of guttering being employed is also of interest with respect to the total available roof catchment that is actually being captured. It is apparent from Table 9 that considerably less than half (41%) of the total number of properties surveyed had sufficient guttering to capture all the potential runoff from their roof. As well as the 16% of properties recorded with absolutely no guttering at all, an additional 34% of the properties only captured 25% to 50% of the available roof area, so there is clearly significant scope for improvement in guttering provision to enable a much higher proportion of the rainfall roof runoff to be diverted to potential tank storage facilities.

Table 9. Gutter capture of total available roof catchment area.

Gutter capture of total available roof catchment area	Total Properties	Total%
100%	125	41%
75%	28	9%
50%	50	26%
25%	25	8%
No Guttering	49	16%
	308	100%

The spatial distribution of the different guttering conditions is illustrated in Figure 20, and illustrates the widespread pattern of mediocre or absent guttering.

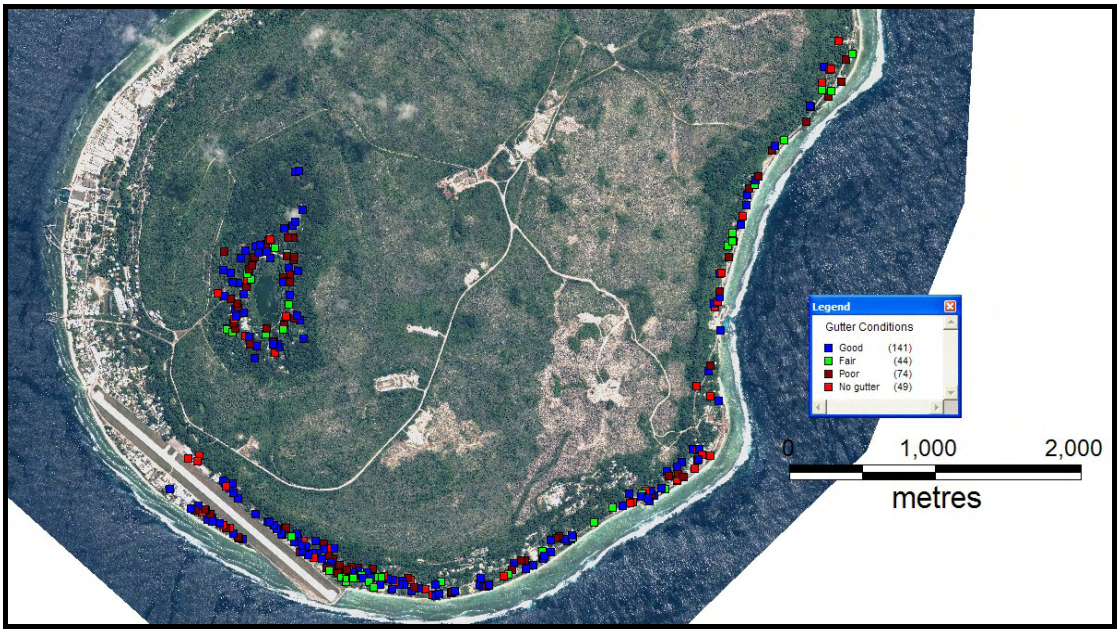

Figure 20. Gutter Conditions.

Downpipe Materials

Table 10 reveals that plastic is effectively the sole material (85%) utilised for system downpipes and also that 10% of the domestic properties surveyed recorded downpipes as completely absent. Obviously the latter properties currently exhibit a vital “missing-link” in the rainwater catchment and transmission equation and, because of this relatively simple and basic omission, are currently unable to consider rainwater harvesting and storage.

Table 10. Downpipe Materials.

Down Pipe Materials	Total	Total%
Plastic	265	85
Metal	11	4
Others	2	1
No downpipe	30	10
Total	308	100%

The spatial distribution of properties with and without downpipes is illustrated in Figure 21, and there is no apparent geographic pattern or concentration that might explain downpipe non-availability – the properties with no downpipe are well scattered and appear randomly distributed.

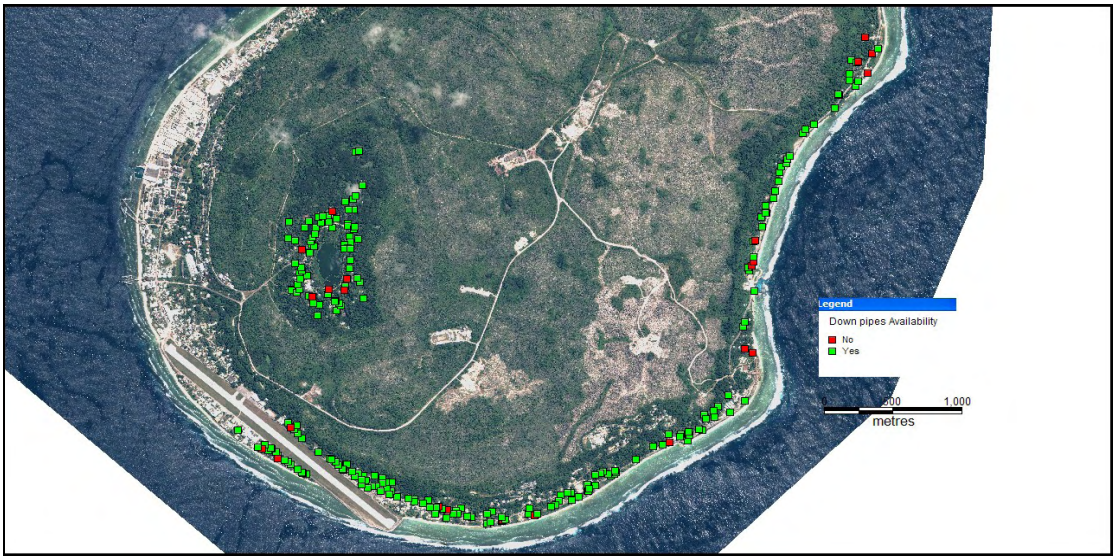

Figure 21. Properties with and without downpipes.

4.3 Storage Systems – Tanks and Cisterns

Tank Materials

The older style of rainwater tanks used for private dwellings was of concrete, galvanised iron or steel sheeting construction. However more recently, newer styles of tanks are being installed that are made of polyethylene in the size range from 2 m^3 to 45 m^3. Table 11 indicates that almost one fifth (19%) of the properties surveyed had no rainwater storage tank present. General observation during the field survey also suggested that the usually older tank installations made of concrete or metal have been increasingly replaced or supplemented by those of more recently introduced plastic manufacture, which now comprise close to two thirds (60%) of the total of 250 tanks identified.

Table 11. Storage Tank Materials.

Tank Materials	Total Properties	Total (%)
Concrete	28	9%
Metal	73	24%
Plastic	149	48%
No Tank	58	19%
Total	308	100%

The spatial distribution of tank materials is illustrated in Figure 22, and it is apparent that there is a notable concentration of properties with metal tanks in Yaren District, whilst concrete appears the more dominant material in Anibare and Ijuw districts. These distributions could relate to specific, historic Aid packages targeting certain districts.

For all properties where circular tanks were observed, the external dimensions of the tanks (mostly sited with base sitting at ground level) and their calculated volumes are fully tabulated within Annex F. The mean volume of circular tanks was observed to be 29.1 m^3.

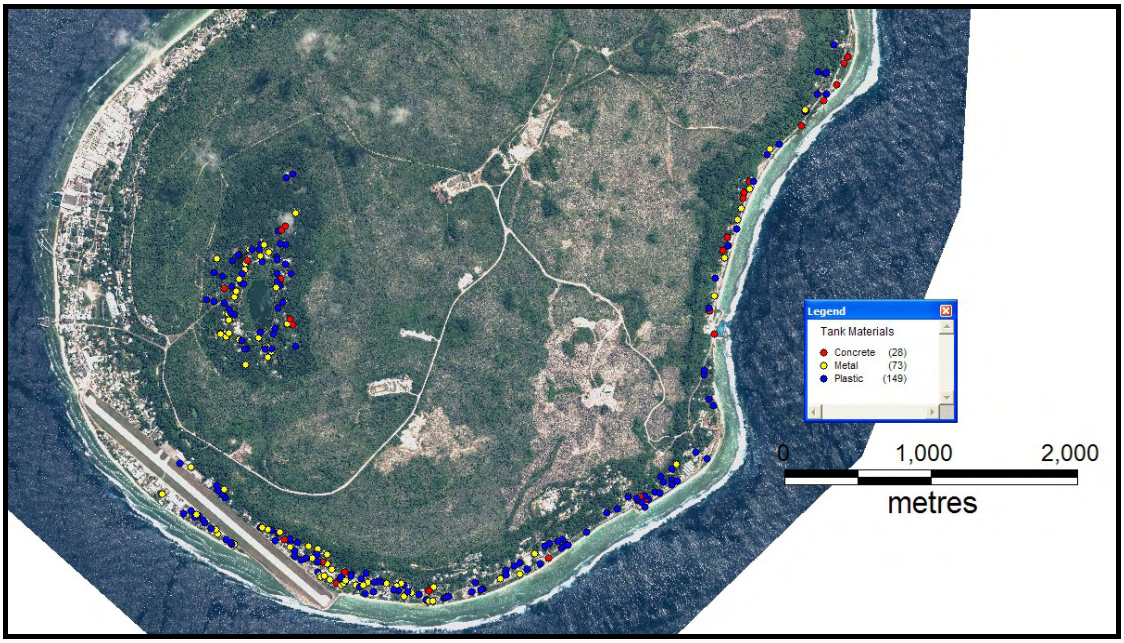

Figure 22. Tank Materials.

Where rectangular tanks (or cisterns) were observed, they were invariably of concrete construction, mostly with the greater percentage of the structure sited partially beneath ground level, sometimes partially or fully beneath the house structure itself. The external dimensions and calculated volumes of the observed rectangular tanks are fully tabulated in Table 12. As can be seen, at two locations (310 and 393) the rectangular tanks are of significant size and capacity, more akin to strategic storage reservoirs, and it would therefore be interesting to note details of ownership, access and usage pattern. Other than these two large installations, the mean volume of rectangular tanks was observed to be 46.04 $m^{3.}$

The spatial distribution of properties with and without tanks is illustrated in Figure 23, and it is apparent that there is an unusual concentration of properties with no tanks in the south eastern sector of Yaren District – the reasoning for this cluster remains to be explained!

Table 12.. Properties with rectangular tanks.

Property Tank ID	Tank Shape	Tank Length (m)	Tank Width (m)	Tank Height or Depth (m)	Total Volume (m³)
56	REC	8	3	2	48
110	REC	3	3	3	27
114	REC	9	4	2	72
122	REC	9	4	2	72
140	REC	7	4	4	112
196	REC	1	1	1	1
200	REC	3	2	2	12
254	REC	5	3	3	45
299	REC	9	4	2	72
310	REC	20	19	7	2660
312	REC	9	7	2	126
325	REC	8	4	2	64
339	REC	8	4	3	96
345	REC	6	4	12	288
393	REC	50	14	4	2800
470	REC	8	3	2	48
472	REC	8	3	2	48
474	REC	8	3	2	48
496	REC	11	3	2	66
518	REC	4	3	1	12
520	REC	9	3	2	54
532	REC	3	2	2	12
538	REC	3	3	2	18
564	REC	4	3	1	12
566	REC	9	3	2	54
578	REC	3	2	2	12
584	REC	3	3	2	18
				TOTAL	6897

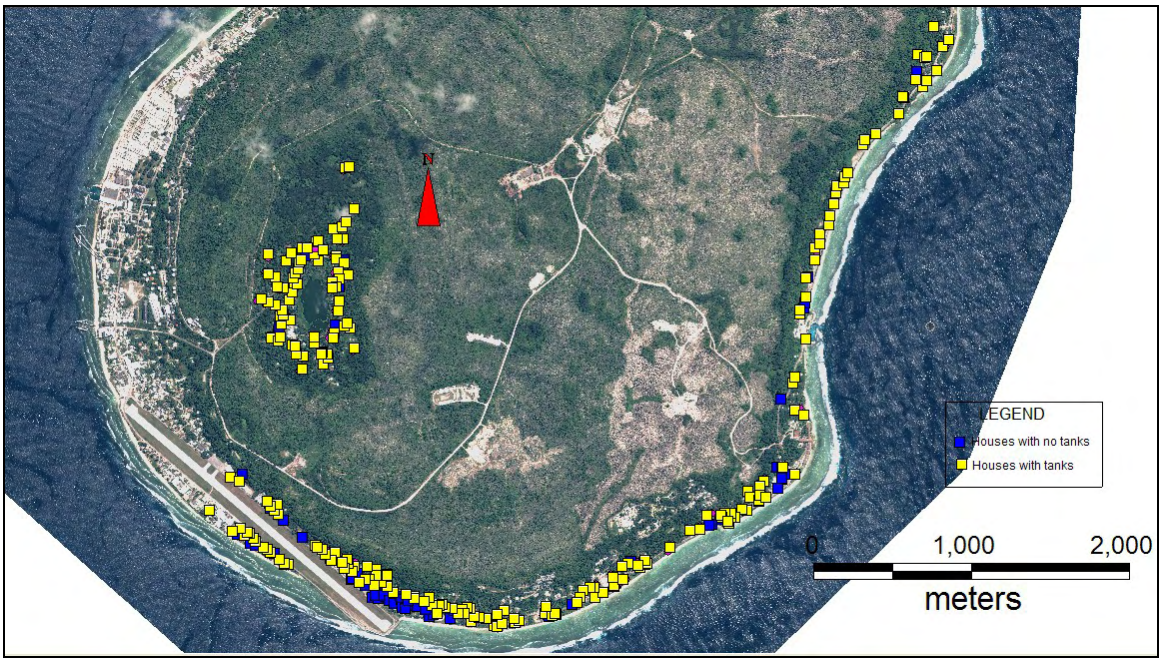

Figure 23. Distribution of properties with and without storage tanks.

Tank Condition

Reference to Table 13 indicates that almost three quarters (69%) of the 250 observed tanks during the field survey appeared to be in a *Good* condition, with quite a high proportion (31%) only in a *Fair to Poor* condition.

Table 13. Tank Conditions.

Tank Conditions	Total	Total (%)
Good	172	69
Fair	33	13
Poor	45	18
Total	250	100

The spatial distribution of tank conditions is illustrated in Figure 24, and it is apparent that the 18% of tanks recorded to be in a *Poor* condition are seemingly concentrated around Buada Lagoon and along the northern coastal strip of Anibare.

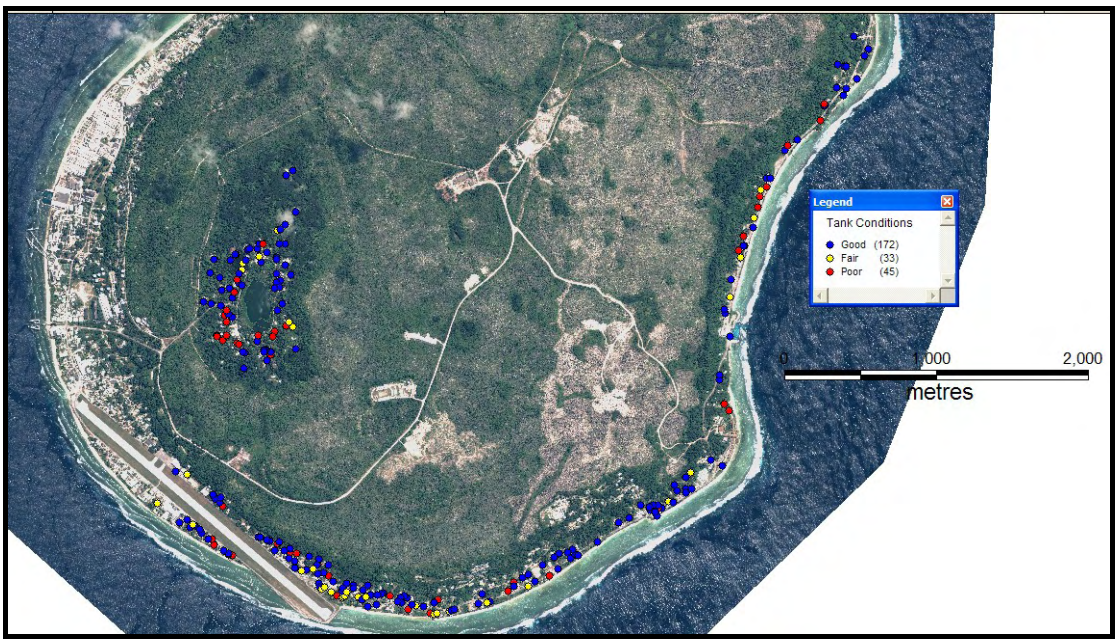

Figure 24. Tank Conditions.

Abstraction Methods

Table 14 indicates that a (basal) tap is the commonest method (44%) utilised to draw water from the storage tanks, though a significant proportion (31%) of the population can afford to utilise a small electrical pump (Davy manufacture commonly observed) to transfer water from the tank into their household.

Table 14. Abstraction Methods (from tanks).

Abstraction Method	Total	Total (%)
Bucket	33	13
Gravity	25	10
Other	5	2
Pump	77	31
Tap	110	44
Total	250	100

The spatial distribution of tank abstraction methods is illustrated in Figure 25, seemingly indicating a high concentration of small electrical pump usage in properties around Buada Lagoon and along the coastal strip of Anibare; it is speculated these may relate to a particular Aid package that these Districts selectively benefited from, or perhaps that the residents are generally more affluent(?) In contrast, a (basal) tap appears to be the more common practice utilised in properties along the coastal strip of Yaren and Meneng.

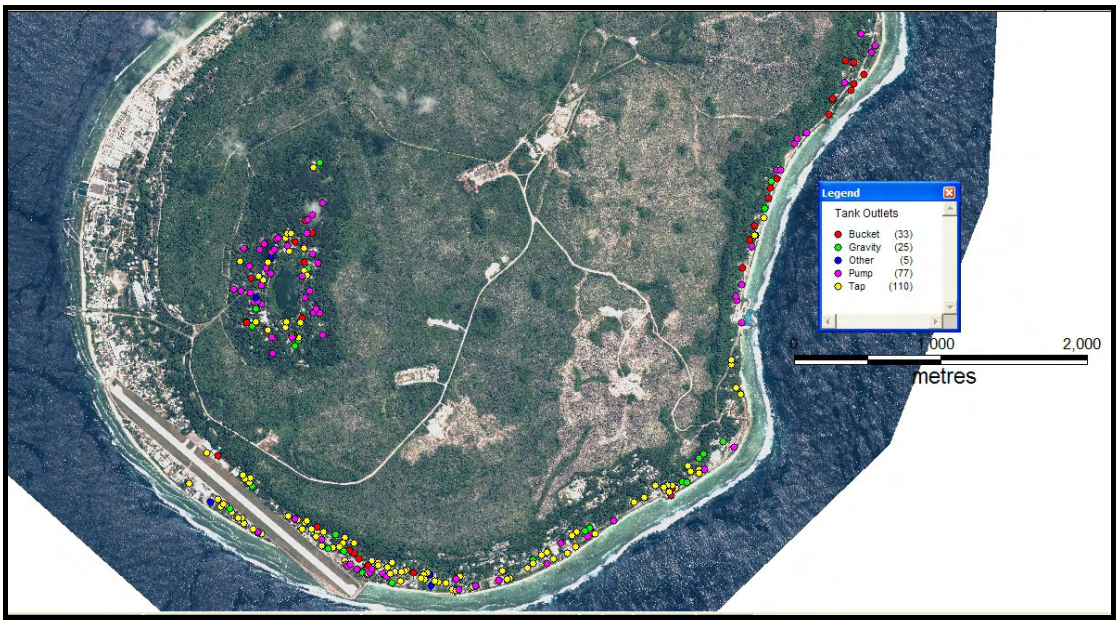

Figure 25. Tank Abstraction Methods.

Alternative supply methods

Table 15 indicates that just over half (56%) of the properties with tank storage available have no alternative supply methods, whilst a high proportion (37%) of the remainder do have a small well that they can abstract groundwater from.

Table 15. Alternative Supply Methods.

Alternative supply methods	Total	Total (%)
Well	92	37
From water truck	2	1
Not available	140	56
Others	10	4
Disuse	6	2
Total	250	100

The spatial distribution of alternative supply methods is illustrated in Figure 26. The high concentration of groundwater wells along the coastal strips in the central area of Anibare District and close to the airport runway in Yaren District is immediately apparent. A typical alternative groundwater supply well is shown in Figure 27.

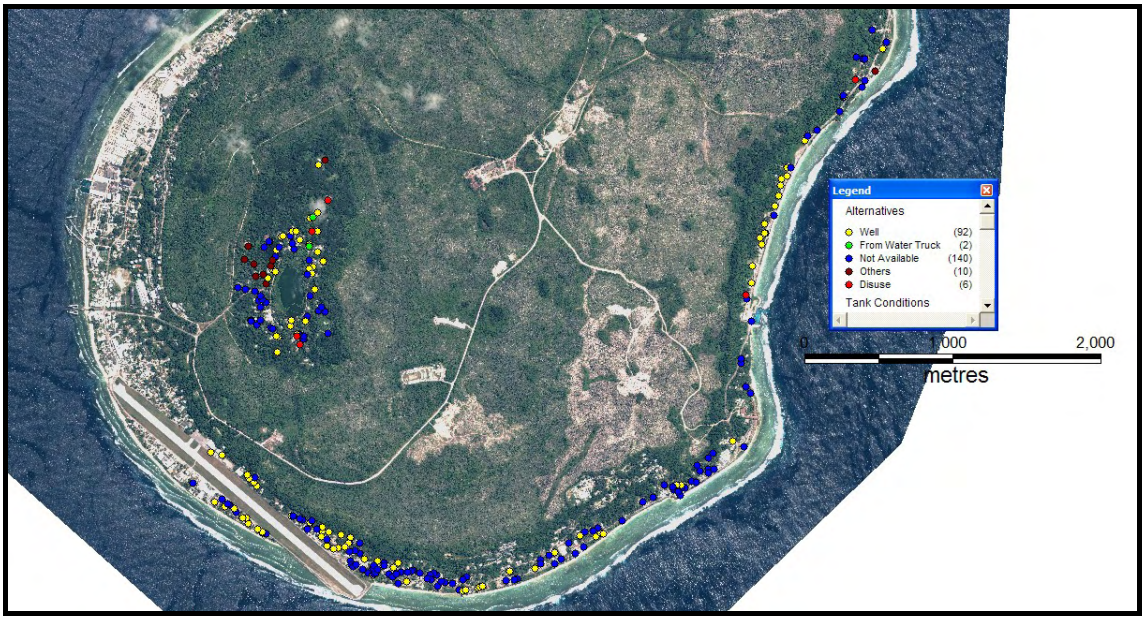

Figure 26. Alternative Supply Methods.

Figure 27. Alternative supply well, Buada District..

5. POPULATION DYNAMICS AND DOMESTIC WATER DEMAND

5.1 Population Size

The most recent census to be undertaken in Nauru was 2002, which recorded Nauru's resident population, defined as comprising all people who have had an established residence in Nauru for at least one year, to be 9,872. This compares to 9600 residents in 1992, representing a very small annual population growth of 0.27%.

In the past, Nauruans were not known for migrating to other countries like other Pacific Islands peoples did, but this might have changed during the last few years. Nauru's low population increase during the period 1992–2002 was mainly due to high levels of negative net migration that almost counterbalanced Nauru's natural growth. If the current economic situation prevails, this trend will most likely continue in the near future.

The number of non-Nauruans declined from 2769 in 1992 to 2300 in 2002, and included mainly people from Kiribati, Tuvalu and the People's Republic of China. It is to be noted from Table 16 that the area known as Location, which provided housing for mining company and government expatriate workers, represented almost 24% of the total population in 2002 – a similar proportion to 1992.

Table 16. Population by District in 2002.

District	Total	Proportion of total population (%)
Yaren	632	6.3
Boe	731	7.3
Aiwo	1051	10.4
Buada	673	6.7
Denig	292	2.9
Nibok	479	4.8
Uaboe	386	3.8
Baitsi	443	4.4
Ewa	397	3.9
Anetan	498	4.9
Anabar	378	3.8
Ijuw	169	1.7
Anibare	232	2.3
Meneng	1323	13.1
Location	2381	23.7
Total	10,065	100.0

Furthermore, it is understood that the great majority of those remaining i-Kiribati and Tuvaluan mine workers living in Location were finally repatriated (as a result of Taiwanese Aid intervention) to their respective countries during 2006, which suggests that Nauru's current (2007) total population realistically now lies somewhere within the range of 7,500-8,000 people only. This represents a significant demographic shift with direct implications not only for water demand assessment, but also all other strategic development planning and related demand horizons. The impact of fertility on Nauru's population dynamics, particularly future population growth, is less pronounced than that of migration and it is apparent that continued economic uncertainties as experienced on Nauru may well be conducive to relative stagnation of population growth or continued negative migration rates for years to come.

Given the observed evidence of population dynamics since 2002, and the lower base population figure that must now apply in 2007, the most representative current and future predictive scenario may arguably be closer to, or even lower than, the "Low" population trend presented in the 2002 Census (Figure 28).

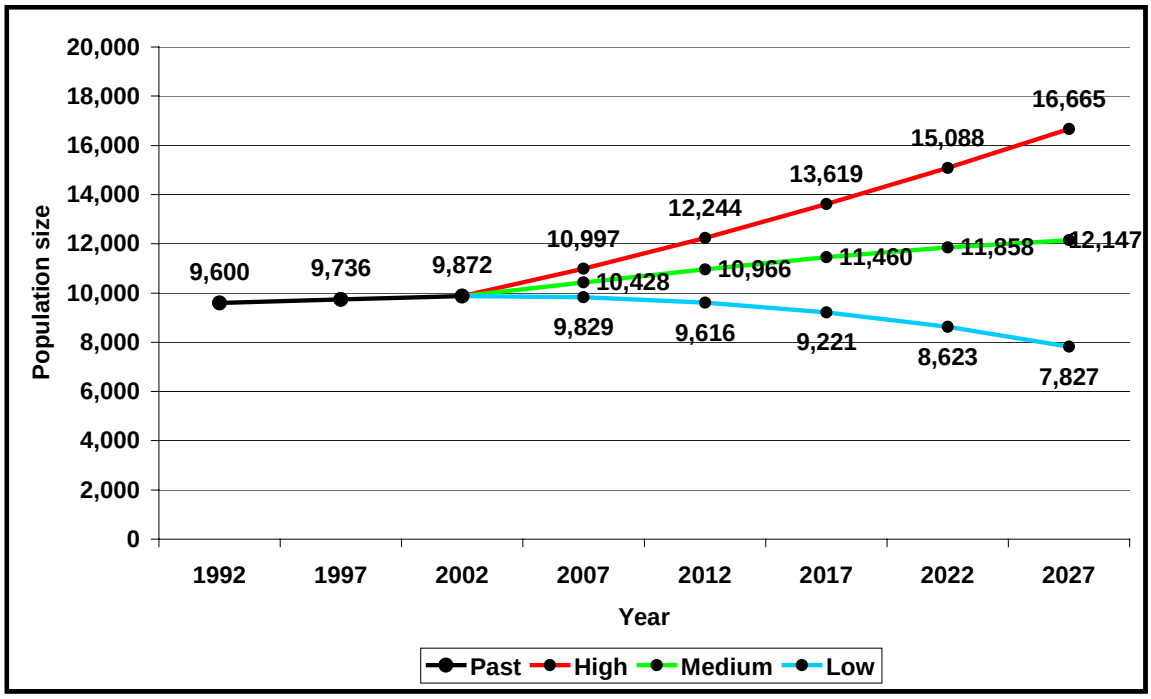

Figure 28. Future population trend according to three projection variants, 2002–2027.

5.2 Population Mortality

As can be seen in Table 17, studies on the level of mortality presented in profiles within the Census 2002 indicate that the life expectancy at birth for indigenous Nauruans, especially for males, has been decreasing and is very low.

Table 17. Life expectancies by sex, total resident and Nauruan population, 1997–2002.

	1997 – 2002	
	Residents	Nauruans
Males	52.5	49.0
Females	58.2	56.9

It is reported(9) that the low overall life expectancy seems to be caused by a growing prevalence of lifestyle diseases such as diabetes, combined with high alcohol consumption, smoking and little exercise. Furthermore, it has also proven difficult to understand the high infant mortality rates (IMR) in an environment like Nauru, which does not experience the climate, health conditions (e.g. vector-borne diseases), physical environment, inaccessibility to health services and general communication problems that are prevalent in high IMR Pacific countries such as Solomon Islands, Papua New Guinea, Vanuatu and Kiribati. **It is notable in both the above instances relating to low life expectancy and high IMR that neither water supply nor sanitation and hygiene issues were reported as contributory factors to these adverse statistics**. The Census concluded that concerted efforts need to be undertaken to improve infant, child and maternal health care programmes, leading to better overall child care, and the unfortunate adult male mortality statistics could be counteracted by intensifying health advocacy/public health awareness campaigns promoting healthier lifestyles.

5.3 Household Size

As can be seen from Table 18, the 2002 Census recorded the lowest average household size in Location (four persons), while the highest was found in Baitsi District with about nine persons. The average household size was recorded as 6 persons per dwelling. Location had the highest concentration of both population and households, and the lowest household size. This is because most residents in this district were foreign nationals living and working in Nauru, but as noted in Section 5.1, this dynamic can almost certainly be expected to have changed dramatically during the past couple of years (2006-07).

Table 18. Average household size by District, (from 2002 Census).

District	Resident population		Households		Household size
	Number	%	Number	%	
Total	9872	100.0	1676	100.0	5.9
Yaren	625	6.3	80	4.8	7.8
Boe	728	7.4	117	7.0	6.2
Aiwo	1042	10.6	175	10.4	6.0
Buada	673	6.8	89	5.3	7.6
Denig	283	2.9	53	3.2	5.3
Nibok	479	4.9	70	4.2	6.8
Uaboe	385	3.9	51	3.0	7.5
Baitsi	443	4.5	47	2.8	9.4
Ewa	394	4.0	65	3.9	6.1
Anetan	497	5.0	69	4.1	7.2
Anabar	378	3.8	44	2.6	8.6
Ijuw	168	1.7	25	1.5	6.7
Anibare	231	2.3	31	1.8	7.5
Meneng	1316	13.3	199	11.9	6.6
Location	2230	22.6	561	33.5	4.0

The 2002 Census also noted that most private dwellings in Nauru were constructed over 20 years ago. Only two out of every 100 were constructed in the two years prior to the census (2001-02), with one in 10 constructed over the previous 10 years. There is little to no evidence to the census of any significant change in this building pattern environment during the subsequent period 2002 to-date (2007).

With respect to household water supply, of the 1652 private dwellings recorded during the 2002 Census, 1403 (85%) claimed to have access to drinking water with dispatches *(deliveries via road tanker)* from the desalination plant operated by the Government providing the main source of drinking water for 81% of private dwellings. The remaining dwellings recorded using rainwater (14%), wells or other means.

With respect to household sanitation (toilet facilities), 83% of private dwellings recorded during the 2002 Census claimed access to modern indoor toilet facilities (tank-flush), with a further 12% having access to external tank or pour-flush facilities. Only 2% (N = 28) of private dwellings claimed not to have access to a toilet facility.

5.4 Domestic Water Demand

Based on the earlier comments in Sections 5.1 to 5.3 of this report on population dynamics, a total base population of 7,500 to 8,000 would appear to be a reasonably accurate representation of Nauru's current 2007 situation. Given historic trends, existing and probable future socio-economic conditions, a very low to negative population growth rate is also considered to be the likely future scenario, so it is difficult to imagine conditions that would cause Nauru's total resident population to exceed 9,000 within the next 20-year demand horizon.

Predictions for future domestic water demands to 2027, assuming a continuation in present social customs and lifestyle by the Nauruan population, are based on the following typical design standards:–

POTABLE REQUIREMENTS

- Basic drinking water supply 30 l/c/d
- Additional uses (washing, cooking) 70 l/c/d

NON-POTABLE REQUIREMENTS

- Toilet flushing, cleaning, other 70 l/c/d

Based upon the recorded average Nauruan household size of 6 persons per dwelling and the reasonably typical potable water design standards noted above, the average household may therefore be expected to require an annual potable water supply of:–

> 6 persons x 100 l/c/d x 365 days = 219,000 litres per Annum = 219 m^3 per Annum (*equivalent to 219 tonnes/Annum, a form of expressing water supply by weight, perhaps uniquely utilised by Nauru as a result of its past history of having to import shipped freshwater [by the tonne], during the active phosphate mining period).*

Alternatively, for a total 2027 population of 9000 persons, potable domestic requirements will equate to:–

> 9000 x 100 l/c/d x 365 days = 328,500 m^3 per Annum or 328,500 tonnes/Annum

Under non-drought conditions, continuous rainwater collection will generally keep storage tanks well provisioned and significantly reduce the demand for potable water (historically delivered by road tanker from the desalination units). Under drought conditions, the average Pacific household would normally instigate careful self-management and domestic conservation measures with respect to their stored rainwater reserves, and a reduced demand of 50 l/c/d for a 3- or 6-month drought period becomes a feasible design standard. As an example in such circumstances, the volume of tank storage required to get the average household through a 3- or 6-month design drought would therefore equate to:–

> 3-month storage = (6 people x 50 l/c/d x 90 days) = 27,000 litres = 27 m^3
> 6-month storage = (6 people x 50 l/c/d x 180 days) = 54,000 litres = 54 m^3

It is apparent from the observations recorded in Section 4.3 and Annex F of this report that the mean storage of the circular tanks surveyed to-date is approximately 29 m^3, so many households already seem quite well provided for in this respect. In view of the currently dynamic situation of RON's water Aid sector, it is clearly important for Nauru to clarify the exact installation locations of; the population numbers to be served by; and the additional rainwater storage contributed by the 150 galvanised tanks and 45 plastic tanks being donated by AusAID and the Government of Japan, respectively. When combined with a completed asset database, it should then prove feasible to assess on a national household basis, exactly where the remaining "gaps and needs" are for RON Government or Aid-donor support to strategically target future RWH infrastructure improvements.

6. CONCLUSIONS AND RECOMMENDATIONS

6.1 The SOPAC/EU Project's approach philosophy, combining the application of high resolution, remotely-sensed (RS) satellite imagery, global positioning systems (GPS), and geographic information systems (GIS) with local capacity building and training, was applied in Nauru to provide an accurate spatial database of domestic and community properties. Identification of associated conditions of rainwater harvesting infrastructure, such as roofing materials, guttering, down-pipes and storage tanks, formed the basis of the asset condition survey. This could subsequently allow production of engineering specifications and associated bill of quantities to accurately identify the infrastructure refurbishment and actual replacement needs; provision and installation of sufficient domestic and community rainwater harvesting facilities would therefore contribute directly to reducing the vulnerability of Nauru's population to drought risks.

6.2 During February 2007, two field teams visited 308 properties over 8 days on Nauru to initiate a detailed asset condition survey of domestic rainwater harvesting infrastructure. A comprehensive database has resulted for the districts of Buada, Yaren, Meneng, Anibare and Ijuw, which can either be fully completed within the remaining Districts at a future date, or perhaps used with some confidence as a statistically representative sample for forward interpolation of "whole-of-island" conditions. With a land area of just 21 km^2 Nauru is spatially by far the smallest of the fourteen nations within the EDF8/9 Project and a "whole-of-island" approach is therefore considered appropriate to such water sector tasks.

6.3 At every household property, data was collected on each respective element of the household rainwater harvesting system; in simple terms of the relative directional "flow diagram", these are respectively:–

Catchment System (roofing) → **Transmission System (gutters & downpipes)** → **Storage System (tanks & cisterns)**

6.4 The results of the field survey work, analysed in Section 4 of this report, are partially summarised in Table 19 below.

Table 19. Summary of domestic RWH asset conditions.

RWH Asset	Good Condition	Fair Condition	Poor Condition	Nil Count	Total Properties.
Catchment	208	28	72	n/a	308
Transmission	141	44	74	49	308
Storage	172	33	45	58	308

6.5 Analysis of the field survey work concluded the following points of interest with respect to the ***Catchment Systems –*** Almost one quarter of the roofs surveyed comprised old asbestos cement sheeting, the remainder being of more modern metal sheeting construction. Asbestos roofing appeared significantly concentrated within the Yaren District. Although the dangers associated with asbestos actually relate to inhalation of fibres within the respiratory tract, and not ingestion within the digestive tract, sufficient public health "scare" is perceived to be present amongst the general population to have deterred most people from collecting and drinking rainwater if they have an asbestos roof. The safe disposal of old asbestos sheeting is a significant environmental problem faced by Nauru. Vegetation overhang of roof areas is not a particular problem, but almost a quarter of the roofs surveyed were considered to be in a *Poor* condition. Of the 308 properties surveyed, the observed mean roof length was 15.35 m and the mean roof width was 11.89 m, representing a mean roof area of 187.67 m^2.

6.6 Analysis of the field survey work concluded the following points of interest with respect to the ***Transmission Systems –*** three types of guttering materials were encountered during

the survey period, namely metal, PVC plastic and asbestos. As with roofing materials, the Yaren District again shows an apparent spatial concentration of asbestos guttering. Approximately one sixth of the domestic properties surveyed had no guttering at all affixed to the fascia boarding. When combined with the fact that a high proportion of gutters could only be ranked as *Fair-to-Poor* condition, it suggests that this component of the RWH infrastructure gets particularly neglected at the domestic level and there is significant scope for improving awareness of basic maintenance issues. Considerably less than half of the total number of properties surveyed had sufficient guttering to capture all (100%) of the potential runoff from their roof. As well as the properties recorded with absolutely no guttering at all, an additional one third of the properties only captured 25% to 50% of the available roof area, so there is clearly also significant scope for improvement in guttering provision, to enable a much higher proportion of the rainfall roof runoff to be diverted to potential tank storage facilities. Plastic is effectively the sole material utilised for system downpipes and one tenth of the surveyed properties recorded no downpipes present.

6.7 Analysis of the field survey work concluded the following points of interest with respect to the ***Storage Systems –*** Almost one fifth of the properties surveyed had no rainwater storage tank present. Tanks of plastic manufacture comprise close to two thirds of the total of 250 tanks identified. Spatial mapping appears to infer a concentration of properties with metal tanks in Yaren District, whilst concrete appears the more dominant material in Anibare and Ijuw districts. It is speculated that these distributions may relate to specific, historic installations relating to distinct Aid packages targeting certain districts. The mean volume of circular tanks was calculated to be 29.1 m^3. Rectangular tanks were invariably of concrete construction, mostly with the greater percentage of the structure sited partially beneath ground level, sometimes partially or fully beneath the building structure itself. Apart from two particularly large tanks (Fisheries building at Anibare Harbour and at the airport), the mean volume of rectangular tanks was calculated to be 46.04 m^3. Spatial mapping appears to indicate a particular concentration of properties with no tanks in the southeastern sector of Yaren District. Almost three quarters of all the tanks observed during the field survey visually appeared to be in a *Good* condition. The dominant method of abstraction from the tanks was via a basal tap, though a significant proportion of the population were also utilising a small electrical pump (Davy manufacture commonly observed) to transfer water from the tank into their household.

6.8 It is recommended that the EDF9 KRA4 training in RS/GPS/GIS, understood to be nominally programmed for Nauru during July 2007, should especially target continued capacity-building of water-sector staff within the following Nauru organisations:–

- Public Utilities;
- Nauru Rehabilitation Corporation;
- Ronphos;
- Environment; and
- Planning.

The training workshop should provide an ideal and timely impetus to encourage a follow-on, field survey which can be undertaken primarily by local staff with limited SOPAC support, to complete the RWH asset condition database for the remaining northern and western districts on Nauru.

6.9 In the near future, perhaps coincident with the completion of the RWH asset survey as mentioned in 6.8 above, it is also important for Nauru to clarify the exact installation locations of; the population numbers to be served by; and the additional rainwater storage contributed by the 150 galvanised tanks and 45 plastic tanks being donated by AusAID and the Government of Japan, respectively. When combined with a completed asset database, it should then prove feasible to ascertain, on a national household basis, exactly where the remaining "gaps and needs" are. This will enable the RON Government, or Aid-donor support, to strategically target future RWH infrastructure improvements and determine what

might be required to satisfactorily upgrade conditions relating to the catchment, transmission and storage of domestic rainwater harvesting systems.

6.10 The repatriation of previous phosphate mine workers to their respective countries during 2006, probably results in Nauru's current (2007) total population realistically lying somewhere within the range of 7,500-8,000 people only. This represents a significant demographic shift from previous years, with direct implications not only for water demand assessment, but also all other strategic development planning and related demand horizons. The impact of fertility on Nauru's population dynamics, particularly future population growth, is less pronounced than that of migration and it is apparent that continued economic uncertainties as experienced on Nauru may well be conducive to relative stagnation of population growth or continued negative migration rates for years to come. Given historic trends and existing and probable future socio-economic conditions, a very low to negative population growth rate is also considered to be the likely future scenario, so it is difficult to imagine conditions that would cause Nauru's total resident population to exceed 9,000 within the next 20-year demand horizon through to 2027. For a total 2027 population of 9000 persons, domestic potable water demand is assessed at 328,500 m^3 per annum.

6.11 The prevailing socio-economic living conditions in Nauru present enormous challenges to the operational viability and maintenance sustainability of any proposals to undertake refurbishment or replacement of rainwater harvesting (or indeed any other) infrastructure. In addition, water conservation and awareness education remain extremely critical issues requiring input, as does the coincident investigation of the viability of (actual) cost recovery mechanisms relating to the water sector.

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ANNEXES

A Government of Japan – Grand Assistance for Grassroots Human Security Projects (GGP)

B RoN letter dated 26th July 2006 (Hon D. Adeang to EU Delegation, Suva), endorsing the use of uncommitted B-Envelope funds for disaster preparedness by addressing drought risk

C Summary Mission Itinerary

D GPS Data Dictionary

E Example of field survey data collection form

F Full tabulations of all field data collected

ANNEX A

Government of Japan – Grand Assistance for Grassroots Human Security Projects (GGP)

Following discussions between GoN and GoJ at the Palm Summit 2006, GoJ agreed to include Nauru under the GGP Assistance Scheme. The GGP Assistance Scheme supports projects proposed by NGO's and local government authorities and is designed to meet the diverse needs of developing countries.

Nauru's inclusion in GGP was initiated by the 2nd Secretary Ms Reiko Konosu when visiting Nauru to introduce and define the criteria of projects under GGP. In August 2006, the Embassy of Japan in Suva advised GoN that due to time limitations and end of annual financial period, they were able to fund only one project for 2006 which is communal water tanks. Funds available under GGP allowed purchase of 45No x 6,000 litre tanks – which will be distributed 3 per community at a location identified by the communities.

From November 2006, contracts were signed between GoN & GoJ, tank provider, local and private organisations. On 30th January 2007, Ambassador Namekawa arrived in Nauru from Fiji to sign and seal the agreement regarding the communal water tanks project. Minister Adeang countersigned the contract with H.E. President Ludwig Scotty, Chief Secretary Mrs Camilla Solomon, 2nd Secretary Reiko Konosu and AMU officials in attendance.

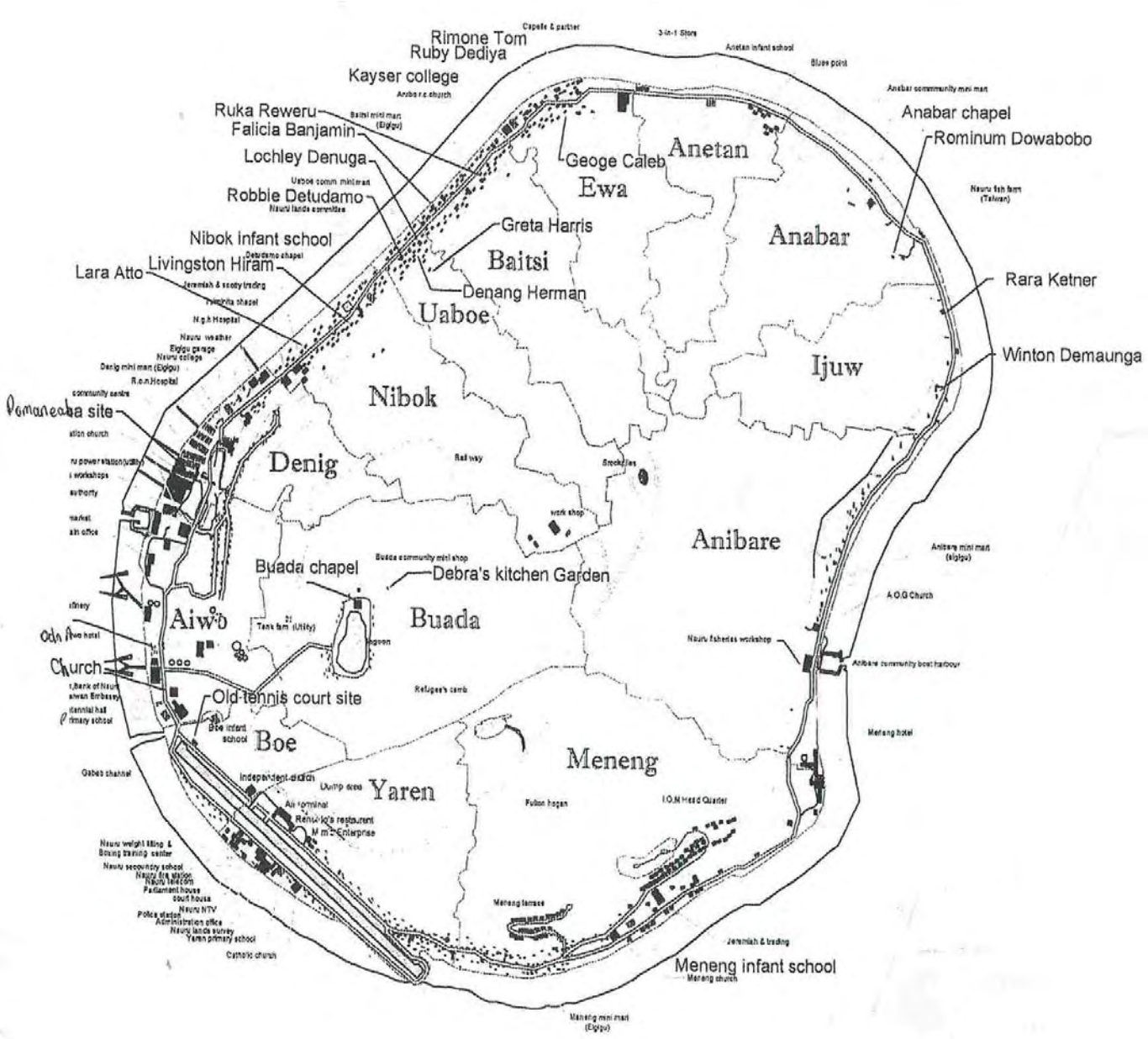
Description	QTY	Unit Price (AUD$)	Total Price (AUD$)	Company
6000ltr water tanks	45	979.23	44,065.35	Rotomould (Solomon) Ltd
Freight (12pcs/FCL)	4	9,094.02	36,376.08	Rotomould (Solomon) Ltd
Insurance	1		425.75	Rotomould (Solomon) Ltd
Concrete bases for water tanks	45	310.80	13,986.00	Egigu Holdings Corporation
45 length PVC pipe 90mm	45	45.00	2,025.00	Capelle & Ptrs Hardware
PVC Elbow 90mm	90	1.90	171.00	Capelle & Ptrs Hardware
Landing Fee	4	100.00	400.00	Port Authority (waived)
Transport Fee from Port to Community	45	30.00	1.350.00	Capelle & Ptrs Hardware (waived)
TOTAL			98,799.18	

Possible sites for erection of communal water tanks submitted by community leaders (see following map for approximate locations)

- Aiwo District — two around Mikaio house; One at church
- Denig — all around the church
- Nibok — one at church
- Uaboe — Lochley Denuga; Denang Herman; Robbie Detudamo
- Baitsi — Ruka Rewera; Felicia Benjamin; Iris Garabwan
- Ewa — Ruby Deiya; Rimone Tom
  Near Kayser College
- Anetan — selected sites
- Anabar — around the chapel
- Ijuw — Suzanne Tonia; Rara Ketner; Wintom Damaunga
- Anibare — Kuria Tom; Dowongo Tabuna; Betina Deireragea
- Menen — all opposite Menen Infant School
- Yaren — 2 at catholic church, 1 at Antina's (Yaren Community hall)
- Boe — all around the old tennis court
- Buada — nil
- Location — all around the domaneab

NB: Above details supplied by AMU staff, 20/02/07.

Map showing approximate proposed locations for the siting of communal rainwater harvesting tanks under GoJ GGP Aid.



ANNEX B

RoN letter dated 26th July 2006 (Hon D. Adeang to EU Delegation, Suva), endorsing the use of uncommitted B-Envelope funds for disaster preparedness by addressing drought risk

Hon. David Adeang MP
Minister Assisting the President
Minister of Foreign Affairs & Trade
Minister of Finance & Economic Planning

Government Offices
Yaren District
Republic of Nauru
Central Pacific
Tel: 444 3133
Fax: 444 3194

REPUBLIC OF NAURU

26 July 2006

Mr. Michel Gauche
Chargé d' Affaires a.i
Delegation of the European
Commission for the Pacific
Suva
FIJI

Dear Mr. Gauche,

In reference to your letter dated 06 July 2006 regarding the Regional Program in Disaster Preparedness and Risk Management Joining EU Natural Disaster Facility and National Remaining B Envelope.

I wish to offer on behalf of the Government of the Republic of Nauru, endorsement for the uncommitted funds under the B Envelope to be utilized for disaster preparedness, most specifically as recommended the completion of a Strategic National Action Plan and the implementation of a first priority under this Plan.

I further concur that a priority identified under our National Sustainable Development Strategy (NSDS) 2005 is the water sector and addressing the drought risk under the National Action Plan is the most appropriate for Nauru at this point in time.

The Government of Nauru through its Aid Management Unit and Development Planning and Policy Division look forward to working with the European Commission and SOPAC to progress on the Strategic National Action Plan at the earliest.

Yours sincerely,

David W. Adeang

ANNEX C

Summary Mission Itinerary

SOPAC EU EDF8/9 PROJECT – KRA2 MISSION TO NAURU (& Kiribati by default) – February 2007
Nauru Rainwater Harvesting Asset Condition Survey

Team Members:– S.K. Booth
E. Lomani-Whippy
A. Navatoga-Sokota
V. Tokalauvere

SUMMARY DIARY OF EVENTS

Day 1 Wednesday 07/02/07

Team travel in SOPAC minibus from HQ 16:00 hrs to Nadi 20:00 hrs
Overnight at Gateway Hotel

Day 2 Thursday 08/02/07

Travel Nadi 08:00 hrs to Tarawa 11:00 hrs on FJ231
Met at Bonriki Airport by Titeem, KI Intern
Check Our Airlines office – tomorrows flight cancelled
Check in Mary's hotel for 5 nights; organise hire car
Visit KI Immigration to correct passport stamp for 5-day stay until next Nauru flight, not due until next Tuesday!
MFMRD to access email; phone Bhaskar and report flight/mission delay; email AMU on Nauru.

Day 3 Friday 09/02/07

Heavy rain overnight & morning – Bairiki awash; very slow office start-up! No internet access available all morning and early afternoon
Obtain loan of tripod from Lands for GPS base station trials
Return to Our Airlines office to enquire flight possibilities & delayed flight compensation (none!)
Call in on EU-MOH Project offices at Environment to speak with Eita – he is off island in Fiji!
Courtesy meeting (all team) with Mr Tong, SOPAC MCR for KI
TSKL internet access (Liz assisting with programming query)
BR email requests mission to proceed rather than abandon

Day 4 & Day 5 Sat10/02/07 & Sun11/02/07

Weekend

Day 6 Monday 12/02/07

Liz & Vilisi to Fisheries & Environment to assist GIS

SKB & Arieta to PUB; discussions with General Manager –Taboia on following topics;
PUB to establish an awareness committee with WEU to look after water and sanitation issues;
Propose to increase frequency of radio programmes;
Leakage problems at household level;
Water quantity/quality;
Tariff rates;

KAP II proposed activities;
Sewerage situation;
Water Demand – last census 2006;
Desalination Plant – resting. Requires $500 000 to operate and acquire capital

SKB & Arieta to PUB GIS Office; 3 GIS operators – Itienang Timona (Water Engineer) Evire Banrrie (Water/Sewerage Superintendent) Kiatoa Kiatoa (Assistant Draughtsman) Toani Tetangika (Power GIS operator) Download copy of GIS

SKB & Arieta to WEU Meeting with Mourongo;
Role of WEU monitoring 30 boreholes, measure salinity;
GIS training needed for WEU;
Office has a lot of data but not fully integrated into GIS;
Operators Teretia Mamau and Maketa Ioteba;
Download Outer island data

Return to MFMRD – no internet available

Drive to MoE, wastewater guy not there; continue on to Liz at Fisheries in Bonriki, then return to MoE to try again, still no luck

Return to TSKL for last half hour of internet

Repack equipment and arrange additional carrier for early departure tomorrow

Day 7 Tuesday 13/02/07

Depart Mary's hotel 07:00 hrs
Bonriki Airport 08:00 hrs & check in
ON351 delayed on-ground at Bonriki; late departure at 11:00 hrs
Arrive Nauru 12:00 hrs; met by Raymond/Nodel/Creedance
Menen Hotel to check in and unload & lunch
Government Buildings – Lands to get tripod from Wes/Porthos & Bryan/Berilyn to discuss survey programme & rental vehicles/fuel etc
Go to CGPS site to locate 3 buried TBMS. Set-up base station for couple of hours background readings and traverse airfield to cross-check mobile GPS units. Return hotel 18:30 hrs

Day 8 Wednesday 14/02/07

08:00 hrs Set up base station at CGPS
Govt offices to get assisting staff – no sign of Bryan or Raymond
Return to site with Giovanni (Lands) & Nodel; eventually joined by Creedance/July from NRC and Raymond. Undertake introductory talks and equipment demo's with team at 10:00 hrs
Begin active survey fieldwork as a single group so all know what to do
Continue whole group survey work after lunch – replacement staff from NRC are Rick & Madison
Capelle supermarket for provisions at 17:00 hrs, then return for close down of base station 18:00 hrs

Day 9 Thursday 15/02/07

08:00 hrs Set up base station at CGPS
Government offices to handover IWRM & HYCOS material to Bryan Star (NB. Kim Hubert SOPAC MCR off island)
Central Police Station to arrange site security for GPS base station. Return to site with police constable.
Split field survey personnel into 2 parties; Team A (SB/EL/N/M) to Buada District, south lagoon side;
Team B (A/V/J/G) continue east long coast in Yaren & Meneng District Districts
Heavy rain in Buada during afternoon slowed Team A survey progress
Close down of base station 18:00 hrs

Day 10 Friday 16/02/07

08:00 hrs Set up base station at CGPS
NRC staff assistance changes (Madison & July do not turn up; replaced by Rick & Dande)
Central Police Station to collect site security police constable
Team A continue field survey Buada west lagoon side
Team B continue Meneng coastal side
Lunch time refuel both vehicles (only 20 litres each allowed)
Team A lose assistant Giovanni – badly cut hand helping Wes
17:00 hrs return to office – pay Judith AMU for initial 6 days rental vehicle charges; discuss with B. Star the need to work Saturday – continuing field assistance required – OK'd provided we remunerate staff at A$6.50 hr
Close down of base station 18:00 hrs

Day 11 Saturday 17/02/07

Discover A$1000 cash of SOPAC accountable advance monies missing from room.
Report to hotel management and Central Police Station – make written statement for insurance claim etc. (09:00-10:30 hrs)
Return hotel, pick girls and set up base station 11:00 hrs
Dande (NRC) provides site security; Rick & Nodel assisting field teams
Team A continue field survey Buada north
Team B continue Meneng coastal /landward side
15:00-16:00 hrs Team A GPS survey around island roads circuit
Close down of base station 16:00 hrs
Swim Anibare Harbour 17:00 hrs
Detective questioning hotel staff at big internal meeting 18:30 hrs

Day 12 Sunday 18/02/07

Rest day

Day 13 Monday 19/02/07

08:00 hrs Set up base station at CGPS
Central Police Station to collect site security police constable
Team A continue field survey Buada east/south – completed
Team B continue Meneng landward side
SKB back & forth to govt buildings all day trying to encash Travellers Cheques;
Eventually GON suggest they loan A$2K cash instead, with SOPAC to repay with transfer
Finally obtain MOF & Presidential approval – go to Bank of Nauru with Berilyn AMU to collect cash at 15:30 hrs. Pay Judith AMU the second tranche of cash for the two rental cars
Close down of base station 17:00 hrs

Day 14 Tuesday 20/02/07

08:00 hrs – Set up base station at CGPS
Pay Saturday wages to 3 local assistant staff
Central Police Station to collect site security police constable
Govt office to copy letter to hotel and give Judith cc copies
Refuel both vehicles (20 litres each)
Team A start survey Anibare Bay, north from Menen hotel; GPS charge problem, return to government office at lunchtime to recharge
Team B continue Meneng/Yaren landward side finishing at air terminal
Close down of base station 17:00 hrs
SKB check out hotel and check-in at 16:30 hrs for ON321 to Brisbane;
flight departure delayed until 19:00 hrs
Arrive Brisbane 22:30 hrs & overnight

Day 15 Wednesday 21/02/07

08:00 hrs – Set up base station at CGPS
Central Police Station to collect site security police constable
Team A continue survey north along Anibare Bay
Team B continue Yaren coastal side of runway
Close down of base station 17:00 hrs
SKB departs Brisbane on DJ177, arrive Nadi 15:00 hrs
Problem with local flight, take 4-hr bus journey back to Suva 21:00 hrs

Day 16 Thursday 22/02/07

Final day working on database and visiting government & NRC offices to transfer collected data and review NRC Arcview GIS
Return both rental vehicles & tripod to Lands

Day 17 Friday 23/02/07

Depart Nauru on ON351 to Honiara
Overnight Honiara

Day 18 Saturday 24/02/07

Depart Honiara on IE708 to Nadi 20:40 hrs; overnight Nadi

Day 19 Sunday 25/02/07

Return personnel and equipment Nadi – Suva in SOPAC minibus

ANNEX D

GPS Data Dictionary

"Building", Dictionary
"Building", point, "", 5, seconds, 1, Code
  "ID", text, 100, required, normal, Label1
  "use", menu, required, normal, Label2
    "house", default
    "school"
    "hotel"
    "church"
    "hospital"
    "business"
    "industry"
    "government"
    "transport"
    "Derelict"
    "community hall"
    "other"
  "RoofMaterial", menu, normal, normal
    "metal sheeting", default
    "asbestos"
    "wood"
    "tile"
    "thatch"

    "other"
  "RoofCondition", menu, normal, normal
    "Good", default
    "Fair"
    "Poor"
  "RoofSlope", menu, normal, normal
    "Flat", default
    "Low"
    "Medium"
    "Steep"
  "treecover", menu, normal, normal
    "0%", default
    "1-25%"
    "25-50%"
    "50-75%"
    "75-100%"
  "RoofLength", numeric, 2, 0.00, 1000.00, 0.00, normal, "m", normal, 10.00
  "RoofWidth", numeric, 2, 0.00, 1000.00, 0.00, normal, "m", normal, 10.00
  "Guttering", menu, normal, normal
    "Yes"
    "No"
  "GutterMat", menu, normal, normal
    "PVC", default
    "metal"
    "other"
    "asbestos"
  "GutterAvailabilty", menu, normal, normal
    "1RoofLength"
    "2RoofLength"
    "1Roof2Width"
    "2Roof2Width"
  "GutterWidth", numeric, 2, 0.00, 1000.00, 0.00, normal, "mm", normal, 10.00
  "GutterLength", numeric, 2, 0.00, 1000.00, 0.00, normal, "m", normal

```
  "GutterCondition", menu, normal, normal
    "Good", default
    "Fair"
    "Poor"
  "RoofCapture", menu, normal, normal
    "0%"
    "25%"
    "50%"
    "75%"
    "100%"
  "Downpipe", menu, normal, normal
    "Yes"
    "No"
  "DownpipeMaterial", menu, required, normal
    "Plastic", default

    "Metal"
    "Other"
  "DownpipeLength", numeric, 2, 0.00, 1000.00, 0.00, normal, "m", normal, 10.00
  "DownpipeWidth", numeric, 0, 0, 1000, 0, normal, "mm", normal, 10
  "HouseholdNumber", numeric, 0, 0, 1000, 0, normal, normal
  "Owner", text, 30, normal, normal
  "Sanitation type", menu, normal, normal
    "Sespit "
    "Sewerage"
    "VIP"
    "SoakAway"
    "N/A"
    "Other"
  "Comment", text, 100, normal, normal

"TankID", point, "", 5, seconds, 1, Code
  "Tank", menu, normal, normal
    "Yes"
    "No"
  "TankID", text, 100, normal, normal
  "TankPosition", menu, required, normal, Label1
    "AboveGround", default
    "GroundLevel"
    "PartialBelowGrnd"
    "MajorityBelosGrnd"
  "TankMaterial", menu, required, normal, Label2
    "plastic", default
    "Concrete"
    "ferro-cement"
    "wood"
    "metal"
    "other"
  "TankShape", menu, required, normal
    "circular", default
    "rectangular"
    "square"
    "other"
  "TankLength", numeric, 2, 0.00, 100.00, 0.00, required, normal, 10.00
  "Tankwidth", numeric, 2, 0.00, 1000.00, 0.00, required, normal, 10.00
  "TankHeightDepth", numeric, 2, 0.00, 100.00, 0.00, required, normal, 10.00
  "TankArea", numeric, 2, 0.00, 1000.00, 0.00, required, normal, 10.00
  "TankCondition", menu, required, normal
    "good", default
    "fair"
    "poor"
  "TankOverflowCapture", menu, required, normal
```

"Zero", default
"One"
"Two"
"Three"
"TankGauze", menu, normal, normal
"Yes", default
"No"
"TankOutlet", menu, required, normal
"tap", default
"bucket"
"pump"
"gravity"
"other"
"WaterUse", menu, required, normal
"Washing"
"Cooking"
"Drinking"
"Bathing"
"WCD"
"WD"
"WB"
"DC"
"CD"
"All above"
"AlternativeSupply", menu, required, normal
"Well"
"Boreholes"
"From Water Truck"
"From Neighbour"
"NIL"
"Disuse"
"Other"
"Comment", text, 100, normal, normal

ANNEX E

Example of field survey data collection form

QUESTIONNAIRE BUILDING SURVEY NAURU

Name: Ariete / Vilisi Date: 22/2/07 Page No.: 1

Ref. No.	Street Name/District	Name of Building/owner	Comments
274 (House)	Yaren	Mathew Betuk	- no gutter/pipe + tank (new building)
275 (Airport)	Yaren	Nauru Int. Air Terminal	- Length of tank – 12m concrete calculated width, very irreg. - well for toilet - tank for all taps. - 80 workers.
276 (House)	Yaren (10)	Mimpo Thoma	- tank l – 5.0 x 2.3m - rusted tank cover. - tank broken - water from relatives. - well use for toilet/shower + washing! - cesspit toilet.
277 (House)	Yaren (9)	Terence Debao	- downpipe. – dpw – 75 – 90mm - only one gutter on one side. - well shared by 4 houses - tank for drinking only - other w/use from well.
278 (House)	Yaren (15)	Agnes Debao	- gl – 52.8 gt metal. - tank broken on top
279 (House)	Yaren (10)	Anwano Ali	- tank 1 for drinking · small - brackish water for toilet - 1 tank broken leaking below - small tank capture from gutter.
280 (Vacant house)	Yaren (0)	Kogos	-
281 (House)	Yaren (9)	Adawoh Dany	- asbs roof - metal/asbs gutter - tank leaking – pump drink only - well

291 ↓ last 304 ↓ 310

ANNEX F

Full tabulations of all field data collected

ROOF CATCHMENT SYSTEMS

ROOF CATCHMENT SYSTEMS								
Building ID	Use	Roof Materials	Roof Condition	Roof Slope	Tree cover	Roof Length	Width	Roof Area
1	house	metal sheeting	Good	Flat	0%	17.00	8.00	136
2	house	metal sheeting	Good	Flat	0%	15.00	10.00	150
3	house	asbestos	Poor	Low	1-25%	14.00	8.60	120.4
5	house	asbestos	Poor	Low	0%	17.80	12.00	213.6
7	house	metal sheeting	Good	Flat	0%	6.00	4.00	24
9	house	metal sheeting	Good	Flat	1-25%	13.60	13.80	187.68
11	business	metal sheeting	Good	Flat	0%	17.30	24.50	423.85
13	house	metal sheeting	Fair	Flat	1-25%	7.00	4.00	28
15	house	asbestos	Poor	Flat	0%	14.40	15.60	224.64
17	business	metal sheeting	Good	Flat	0%	14.40	9.00	129.6
19	house	asbestos	Fair	Steep	0%	14.00	8.00	112
20	house	metal sheeting	Good	Low	1-25%	17.60	10.00	176
21	house	metal sheeting	Good	Low	0%	11.60	8.80	102.08
22	house	metal sheeting	Good	Steep	1-25%	8.60	11.50	98.9
23	house	metal sheeting	Good	Low	1-25%	16.00	10.00	160
24	house	metal sheeting	Good	Low	0%	21.00	4.50	94.5
25	house	metal sheeting	Good	Flat	0%	19.60	12.50	245
26	house	metal sheeting	Good	Low	0%	19.80	11.90	235.62
27	house	metal sheeting	Good	Flat	0%	10.00	10.00	100
28	house	metal sheeting	Good	Low	0%	9.70	8.70	84.39
29	house	metal sheeting	Good	Low	1-25%	15.60	11.60	180.96
30	house	metal sheeting	Good	Low	0%	11.80	12.10	142.78
32	house	asbestos	Good	Low	0%	12.70	7.30	92.71
33	house	metal sheeting	Good	Low	0%	14.20	10.70	151.94
35	house	asbestos	Poor	Low	1-25%	26.00	12.20	317.2
37	house	metal sheeting	Good	Flat	0%	14.00	12.00	168
38	house	asbestos	Fair	Low	0%	9.70	7.00	67.9
39	house	metal sheeting	Good	Flat	0%	15.00	10.00	150
40	Derelict	metal sheeting	Good	Flat	0%	16.00	10.00	160
43	house	asbestos	Poor	Low	0%	18.30	10.00	183
45	house	asbestos	Fair	Low	1-25%	15.60	16.40	255.84
47	house	metal sheeting	Good	Steep	1-25%	14.50	8.00	116
49	house	metal sheeting	Good	Flat	0%	20.30	12.50	253.75
51	house	asbestos	Poor	Low	0%	14.30	22.20	317.46
53	house	asbestos	Good	Low	0%	14.30	9.00	128.7
55	house	metal sheeting	Good	Low	0%	16.80	12.00	201.6
57	house	metal sheeting	Good	Low	0%	17.20	12.60	216.72
59	house	metal sheeting	Good	Low	1-25%	11.20	8.00	89.6
61	church	metal sheeting	Good	Low	0%	18.70	12.50	233.75
63	community hall	metal sheeting	Good	Low	0%	18.00	9.00	162
64	house	metal sheeting	Good	Low	0%	14.20	18.00	255.6
66	house	metal sheeting	Good	Low	0%	18.00	10.00	180
487	house	metal sheeting	Fair	Low	1-25%	16.00	11.00	176
68	house	asbestos	Poor	Medium	1-25%	14.00	8.80	123.2
69	house	asbestos	Good	Low	1-25%	14.50	11.40	165.3

71	house	asbestos	Poor	Medium	0%	7.80	11.00	85.8
73	house	asbestos	Poor	Low	1-25%	14.00	11.30	158.2
75	house	metal sheeting	Good	Flat	0%	11.00	14.60	160.6
77	house	asbestos	Poor	Medium	0%	14.30	9.00	128.7
80	house	metal sheeting	Good	Flat	0%	17.20	12.30	211.56
81	house	metal sheeting	Good	Flat	0%	23.00	10.70	246.1
82	house	metal sheeting	Good	Flat	0%	33.00	20.70	683.1
83	business	metal sheeting	Good	Flat	0%	16.90	30.70	518.83
84	house	asbestos	Poor	Flat	0%	21.00	12.90	270.9
85	house	metal sheeting	Good	Flat	0%	13.00	13.60	176.8
86	house	metal sheeting	Good	Flat	0%	13.00	13.60	176.8
87	house	metal sheeting	Good	Flat	0%	13.00	13.60	176.8
88	house	metal sheeting	Good	Flat	0%	12.30	12.10	148.83
90	house	metal sheeting	Good	Flat	0%	11.40	15.00	171
92	house	metal sheeting	Good	Low	0%	16.20	11.60	187.92
94	house	metal sheeting	Good	Flat	1-25%	17.60	11.40	200.64
96	house	asbestos	Poor	Flat	0%	27.60	21.40	590.64
97	house	metal sheeting	Good	Medium	0%	37.60	31.40	1180.64
99	house	asbestos	Poor	Flat	0%	9.10	12.00	109.2
101	house	metal sheeting	Good	Flat	1-25%	13.00	14.00	182
103	house	asbestos	Poor	Flat	1-25%	14.40	9.00	129.6
104	house	metal sheeting	Good	Flat	0%	15.00	8.50	127.5
107	business	metal sheeting	Good	Flat	0%	10.00	10.00	100
109	house	asbestos	Poor	Low	0%	16.00	12.60	201.6
111	house	metal sheeting	Fair	Low	0%	16.00	10.00	160
113	house	metal sheeting	Good	Low	0%	19.00	15.00	285
115	house	metal sheeting	Good	Low	0%	14.00	9.00	126
117	house	metal sheeting	Good	Low	0%	15.00	15.00	225
119	house	metal sheeting	Fair	Low	0%	16.00	10.00	160
121	house	metal sheeting	Good	Low	0%	19.00	15.00	285
123	house	metal sheeting	Good	Low	0%	14.00	9.00	126
125	house	metal sheeting	Good	Low	0%	10.00	10.00	100
127	house	asbestos	Poor	Medium	0%	15.00	8.60	129
129	house	asbestos	Poor	Flat	0%	14.00	8.00	112
131	house	asbestos	Good	Medium	0%	9.00	13.40	120.6
133	house	metal sheeting	Good	Flat	0%	6.00	5.00	30
135	house	metal sheeting	Good	Flat	0%	18.00	9.90	178.2
136	house	metal sheeting	Good	Flat	0%	14.50	10.90	158.05
137	house	metal sheeting	Good	Flat	0%	16.00	11.00	176
139	house	metal sheeting	Good	Flat	0%	17.40	12.80	222.72
141	house	metal sheeting	Good	Flat	0%	119.00	9.50	1130.5
142	house	metal sheeting	Good	Flat	0%	10.20	9.30	94.86
143	house	metal sheeting	Good	Flat	1-25%	9.40	1.00	9.4
145	house	metal sheeting	Good	Flat	0%	20.00	7.60	152
147	house	metal sheeting	Good	Flat	0%	19.70	19.90	392.03
149	house	metal sheeting	Good	Flat	0%	13.00	15.00	195
151	house	asbestos	Poor	Flat	0%	13.00	9.00	117
152	house	metal sheeting	Good	Flat	0%	13.00	12.20	158.6
154	house	metal sheeting	Good	Low	0%	15.00	9.00	135
155	house	metal sheeting	Fair	Flat	0%	19.00	10.00	190
157	house	metal sheeting	Good	Low	0%	12.00	18.00	216
159	house	metal sheeting	Good	Low	0%	19.00	14.00	266
161	house	metal sheeting	Good	Low	0%	17.00	9.00	153
163	house	metal sheeting	Good	Low	0%	17.00	9.00	153

165	house	metal sheeting	Good	Low	0%	16.00	13.00	208
167	house	metal sheeting	Good	Low	0%	19.00	11.00	209
169	house	metal sheeting	Good	Flat	0%	17.00	14.00	238
171	house	metal sheeting	Fair	Medium	0%	13.00	9.00	117
173	house	metal sheeting	Fair	Steep	1-25%	14.00	9.00	126
175	house	metal sheeting	Poor	Low	0%	14.00	13.00	182
181	house	metal sheeting	Good	Low	0%	17.00	11.50	195.5
183	house	metal sheeting	Good	Low	0%	18.00	8.00	144
185	house	metal sheeting	Good	Low	0%	17.90	12.00	214.8
187	house	metal sheeting	Poor	Flat	0%	18.00	8.00	144
189	house	metal sheeting	Fair	Low	0%	12.00	9.00	108
191	house	metal sheeting	Poor	Low	0%	12.00	11.00	132
193	house	metal sheeting	Good	Low	0%	14.50	11.50	166.75
195	house	metal sheeting	Good	Flat	1-25%	16.00	10.00	160
197	house	metal sheeting	Good	Flat	0%	14.00	13.00	182
199	house	metal sheeting	Good	Low	0%	15.00	8.50	127.5
201	house	metal sheeting	Good	Low	1-25%	12.00	11.00	132
202	house	metal sheeting	Good	Flat	0%	12.00	11.00	132
203	house	metal sheeting	Good	Low	0%	16.00	8.00	128
205	house	metal sheeting	Good	Low	25-50%	19.00	9.00	171
208	house	metal sheeting	Good	Low	0%	17.30	11.30	195.49
210	house	metal sheeting	Good	Flat	0%	3.00	10.00	30
212	house	metal sheeting	Good	Flat	50-75%	17.00	17.00	289
214	house	asbestos	Good	Low	1-25%	14.00	23.00	322
216	house	asbestos	Poor	Flat	1-25%	14.70	9.60	141.12
219	house	metal sheeting	Good	Flat	0%	12.00	7.00	84
220	house	metal sheeting	Good	Flat	0%	12.70	14.90	189.23
222	house	asbestos	Poor	Low	0%	14.50	11.70	169.65
224	house	metal sheeting	Good	Flat	0%	15.20	19.30	293.36
226	house	metal sheeting	Good	Flat	0%	11.70	15.10	176.67
228	house	other	Poor	Low	1-25%	12.20	16.30	198.86
229	house	asbestos	Poor	Low	1-25%	10.00	6.40	64
231	house	metal sheeting	Good	Flat	0%	16.50	12.20	201.3
233	house	metal sheeting	Good	Flat	0%	18.00	9.10	163.8
235	house	metal sheeting	Good	Flat	0%	12.00	9.00	108
236	house	asbestos	Poor	Flat	0%	12.00	15.40	184.8
243	house	asbestos	Poor	Low	1-25%	9.70	13.50	130.95
245	house	asbestos	Good	Flat	0%	19.20	18.20	349.44
247	house	metal sheeting	Good	Flat	0%	17.00	8.40	142.8
249	house	metal sheeting	Good	Flat	0%	12.80	12.10	154.88
251	house	asbestos	Poor	Flat	0%	15.30	9.00	137.7
253	house	metal sheeting	Good	Low	1-25%	17.40	12.40	215.76
255	house	asbestos	Poor	Low	1-25%	14.20	9.00	127.8
257	house	asbestos	Poor	Flat	0%	14.40	9.20	132.48
259	house	metal sheeting	Good	Flat	0%	17.20	12.00	206.4
261	house	metal sheeting	Good	Flat	0%	12.30	10.10	124.23
263	house	metal sheeting	Good	Flat	0%	9.10	17.60	160.16
264	house	metal sheeting	Good	Flat	0%	13.50	8.50	114.75
266	house	asbestos	Poor	Flat	0%	13.90	11.90	165.41
268	house	asbestos	Poor	Flat	0%	14.20	12.60	178.92
270	house	asbestos	Poor	Low	1-25%	15.00	13.90	208.5
272	house	asbestos	Poor	Flat	0%	14.10	13.60	191.76
274	house	metal sheeting	Good	Flat	0%	14.40	18.00	259.2
276	house	asbestos	Poor	Flat	0%	18.00	11.80	212.4

277	house	metal sheeting	Good	Flat	50-75%	14.30	12.70	181.61
279	house	metal sheeting	Good	Flat	0%	16.00	10.20	163.2
281	house	metal sheeting	Good	Flat	0%	18.00	9.60	172.8
282	house	metal sheeting	Good	Flat	0%	16.40	8.90	145.96
284	house	metal sheeting	Good	Flat	0%	10.00	5.60	56
285	house	asbestos	Poor	Flat	1-25%	18.90	11.20	211.68
287	business	metal sheeting	Good	Flat	0%	12.00	8.60	103.2
288	house	asbestos	Good	Flat	0%	22.00	11.90	261.8
290	house	metal sheeting	Good	Flat	0%	14.30	9.90	141.57
292	house	asbestos	Poor	Flat	0%	14.70	13.30	195.51
294	house	metal sheeting	Good	Flat	0%	9.50	10.30	97.85
296	house	asbestos	Poor	Flat	0%	12.60	13.50	170.1
298	house	metal sheeting	Good	Flat	1-25%	16.70	12.70	212.09
300	house	metal sheeting	Good	Low	0%	8.50	8.00	68
302	house	metal sheeting	Good	Low	0%	10.50	10.00	105
304	house	metal sheeting	Good	Flat	0%	15.00	13.00	195
306	house	metal sheeting	Good	Flat	0%	15.00	8.00	120
308	house	metal sheeting	Good	Flat	0%	12.00	10.00	120
309	government	metal sheeting	Good	Flat	0%	21.00	30.00	630
311	church	metal sheeting	Poor	Low	0%	14.00	18.00	252
313	business	metal sheeting	Good	Low	0%	12.00	14.00	168
315	house	metal sheeting	Good	Low	0%	13.00	11.50	149.5
316	house	metal sheeting	Good	Flat	0%	10.00	14.00	140
317	house	metal sheeting	Good	Flat	0%	18.00	20.00	360
319	house	metal sheeting	Good	Low	75-100%	7.00	10.00	70
321	house	metal sheeting	Good	Flat	0%	15.00	10.00	150
322	house	metal sheeting	Poor	Low	0%	15.00	9.00	135
324	house	metal sheeting	Good	Flat	0%	18.00	10.00	180
326	house	metal sheeting	Poor	Low	0%	12.00	10.00	120
328	house	metal sheeting	Fair	Medium	1-25%	17.00	11.00	187
330	house	metal sheeting	Fair	Low	0%	16.00	12.00	192
332	house	asbestos	Poor	Medium	0%	17.00	10.00	170
334	house	asbestos	Poor	Low	1-25%	14.00	10.00	140
336	house	asbestos	Poor	Medium	1-25%	18.00	11.00	198
338	house	metal sheeting	Good	Low	0%	18.00	13.00	234
340	house	metal sheeting	Good	Low	0%	19.00	17.00	323
342	house	asbestos	Poor	Low	0%	16.00	7.00	112
344	house	metal sheeting	Good	Low	0%	19.00	10.00	190
346	house	metal sheeting	Good	Flat	0%	16.00	10.00	160
348	house	metal sheeting	Good	Low	0%	20.00	14.00	280
350	house	metal sheeting	Good	Low	75-100%	18.00	12.00	216
352	house	metal sheeting	Good	Low	0%	14.00	16.00	224
354	house	metal sheeting	Poor	Low	1-25%	21.00	11.00	231
356	house	metal sheeting	Fair	Low	0%	8.00	6.00	48
358	house	metal sheeting	Fair	Low	0%	13.00	12.00	156
360	house	asbestos	Good	Low	0%	8.00	8.00	64
362	house	metal sheeting	Good	Flat	0%	12.00	10.00	120
364	house	metal sheeting	Good	Flat	0%	6.70	5.10	34.17
366	house	asbestos	Poor	Flat	0%	14.30	9.00	128.7
368	house	metal sheeting	Good	Flat	0%	12.32	10.31	127.0192
370	house	metal sheeting	Good	Flat	0%	21.77	11.44	249.0488
371	house	asbestos	Good	Flat	0%	15.58	11.55	179.949
373	house	metal sheeting	Good	Flat	0%	20.25	15.27	309.2175

375	house	metal sheeting	Good	Flat	0%	18.31	10.45	191.3395
377	house	metal sheeting	Good	Flat	1-25%	13.14	13.63	179.0982
379	house	metal sheeting	Good	Flat	1-25%	17.35	23.55	408.5925
380	house	metal sheeting	Good	Flat	0%	12.71	11.19	142.2249
382	house	metal sheeting	Good	Flat	0%	18.40	13.38	246.192
384	house	metal sheeting	Good	Flat	0%	14.00	13.20	184.8
386	house	metal sheeting	Good	Flat	0%	17.50	12.42	217.35
388	house	metal sheeting	Good	Flat	0%	19.00	18.00	342
389	house	metal sheeting	Good	Flat	0%	9.00	10.00	90
391	house	metal sheeting	Good	Flat	0%	20.50	15.00	307.5
392	transport	metal sheeting	Good	Flat	0%	10.00	15.00	150
394	house	asbestos	Poor	Flat	0%	21.00	11.40	239.4
396	house	metal sheeting	Good	Flat	0%	10.60	14.30	151.58
398	house	asbestos	Poor	Low	0%	21.40	14.00	299.6
400	house	metal sheeting	Good	Medium	0%	18.70	24.00	448.8
402	house	metal sheeting	Good	Flat	0%	20.10	10.00	201
403	house	asbestos	Good	Flat	0%	15.00	11.40	171
405	house	asbestos	Poor	Low	0%	15.00	11.40	171
407	house	metal sheeting	Good	Flat	0%	9.00	16.50	148.5
409	house	metal sheeting	Good	Flat	0%	8.00	10.60	84.8
410	house	metal sheeting	Good	Flat	0%	22.00	11.50	253
411	church	metal sheeting	Good	Flat	0%	31.00	19.00	589
413	house	metal sheeting	Good	Flat	0%	17.80	10.80	192.24
414	house	asbestos	Poor	Low	1-25%	15.90	12.20	193.98
416	house	metal sheeting	Good	Flat	0%	13.00	15.00	195
418	house	metal sheeting	Good	Flat	0%	13.20	16.00	211.2
421	house	asbestos	Poor	Flat	0%	16.10	18.60	299.46
422	house	metal sheeting	Good	Flat	0%	8.40	9.00	75.6
423	business	metal sheeting	Good	Flat	0%	9.10	9.00	81.9
425	house	asbestos	Poor	Flat	0%	14.00	10.20	142.8
426	school	metal sheeting	Good	Flat	0%	32.80	12.10	396.88
428	house	metal sheeting	Good	Flat	0%	18.00	10.00	180
430	house	metal sheeting	Good	Low	0%	17.30	11.30	195.49
432	house	metal sheeting	Good	Flat	0%	3.00	10.00	30
434	house	metal sheeting	Good	Flat	50-75%	10.00	10.00	100
436	house	asbestos	Good	Low	1-25%	14.00	23.00	322
438	house	asbestos	Poor	Flat	1-25%	14.70	9.60	141.12
441	house	metal sheeting	Good	Flat	0%	12.00	7.00	84
442	house	metal sheeting	Good	Flat	0%	12.70	14.90	189.23
444	house	asbestos	Poor	Low	0%	14.50	11.70	169.65
446	house	metal sheeting	Good	Flat	0%	15.20	19.30	293.36
448	house	metal sheeting	Good	Flat	0%	11.70	15.10	176.67
450	house	other	Poor	Low	1-25%	12.20	16.30	198.86
451	house	asbestos	Poor	Low	1-25%	10.00	6.40	64
453	house	metal sheeting	Good	Flat	0%	16.50	12.20	201.3
455	house	metal sheeting	Good	Flat	0%	18.00	9.10	163.8
457	house	metal sheeting	Good	Flat	0%	12.00	9.00	108
458	house	asbestos	Poor	Flat	0%	12.00	15.40	184.8
460	house	asbestos	Poor	Low	0%	16.00	12.00	192
462	house	metal sheeting	Good	Low	0%	16.00	11.00	176
464	house	metal sheeting	Good	Low	0%	12.50	10.00	125
465	house	asbestos	Poor	Low	0%	12.00	8.00	96
467	house	metal sheeting	Good	Low	0%	12.00	7.00	84
469	house	asbestos	Poor	Flat	0%	12.00	8.00	96

471	house	metal sheeting	Good	Low	0%	18.00	16.00	288
473	house	metal sheeting	Fair	Low	0%	15.00	12.00	180
475	house	metal sheeting	Good	Low	0%	20.00	13.00	260
477	house	metal sheeting	Good	Medium	1-25%	17.00	11.00	187
480	house	metal sheeting	Poor	Flat	0%	13.00	7.00	91
481	house	metal sheeting	Good	Low	1-25%	19.00	11.00	209
483	house	metal sheeting	Good	Flat	0%	19.00	11.00	209
485	house	metal sheeting	Good	Low	0%	19.00	9.00	171
501	house	metal sheeting	Fair	Low	1-25%	13.00	15.00	195
503	house	metal sheeting	Poor	Medium	0%	14.00	8.50	119
505	house	metal sheeting	Good	Low	1-25%	18.00	9.00	162
507	house	metal sheeting	Fair	Low	0%	13.00	10.60	137.8
509	house	metal sheeting	Good	Steep	0%	14.00	9.00	126
511	house	metal sheeting	Good	Flat	0%	17.20	11.80	202.96
513	house	metal sheeting	Good	Low	0%	17.00	11.50	195.5
515	house	metal sheeting	Good	Medium	0%	12.60	10.00	126
517	house	metal sheeting	Good	Flat	0%	14.20	15.20	215.84
519	house	metal sheeting	Good	Flat	0%	15.00	10.00	150
523	house	metal sheeting	Good	Flat	0%	14.50	13.20	191.4
525	house	metal sheeting	Good	Flat	0%	17.40	8.50	147.9
527	house	metal sheeting	Good	Low	0%	17.70	10.00	177
529	house	asbestos	Poor	Low	0%	15.40	11.30	174.02
531	house	metal sheeting	Good	Low	0%	17.00	13.00	221
533	house	metal sheeting	Poor	Flat	0%	14.00	8.50	119
535	house	metal sheeting	Good	Low	0%	13.00	8.00	104
537	house	metal sheeting	Good	Low	0%	0.00	18.00	0
539	house	metal sheeting	Poor	Medium	0%	15.00	13.00	195
541	house	metal sheeting	Good	Low	0%	18.00	12.00	216
543	house	metal sheeting	Good	Low	1-25%	10.00	10.00	100
545	house	metal sheeting	Good	Low	0%	20.00	20.00	400
567	house	metal sheeting	Good	Low	0%	10.20	11.00	112.2
569	house	metal sheeting	Good	Flat	0%	14.50	13.20	191.4
571	house	metal sheeting	Good	Flat	0%	17.40	8.50	147.9
577	house	metal sheeting	Good	Low	0%	17.00	13.00	221
579	house	metal sheeting	Poor	Flat	0%	14.00	8.50	119
581	house	metal sheeting	Good	Low	0%	13.00	8.00	104
583	house	metal sheeting	Good	Low	0%	12.00	18.00	216
585	house	metal sheeting	Poor	Medium	0%	15.00	13.00	195
587	house	metal sheeting	Good	Low	0%	18.00	12.00	216
589	house	metal sheeting	Good	Low	1-25%	10.00	10.00	100
591	house	metal sheeting	Good	Low	0%	20.00	20.00	400
593	house	metal sheeting	Good	Flat	0%	19.90	11.30	224.87
595	house	metal sheeting	Good	Flat	1-25%	6.20	16.80	104.16
596	house	asbestos	Poor	Medium	1-25%	17.20	14.70	252.84
598	house	metal sheeting	Poor	Flat	0%	12.50	10.40	130
599	house	metal sheeting	Good	Flat	0%	37.60	15.60	586.56
133	house	metal sheeting	Good	Flat	0%	6.00	5.00	30
149	house	metal sheeting	Good	Flat	0%	13.00	15.00	195
Total roof area						4728.93	3663.19	57800.80

Mean roof length 15.35 metres
Mean roof width 11.89 metres
Mean roof Area 187.67 square metres

TRANSMISSION SYSTEMS

TRANSMISSION SYSTEMS										
Building ID	Guttering	Gutter Material	Gutter Width	Gutter Length	Gutter Conditions	Roof Capture	Down Pipe	Down Pipe Material	Down Pipe Length	Down Pipe Width
1	No	NG	0.00	0.00	NG	0%	No	ND	0.00	0.00
2	No	NG	0.00	0.00	NG	0%	No	ND	0.00	0.00
3	Yes	metal	100.00	28.00	Fair	100%	Yes	Plastic	14.90	100.00
5	Yes	PVC	100.00	36.00	Good	100%	Yes	Plastic	3.40	80.00
7	No	PVC	0.00	0.00	NG	0%	No	ND	0.00	0.00
9	Yes	metal	100.00	27.20	Good	100%	Yes	Plastic	17.80	100.00
11	Yes	metal	200.00	33.30	Good	100%	Yes	Plastic	37.00	80.00
13	No	NG	0.00	0.00	NG	0%	No	ND	0.00	0.00
15	Yes	metal	200.00	37.00	Poor	25%	No	ND	0.00	0.00
17	Yes	metal	200.00	14.40	Good	100%	Yes	Plastic	3.00	100.00
19	Yes	metal	80.00	14.00	Good	50%	Yes	Plastic	5.00	80.00
20	Yes	asbestos	150.00	15.00	Poor	0%	Yes	Plastic	0.00	0.00
21	Yes	metal	100.00	11.60	Good	100%	No	ND	0.00	0.00
22	Yes	metal	100.00	11.50	Good	100%	Yes	Plastic	3.20	100.00
23	Yes	PVC	100.00	32.00	Good	100%	Yes	Plastic	3.00	80.00
24	Yes	asbestos	200.00	20.00	Poor	100%	Yes	Plastic	6.00	80.00
25	Yes	metal	100.00	38.00	Good	100%	Yes	Plastic	18.50	80.00
26	Yes	metal	80.00	38.00	Fair	75%	Yes	Plastic	30.00	80.00
27	No	NG	0.00	0.00	NG	0%	ND	ND	0.00	0.00
28	Yes	metal	100.00	9.70	Fair	100%	Yes	Plastic	11.00	100.00
29	Yes	metal	100.00	30.00	Fair	100%	Yes	Plastic	17.00	80.00
30	Yes	metal	100.00	23.00	Poor	100%	Yes	Plastic	24.00	80.00
32	Yes	metal	100.00	12.70	Poor	100%	Yes	Plastic	6.00	80.00
33	Yes	metal	100.00	14.20	Good	50%	Yes	Plastic	3.40	80.00
35	Yes	metal	150.00	12.20	Good	50%	Yes	Plastic	14.00	80.00
37	Yes	metal	150.00	10.00	Fair	50%	Yes	Plastic	0.00	0.00
38	Yes	asbestos	250.00	9.70	Poor	0%	No	ND	0.00	0.00
39	No	NG	0.00	0.00	NG	0%	Yes	Plastic	0.00	0.00
40	Yes	metal	150.00	32.00	Good	100%	Yes	Plastic	3.00	80.00
43	Yes	metal	150.00	36.60	Good	100%	Yes	Plastic	25.00	80.00
45	Yes	asbestos	80.00	32.00	Good	100%	Yes	Plastic	22.00	80.00
47	No	NG	150.00	25.00	NG	100%	Yes	Plastic	13.00	80.00
49	Yes	metal	100.00	30.30	Good	75%	Yes	Plastic	15.50	80.00
51	Yes	PVC	80.00	28.60	Fair	100%	Yes	Plastic	25.00	80.00
53	Yes	metal	100.00	28.00	Poor	100%	Yes	Plastic	19.00	80.00
55	Yes	asbestos	200.00	16.80	Poor	50%	Yes	Plastic	10.00	80.00
57	Yes	asbestos	200.00	34.40	Fair	100%	Yes	Plastic	32.00	80.00
59	Yes	metal	100.00	22.40	Good	100%	Yes	Plastic	11.00	80.00
61	Yes	metal	100.00	37.00	Good	100%	Yes	Plastic	50.00	250.00
63	Yes	metal	100.00	36.00	Good	100%	Yes	Plastic	50.00	250.00
64	Yes	metal	100.00	28.00	Good	100%	Yes	Plastic	1.00	80.00
66	Yes	metal	100.00	36.00	Poor	100%	Yes	Plastic	16.00	80.00
487	Yes	metal	100.00	0.00	Fair	50%	Yes	Plastic	8.00	80.00
68	Yes	PVC	80.00	14.00	Fair	50%	Yes	Plastic	13.00	80.00
69	Yes	metal	150.00	29.00	Good	100%	Yes	Plastic	23.00	90.00
71	Yes	metal	150.00	15.60	Good	100%	Yes	Plastic	20.00	160.00
73	Yes	metal	100.00	28.00	Good	100%	Yes	Plastic	14.00	80.00
75	Yes	metal	11.00	80.00	Good	75%	Yes	Plastic	3.50	90.00
77	Yes	PVC	75.00	14.30	Fair	50%	Yes	Plastic	14.00	80.00

80	Yes	metal	80.00	20.00	Good	75%	Yes	Plastic	0.00	0.00
81	Yes	PVC	46.00	80.00	Good	50%	Yes	Plastic	3.00	80.00
82	No	NG	56.00	0.00	NG	0%	Yes	Plastic	13.00	90.00
83	Yes	PVC	66.00	0.00	Good	75%	Yes	Plastic	23.00	100.00
84	No	NG	0.00	0.00	NG	0%	Yes	Plastic	0.00	0.00
85	Yes	metal	100.00	42.00	Good	75%	Yes	Plastic	10.00	10.00
86	Yes	metal	110.00	42.00	Good	75%	Yes	Plastic	20.00	20.00
87	No	NG	120.00	0.00	NG	0%	Yes	Plastic	6.00	75.00
88	Yes	metal	130.00	12.00	Good	50%	Yes	Plastic	11.30	80.00
90	Yes	PVC	80.00	11.40	Good	50%	Yes	Plastic	5.00	90.00
92	Yes	metal	90.00	36.40	Good	100%	Yes	Plastic	15.00	100.00
94	Yes	asbestos	100.00	12.00	Poor		Yes	Plastic	18.00	75.00
96	No	NG	110.00	0.00	NG	75%	Yes	Plastic	28.00	85.00
97	No	NG	120.00	0.00	NG	75%	Yes	Plastic	38.00	95.00
99	Yes	asbestos	80.00	12.00	Poor	50%	Yes	Plastic	7.20	200.00
101	Yes	metal	28.00	0.00	Poor		Yes	Plastic	17.20	210.00
103	Yes	metal	80.00	14.40	Fair	50%	Yes	Plastic	9.00	50.00
104	Yes	metal	90.00	15.00	Good	50%	Yes	Plastic	25.00	60.00
107	Yes	PVC	100.00	0.00	Good		Yes	Plastic	35.00	70.00
109	Yes	asbestos	80.00	32.00	Poor	100%	Yes	Plastic	22.00	80.00
111	Yes	metal	100.00	20.00	Fair	100%	Yes	Plastic	30.00	100.00
113	Yes	metal	100.00	38.00	Good	100%	Yes	Plastic	20.00	80.00
115	Yes	PVC	200.00	14.00	Poor	50%	Yes	Plastic	16.00	80.00
117	Yes	metal	100.00	0.00	Good	50%	Yes	Plastic	16.00	100.00
119	Yes	metal	100.00	20.00	Fair	100%	Yes	Plastic	30.00	100.00
121	Yes	metal	100.00	38.00	Good	100%	Yes	Plastic	20.00	80.00
123	Yes	PVC	200.00	14.00	Poor	50%	Yes	Plastic	16.00	80.00
125	Yes	metal	100.00	0.00	Good	50%	Yes	Plastic	16.00	100.00
127	Yes	metal	90.00	30.00	Good	100%	Yes	Plastic	12.00	80.00
129	Yes	PVC	100.00	0.00	Good	25%	Yes	Plastic	22.00	90.00
131	Yes	PVC	110.00	14.00	Poor	100%	Yes	Plastic	7.00	100.00
133	Yes	PVC	80.00	6.00	Fair	75%	Yes	Plastic	4.00	110.00
135	Yes	PVC	90.00	54.00	Good	100%	Yes	Plastic	14.00	120.00
136	Yes	asbestos	100.00	14.50	Good	50%	Yes	Plastic	9.00	130.00
137	Yes	metal	110.00	77.00	Good	100%	Yes	Plastic	14.00	140.00
139	Yes	asbestos	90.00	25.00	Good	75%	Yes	Plastic	10.00	80.00
141	No	NG	100.00	0.00	NG	0%	Yes	Plastic	20.00	90.00
142	No	NG	0.00	0.00	NG	0%	No	Plastic	0.00	0.00
143	Yes	PVC	80.00	19.60	Good	100%	Yes	Plastic	6.50	10.00
145	Yes	PVC	80.00	15.00	Fair	50%	Yes	Plastic	12.00	80.00
147	Yes	PVC	80.00	19.90	Good	75%	Yes	Plastic	22.00	90.00
149	Yes	PVC	90.00	26.00	Good	100%	Yes	Plastic	15.00	100.00
151	Yes	asbestos	100.00	26.00	Poor	75%	Yes	Plastic	7.00	80.00
152	Yes	asbestos	80.00	4.00	Poor	25%	Yes	Plastic	20.00	90.00
154	No	PVC	0.00	0.00	NG	0%	No	Plastic	0.00	0.00
155	Yes	asbestos	200.00	19.00	Poor	50%	Yes	Plastic	4.00	80.00
157	Yes	PVC	100.00	10.00	Good	50%	Yes	Plastic	11.00	80.00
159	Yes	asbestos	200.00	36.00	Poor	100%	Yes	Plastic	24.00	80.00
161	Yes	metal	100.00	34.00	Good	100%	Yes	Plastic	15.00	100.00
163	Yes	metal	100.00	34.00	Good	100%	Yes	Plastic	15.00	80.00
165	Yes	metal	100.00	45.00	Good	100%	Yes	Plastic	18.00	80.00
167	Yes	asbestos	200.00	36.00	Poor	100%	Yes	Plastic	40.00	80.00
169	Yes	metal	200.00	10.00	Good	50%	Yes	Plastic	41.00	100.00
171	Yes	metal	100.00	26.00	Fair	100%	Yes	Plastic	30.00	80.00

173	Yes	metal	100.00	24.00	Poor	0%	No	Plastic	0.00	0.00
175	Yes	metal	80.00	24.00	Fair	0%	No	Plastic	0.00	0.00
181	Yes	metal	100.00	0.00	Good	100%	Yes	Plastic	30.00	100.00
183	Yes	metal	100.00	36.00	Good	100%	Yes	Plastic	13.00	80.00
185	Yes	asbestos	200.00	34.00	Poor	75%	Yes	Plastic	6.00	100.00
187	Yes	metal	210.00	46.00	Poor	75%	Yes	Plastic	45.00	100.00
189	Yes	metal	100.00	26.00	Good	0%	No	Plastic	55.00	110.00
191	Yes	PVC	100.00	0.00	Good	100%	Yes	Plastic	16.00	80.00
193	Yes	asbestos	200.00	29.00	Poor	0%	Yes	Plastic	30.00	80.00
195	Yes	metal	100.00	32.00	Fair	100%	Yes	Plastic	20.00	80.00
197	Yes	metal	100.00	26.00	Fair	100%	Yes	Plastic	24.00	80.00
199	Yes	metal	100.00	4.00	Poor	50%	Yes	Plastic	6.00	100.00
201	Yes	metal	80.00	6.00	Poor	25%	Yes	Metal	5.00	80.00
202	No	NG	90.00	0.00	NG	0%	Yes	Plastic	15.00	90.00
203	Yes	metal	100.00	32.00	Good	100%	Yes	Plastic	13.00	80.00
205	Yes	metal	100.00	38.00	Good	100%	Yes	Plastic	10.00	80.00
208	Yes	PVC	100.00	34.60	Fair	50%	Yes	Plastic	6.00	75.00
210	Yes	PVC	100.00	30.40	Good	100%	Yes	Plastic	7.00	85.00
212	NO	NG	110.00	0.00	NG	0%	ND	Plastic	0.00	0.00
214	Yes	metal	120.00	35.00	Good	100%	Yes	Plastic	6.00	80.00
216	Yes	PVC	100.00	29.40	Poor	100%	Yes	Plastic	20.10	90.00
219	No	NG	0.00	0.00	NG	0%	No	ND	0.00	0.00
220	Yes	asbestos	100.00	12.70	Poor	50%	Yes	Plastic	14.90	80.00
222	Yes	metal	100.00	29.00	Good	100%	Yes	Plastic	6.00	90.00
224	Yes	metal	100.00	40.40	Good	100%	Yes	Plastic	6.00	100.00
226	Yes	other	110.00	53.60	Good	100%	Yes	Plastic	6.00	80.00
228	No	NG	120.00	0.00	NG	0%		Plastic	16.00	90.00
229	Yes	PVC	130.00	20.00	Good	0%	No	Plastic	0.00	0.00
231	Yes	metal	140.00	57.40	Good	100%	Yes	Plastic	20.00	75.00
233	Yes	PVC	150.00	6.00	Good	25%	Yes	Plastic	7.20	85.00
235	No	NG	0.00	0.00	NG	0%	No	Plastic	0.00	0.00
236	Yes	metal	100.00	24.00	Fair	100%	Yes	Plastic	6.00	80.00
243	Yes	PVC	80.00	9.70	Fair	50%	Yes	Plastic	15.00	75.00
245	Yes	PVC	19.20	0.00	Poor	25%	Yes	Plastic	7.00	75.00
247	Yes	PVC	100.00	32.10	Good	50%	Yes	Plastic	35.00	85.00
249	Yes	asbestos	100.00	12.80	Poor	50%	Yes	Plastic	7.00	95.00
251	Yes	PVC	100.00	30.60	Good	100%	Yes	Plastic	9.00	75.00
253	Yes	asbestos	110.00	17.40	Poor	50%	Yes	Plastic	10.00	85.00
255	Yes	metal	120.00	28.40	Poor	50%	Yes	Plastic	6.30	95.00
257	Yes	asbestos	130.00	21.00	Poor	75%	Yes	Plastic	12.00	105.00
259	Yes	asbestos	100.00	34.40	Poor	0%	Yes	Plastic	22.00	80.00
261	Yes	PVC	100.00	24.60	Good	100%	Yes	Plastic	15.60	90.00
263	Yes	metal	110.00	10.00	Good	50%		Plastic	25.60	100.00
264	Yes	PVC	120.00	17.00	Fair	100%	Yes	Plastic	163.00	80.00
266	Yes	PVC	100.00	28.00	Poor	75%	Yes	Plastic	14.00	90.00
268	Yes	asbestos	100.00	7.30	Poor	25%	Yes	Plastic	16.50	100.00
270	Yes	metal	100.00	30.00	Good	50%	Yes	Plastic	7.10	80.00
272	Yes	metal	110.00	29.60	Good	100%	Yes	Plastic	15.00	90.00
274	Yes	metal	100.00	28.80	Good	100%	Yes	Plastic	22.00	100.00
276	Yes	PVC	100.00	39.00	Good	0%	Yes	Plastic	15.00	80.00
277	Yes	metal	110.00	4.00	Good	25%	Yes	Plastic	5.20	90.00
279	No	NG	80.00	32.00	NG	100%	Yes	Plastic	23.60	100.00
281	Yes	metal	90.00	39.00	Good	100%	Yes	Plastic	22.00	110.00
282	Yes	metal	100.00	32.80	Good	100%	Yes	Plastic	16.50	120.00

284	No	NG	110.00	0.00	Good	25%		Plastic	0.00	0.00
285	Yes	metal	100.00	38.00	Good	100%	Yes	Plastic	25.00	757.00
287	No	NG	0.00	0.00	Good	0%		Plastic	0.00	0.00
288	Yes	PVC	80.00	44.00	Good	100%	Yes	Plastic	20.00	80.00
290	Yes	metal	90.00	14.30	Good	50%	Yes	Plastic	3.00	75.00
292	Yes	PVC	100.00	29.40	Good	50%	Yes	Plastic	16.30	85.00
294	Yes	PVC	110.00	9.50	Good	50%		Plastic	3.00	75.00
296	Yes	metal	100.00	24.00	Good	100%	Yes	Plastic	17.00	85.00
298	Yes	asbestos	100.00	33.40	Fair	100%	Yes	Plastic	10.00	95.00
300	No	NG	0.00	0.00	NG	0%	No	Plastic	0.00	0.00
302	Yes	PVC	100.00	10.50	Good	100%	No	Plastic	0.00	0.00
304	Yes	metal	150.00	30.00	Good	50%	Yes	Plastic	5.00	80.00
306	Yes	metal	100.00	0.00	Poor	25%	Yes	Metal	3.00	80.00
308	No	NG	0.00	0.00	Good	0%		Plastic	13.00	90.00
309	Yes	metal	150.00	42.00	Good	100%	Yes	Plastic	85.00	150.00
311	Yes	metal	150.00	28.00	Poor	50%	Yes	Plastic	8.00	80.00
313	Yes	metal	80.00	12.00	NG	100%	Yes	Plastic	5.00	80.00
315	No	NG	0.00	0.00	Poor	0%	No	Other	0.00	0.00
316	Yes	PVC	100.00	10.00	Good	0%	No	Plastic	0.00	0.00
317	Yes	metal	100.00	40.00	Poor	75%	Yes	Plastic	40.00	80.00
319	Yes	metal	80.00	5.00	Good	100%	Yes	Plastic	7.00	80.00
321	No	NG	90.00	0.00	Poor	0%	No	Other	17.00	0.00
322	Yes	asbestos	100.00	30.00	Poor	75%	Yes	Plastic	14.00	80.00
324	Yes	metal	100.00	36.00	Fair	100%	Yes	Plastic	16.00	80.00
326	No	NG	0.00	0.00	NG	0%	No	Plastic	0.00	0.00
328	Yes	PVC	80.00	18.00	Fair	50%	Yes	Plastic	10.00	10.00
330	Yes	PVC	100.00	32.00	Fair	100%	Yes	Plastic	20.00	22.00
332	Yes	metal	100.00	34.00	Good	100%	Yes	Plastic	30.00	32.00
334	Yes	metal	100.00	14.00	Poor	50%	Yes	Plastic	4.00	80.00
336	Yes	metal	150.00	16.00	Good	50%	Yes	Plastic	31.00	100.00
338	Yes	metal	100.00	36.00	Good	100%	Yes	Plastic	15.00	80.00
340	Yes	asbestos	200.00	36.00	Poor	100%	Yes	Plastic	30.00	150.00
342	Yes	metal	100.00	16.00	Fair	25%	Yes	Plastic	30.00	80.00
344	Yes	metal	110.00	38.00	Good	100%	Yes	Plastic	30.00	80.00
346	Yes	metal	100.00	32.00	Poor	100%	Yes	Plastic	20.00	80.00
348	Yes	metal	100.00	40.00	Poor	100%	Yes	Plastic	20.00	100.00
350	Yes	metal	100.00	36.00	Good	100%	Yes	Plastic	16.00	80.00
352	Yes	PVC	110.00	14.00	Fair	50%	Yes	Plastic	6.00	80.00
354	Yes	metal	100.00	21.00	Poor	25%	Yes	Plastic	4.00	80.00
356	Yes	asbestos	200.00	8.00	Poor	50%	Yes	Plastic	5.00	150.00
358	No	NG	210.00	0.00	NG	0%	No	Plastic	0.00	0.00
360	Yes	PVC	100.00	80.00	Good	50%	Yes	Plastic	5.00	80.00
362	Yes	metal	100.00	24.00	Poor	75%	Yes	Plastic	20.00	80.00
364	Yes	metal	100.00	5.45	Fair	25%	Yes	Metal	3.40	100.00
366	Yes	PVC	100.00	28.60	Poor	25%	Yes	Plastic	13.60	80.00
368	Yes	PVC	110.00	12.32	Good	100%	Yes	Plastic	1.50	90.00
370	Yes	PVC	100.00	21.77	Good	25%	Yes	Plastic	16.04	100.00
371	Yes	metal	110.00	31.16	Good	100%	Yes	Plastic	20.21	26.00
373	Yes	asbestos	120.00	30.64	Good	100%	Yes	Plastic	4.20	75.00
375	Yes	PVC	90.00	54.93	Good	100%	Yes	Plastic	16.30	85.00
377	Yes	metal	100.00	26.28	Good	100%	Yes	Plastic	15.00	95.00
379	Yes	PVC	100.00	23.00	Good	50%	Yes	Plastic	7.00	105.00
380	Yes	asbestos	100.00	25.00	Good	50%	Yes	Plastic	18.00	115.00
382	Yes	PVC	0.00	10.00	Good	50%	Yes	Plastic	2.00	75.00

384	Yes	PVC	10.00	7.30	Good	25%	Yes	Plastic	6.30	85.00
386	Yes	asbestos	100.00	35.00	Good	100%	Yes	Plastic	17.42	95.00
388	No	NG	0.00	0.00	NG	0%	Yes	Plastic	8.00	80.00
389	Yes	metal	100.00	9.00	Good	100%	Yes	Plastic	100.00	100.00
391	No	NG	0.00	0.00	NG	50%	No	Plastic	0.00	0.00
392	No	NG	0.00	0.00	NG	50%	Yes	Plastic	10.00	10.00
394	Yes	PVC	100.00	0.00	Good	75%	Yes	Plastic	16.40	80.00
396	Yes	PVC	80.00	10.60	Poor	50%	Yes	Plastic	24.00	90.00
398	Yes	PVC	100.00	52.80	Poor	75%	Yes	Plastic	20.00	80.00
400	Yes	metal	100.00	14.10	Good	50%	Yes	Plastic	6.00	90.00
402	No	NG	0.00	0.00	NG	0%	No	Plastic	0.00	0.00
403	Yes	PVC	100.00	20.00	Poor	75%	Yes	Plastic	7.00	75.00
405	Yes	asbestos	100.00	23.60	Poor	75%	Yes	Plastic	15.00	85.00
407	Yes	metal	110.00	51.00	Good	100%	Yes	Plastic	15.00	90.00
409	No	NG	0.00	0.00	Good	0%	No	Plastic	0.00	0.00
410	Yes	metal	100.00	22.00	Good	50%	Yes	Plastic	10.00	10.00
411	Yes	metal	110.00	62.00	Good	100%	Yes	Plastic	70.00	75.00
413	Yes	PVC	120.00	0.00	Good	0%	No	Plastic	80.00	85.00
414	Yes	asbestos	100.00	31.80	Poor	100%	Yes	Plastic	7.50	95.00
416	Yes	asbestos	100.00	15.00	Poor	50%	Yes	Plastic	17.80	80.00
418	No	NG	100.00	13.20	Good	50%	Yes	Plastic	9.20	90.00
421	Yes	asbestos	100.00	32.00	Poor	100%	Yes	Plastic	3.50	100.00
422	Yes	metal	110.00	0.00	Fair	100%	Yes	Plastic	6.00	110.00
423	Yes	PVC	100.00	8.00	Good	100%	Yes	Plastic	6.00	120.00
425	Yes	PVC	100.00	0.00	Poor	0%	No	Plastic	0.00	0.00
426	Yes	metal	75.00	35.60	Good	100%	Yes	Plastic	8.00	75.00
428	Yes	metal	85.00	32.00	Good	100%	Yes	Plastic	5.00	85.00
430	Yes	PVC	100.00	34.60	Fair	50%	Yes	Plastic	6.00	75.00
432	Yes	PVC	100.00	30.40	Good	100%	Yes	Plastic	7.00	85.00
434	Yes	PVC	110.00	10.00	Good	50%	Yes	Plastic	17.00	95.00
436	Yes	metal	120.00	35.00	Good	100%	Yes	Plastic	6.00	80.00
438	Yes	PVC	100.00	29.40	Poor	100%	Yes	Plastic	20.10	90.00
441	No	NG	0.00	0.00	NG	0%	No	ND	0.00	0.00
442	Yes	asbestos	100.00	12.70	Poor	50%	Yes	Plastic	14.90	80.00
444	Yes	metal	100.00	29.00	Good	100%	Yes	Plastic	6.00	90.00
446	Yes	metal	100.00	40.40	Good	100%	Yes	Plastic	6.00	100.00
448	Yes	other	110.00	53.60	Good	100%	Yes	Plastic	6.00	80.00
450	No	NG	120.00	0.00	NG	0%	Yes	Plastic	16.00	90.00
451	Yes	PVC	130.00	20.00	Good	0%	No	ND	0.00	0.00
453	Yes	metal	140.00	57.40	Good	100%	Yes	Plastic	20.00	75.00
455	Yes	PVC	150.00	6.00	Good	25%	Yes	Plastic	7.20	85.00
457	No	NG	0.00	0.00	NG	0%	No	Plastic	0.00	0.00
458	Yes	metal	100.00	24.00	Fair	100%	Yes	Plastic	6.00	80.00
460	Yes	asbestos	200.00	16.00	Poor	50%	Yes	Plastic	19.00	80.00
462	Yes	metal	100.00	16.00	Good	50%	Yes	Plastic	4.00	100.00
464	No	NG	0.00	0.00	NG	0%	No	ND	0.00	0.00
465	Yes	metal	80.00	24.00	Fair	100%	Yes	Plastic	20.00	80.00
467	Yes	PVC	100.00	24.00	Fair	75%	Yes	Plastic	15.00	80.00
469	Yes	metal	100.00	12.00	Poor	50%	No	Plastic	17.50	100.00
471	Yes	metal	200.00	18.00	Poor	25%	No	Plastic	0.00	0.00
473	Yes	metal	100.00	15.00	Fair	50%	Yes	Plastic	10.00	10.00
475	No	NG	0.00	0.00	NG	25%	No	Plastic	0.00	0.00
477	Yes	metal	100.00	34.00	Poor	75%	Yes	Plastic	16.00	80.00
480	Yes	metal	100.00	7.00	Poor	25%	Yes	Plastic	10.00	80.00

481	Yes	metal	100.00	36.00	Poor	100%	Yes	Plastic	25.00	80.00
483	Yes	metal	100.00	58.00	Good	75%	Yes	Plastic	19.00	100.00
485	Yes	metal	100.00	54.00	Good	100%	Yes	Metal	40.00	100.00
501	Yes	metal	100.00	26.00	Poor	100%	Yes	Plastic	15.00	80.00
503	No	NG	0.00	0.00	NG	0%	No	ND	0.00	0.00
505	Yes	metal	100.00	36.00	Good	50%	Yes	Plastic	9.00	80.00
507	Yes	metal	100.00	13.00	Good	50%	Yes	Plastic	13.00	80.00
509	Yes	metal	100.00	14.00	Fair	50%	Yes	Plastic	14.00	80.00
511	Yes	asbestos	200.00	8.00	Poor	25%	Yes	Plastic	2.00	80.00
513	Yes	metal	200.00	34.00	Poor	100%	Yes	Plastic	17.00	80.00
515	Yes	metal	100.00	25.00	Good	25%	Yes	Metal	6.00	100.00
517	Yes	metal	100.00	14.20	Good	50%	Yes	Plastic	25.00	80.00
519	Yes	metal	100.00	30.00	Good	100%	Yes	Plastic	20.00	80.00
523	Yes	metal	150.00	28.00	Good	50%	Yes	Plastic	17.00	80.00
525	Yes	metal	100.00	17.40	Good	50%	Yes	Plastic	3.00	80.00
527	Yes	PVC	80.00	35.00	Fair	100%	Yes	Plastic	33.00	80.00
529	Yes	asbestos	200.00	30.00	Poor	100%	Yes	Plastic	43.00	90.00
531	Yes	asbestos	200.00	8.50	Poor	25%	Yes	Plastic	7.00	80.00
533	Yes	metal	100.00	14.00	Good	50%	Yes	Plastic	10.00	80.00
535	Yes	metal	100.00	26.00	Good	100%	Yes	Plastic	13.00	80.00
537	Yes	PVC	150.00	0.00	Fair	50%	Yes	Plastic	2.00	100.00
539	Yes	metal	100.00	15.00	Poor	50%	Yes	Plastic	18.00	80.00
541	Yes	asbestos	200.00	18.00	Poor	50%	Yes	Plastic	28.00	90.00
543	Yes	metal	100.00	20.00	Good	50%	Yes	Plastic	3.00	80.00
545	Yes	metal	100.00	60.00	Good	100%	Yes	Plastic	40.00	80.00
567	Yes	metal	100.00	10.20	Good	100%	Yes	Plastic	10.00	80.00
569	Yes	metal	150.00	28.00	Good	50%	Yes	Plastic	17.00	80.00
571	Yes	metal	100.00	17.40	Good	50%	Yes	Plastic	3.00	80.00
577	Yes	asbestos	200.00	8.50	Poor	25%	Yes	Plastic	7.00	80.00
579	Yes	metal	100.00	14.00	Good	50%	Yes	Plastic	10.00	80.00
581	Yes	metal	100.00	26.00	Good	100%	Yes	Plastic	13.00	80.00
583	Yes	PVC	150.00	0.00	Fair	50%	Yes	Plastic	2.00	100.00
585	Yes	metal	100.00	15.00	Poor	50%	Yes	Plastic	18.00	80.00
587	Yes	asbestos	200.00	18.00	Poor	50%	Yes	Plastic	28.00	90.00
589	Yes	metal	100.00	20.00	Good	50%	Yes	Plastic	3.00	80.00
591	Yes	metal	100.00	60.00	Good	100%	Yes	Plastic	40.00	80.00
593	Yes	PVC	80.00	19.90	Good	50%	Yes	Plastic	8.00	75.00
595	No	NG	90.00	0.00	NG	0%	Yes	Plastic	18.00	85.00
596	Yes	metal	100.00	29.40	Good	100%	Yes	Plastic	24.00	95.00
598	No	NG	0.00	0.00	NG	25%	No	ND	34.00	105.00
599	No	NG	10.00	0.00	NG	0%	Yes	Plastic	10.00	115.00
133	Yes	PVC	80.00	6.00	Fair	75%	Yes	Plastic	4.00	110.00
149	Yes	PVC	90.00	26.00	Good	100%	Yes	Plastic	15.00	100.00
Total Guttering System				6515.95			Total Down pipe Length		4485.37	

STORAGE SYSTEMS

STORAGE SYSTEMS																
Tank Shape	Point ID	Tank Material	Tank Length	Tank Width	Tank Height	Tank Volume (m^3)	Tank Condition	Tank Overflow Capture	Tank Gauze	Tank Outlet	Water Use	Alternative	COMMENT	GPS_DATE	GPS_TIME	DATAFILE
circular	4	plastic	0	3	2	14	good	Zero	No	other	All above	Other		15/02/2007	10:22:26am	R021510A.cor
circular	6	metal	0	5	2	39	poor	Zero	No	other	All above	Other		15/02/2007	10:34:21am	R021510A.cor
circular	8	plastic	0	15	12	2121	good	Zero	Yes	tap	Drinking	Other		15/02/2007	10:43:56am	R021510A.cor
circular	10	metal	0	5	2	39	fair	Zero	No	tap	All above	Well		15/02/2007	10:52:51am	R021510A.cor
circular	12	metal	0	5	2	39	good	Zero	Yes	pump	Drinking	Well		15/02/2007	11:15:21am	R021510A.cor
circular	14	plastic	0	5	2	39	good	Zero	Yes	tap	Drinking	Well		15/02/2007	11:32:46am	R021510A.cor
circular	16	plastic	0	1	2	2	good	Zero	Yes	tap	Drinking	Well		15/02/2007	11:48:16am	R021510A.cor
circular	18	plastic	0	2	3	9	good	Zero	Yes	pump	Drinking	Well		15/02/2007	12:00:21pm	R021510A.cor
circular	31	metal	0	5	2	39	good	Zero	Yes	other	Drinking	Other		15/02/2007	12:34:46pm	R021512A.cor
circular	34	plastic	0	3	2	14	good	Zero	Yes	pump	All above	Other		15/02/2007	12:53:01pm	R021512A_A.cor
circular	36	plastic	0	2	2	6	good	Zero	No	pump	All above	Other		15/02/2007	03:35:11pm	R021515A.cor
circular	41	plastic	0	3	3	21	good	Zero	Yes	tap	All above	Other		15/02/2007	04:00:21pm	R021515A.cor
circular	42	plastic	0	1	1	1	fair	Zero	No	tap	All above	Other		15/02/2007	04:02:56pm	R021515A.cor
circular	44	metal	0	5	3	59	fair	Zero	No	pump	All above	Other		15/02/2007	04:17:21pm	R021515A.cor
circular	46	plastic	0	3	3	21	good	Zero	Yes	tap	All above	Other		15/02/2007	04:30:36pm	R021515A.cor
circular	48	plastic	0	5	4	79	good	Zero	Yes	pump	All above	Other		15/02/2007	04:49:51pm	R021515A.cor
circular	50	plastic	0	4	2	25	good	Zero	Yes	bucket	All above	Other		15/02/2007	05:04:16pm	R021515A.cor
circular	52	plastic	0	3	2	14	good	Zero	No	pump	All above	Other		15/02/2007	05:14:36pm	R021515A.cor
circular	54	metal	0	5	2	39	good	Zero	No	pump	All above	Well		15/02/2007	03:33:56pm	R021515A_A.cor
circular	58	metal	0	7	2	77	good	Zero	No	pump	All above	Other		15/02/2007	03:56:21pm	R021515A_A.cor
circular	60	plastic	0	4	2	25	good	Zero	No	pump	All above	Other		15/02/2007	04:04:11pm	R021515A_A.cor
circular	62	plastic	0	2	2	6	good	Zero	No	tap	Drinking	Other		15/02/2007	04:30:31pm	R021515A_A.cor
circular	65	metal	0	5	2	39	good	Zero	Yes	pump	All above	Other		15/02/2007	04:51:51pm	R021515A_A.cor
circular	67	plastic	0	4	2	25	good	Zero	Yes	tap	All above	Well		15/02/2007	05:02:06pm	R021515A_A.cor
circular	488	metal	0	5	2	39	fair	Zero	No	tap	All above	Other		15/02/2007	10:17:16am	77UR021510A.cor
circular	489	metal	0	5	2	39	good	Zero	No	pump	All above	Other		15/02/2007	10:23:16am	77UR021510A.cor
circular	490	metal	0	5	2	39	poor	Zero	No	tap	WCD	Well		15/02/2007	10:33:11am	77UR021510A.cor
circular	491	plastic	0	4	2	25	good	Zero	No	tap	All above	Other		15/02/2007	10:43:11am	77UR021510A.cor
circular	493	plastic	0	3	2	14	good	Zero	Yes	pump	All above	Other		15/02/2007	10:54:31am	77UR021510A.cor

circular	494	plastic	0	2	3	9	good	Zero	No	tap	All above	Other		15/02/2007	11:04:56am	77UR021510A.cor
circular	495	metal	0	5	2	39	good	Zero	No	pump	All above	Other		15/02/2007	11:12:41am	77UR021510A.cor
circular	497	plastic	0	6	2	57	good	Zero	No	pump	All above	Well		15/02/2007	11:43:36am	77UR021510A.cor
circular	498	plastic	0	3	2	14	good	Zero	No	pump	All above	Well		15/02/2007	11:54:11am	77UR021510A.cor
circular	499	metal	0	5	2	39	poor	Zero	Yes	pump	All above	Other		15/02/2007	12:04:41pm	77UR021510A.cor
circular	500	plastic	0	3	3	21	good	Zero	No	tap	All above	Other		15/02/2007	12:14:06pm	77UR021510A.cor
circular	70	plastic	0	5	5	98	poor	Zero	No	tap	WB	From Neighbour		16/02/2007	10:30:41am	R021610A.cor
circular	72	Concrete	9	4	3	38	good	Zero	Yes	tap	All above	NIL		16/02/2007	10:45:11am	R021610A.cor
circular	74	plastic	0	3	3	21	good	Zero	Yes	pump	All above	Well		16/02/2007	10:59:56am	R021610A.cor
circular	76	plastic	0	2	3	9	good	Zero	Yes	pump	WCD	Well		16/02/2007	11:11:51am	R021610A.cor
circular	78	plastic	0	3	3	21	good	Zero	No	tap	WD	Well		16/02/2007	11:18:26am	R021610A.cor
circular	100	plastic	0	3	3	21	good	Zero	Yes	tap	All above	NIL		16/02/2007	03:08:46pm	R021613A.cor
circular	102	plastic	0	4	3	38	good	Zero	Yes	pump	All above	NIL		16/02/2007	03:20:06pm	R021613A.cor
circular	105	plastic	0	3	3	21	fair	Zero	Yes	gravity	All above	NIL		16/02/2007	03:43:21pm	R021613A.cor
circular	106	plastic	0	3	2	14	good	Zero	No	gravity	All above	NIL		16/02/2007	03:44:41pm	R021613A.cor
circular	108	plastic	0	4	2	25	good	Zero	No	tap	All above	NIL		16/02/2007	04:02:06pm	R021613A.cor
circular	112	plastic	0	3	2	14	good	Zero	No	pump	All above	NIL		16/02/2007	04:30:11pm	R021616A2.cor
circular	116	metal	0	4	2	25	poor	Zero	No	pump	Drinking	Disuse		16/02/2007	04:57:21pm	R021616A2.cor
circular	118	Concrete	0	4	2	25	fair	Zero	No	pump	All above	From Neighbour		16/02/2007	05:08:21pm	R021616A2.cor
circular	120	plastic	0	3	2	14	good	Zero	No	pump	All above	NIL		16/02/2007	04:30:11pm	R021616A.cor
circular	124	metal	0	4	2	25	poor	Zero	No	pump	Drinking	Disuse		16/02/2007	04:57:21pm	R021616A.cor
circular	126	Concrete	0	4	2	25	fair	Zero	No	pump	All above	From Neighbour		16/02/2007	05:08:21pm	R021616A.cor
circular	128	plastic	0	3	2	14	good	Zero	Yes	tap	All above	Well		17/02/2007	11:55:01am	R021711A.cor
circular	132	plastic	0	3	3	21	good	Zero	Yes	tap	Bathing	NIL		17/02/2007	12:27:21pm	R021711A.cor
circular	134	plastic	0	2	2	6	good	Zero	No	tap	All above	NIL		17/02/2007	12:33:41pm	R021711A.cor
circular	138	plastic	0	4	3	38	good	Zero	No	tap	All above	NIL		17/02/2007	12:58:31pm	R021711A.cor
circular	144	plastic	0	2	3	9	good	Zero	Yes	tap	All above	NIL		17/02/2007	01:54:26pm	R021711A.cor
circular	146	plastic	0	3	3	21	good	Zero	Yes	tap	All above	NIL		17/02/2007	02:11:01pm	R021711A.cor
circular	148	plastic	0	3	2	14	good	Zero	Yes	gravity	All above	NIL		17/02/2007	02:26:46pm	R021711A.cor
circular	150	plastic	0	2	2	6	good	Zero	Yes	gravity	Drinking	Well		17/02/2007	02:37:21pm	R021711A.cor
circular	153	plastic	0	1	2	2	good	Zero	Yes	tap	Drinking	Well		17/02/2007	02:52:51pm	R021711A.cor
circular	156	plastic	0	5	2	39	poor	Zero	No	bucket	All above	NIL		17/02/2007	12:05:36pm	R021711AA.cor
circular	158	plastic	0	3	2	14	good	Zero	No	pump	All above	NIL		17/02/2007	12:19:16pm	R021711AA.cor
circular	160	metal	0	5	2	39	good	Zero	Yes	gravity	All above	Disuse		17/02/2007	12:42:26pm	R021711AA.cor
circular	162	metal	0	5	3	59	poor	Zero	No	gravity	All above	NIL		17/02/2007	12:58:01pm	R021711AA.cor

circular	164	plastic	0	3	2	14	good	Zero	No	tap	All above	NIL		17/02/2007	01:08:01pm	R021711AA.cor
circular	166	metal	0	5	2	39	good	Zero	No	bucket	All above	NIL		17/02/2007	01:21:41pm	R021711AA.cor
circular	168	metal	0	5	2	39	good	Zero	Yes	gravity	DC	Well		17/02/2007	01:30:41pm	R021711AA.cor
circular	170	plastic	0	5	3	59	good	Zero	No	pump	All above	Disuse		17/02/2007	01:41:01pm	R021711AA.cor
circular	172	metal	0	5	3	59	good	Zero	No	tap	DC	Well		17/02/2007	01:52:26pm	R021711AA.cor
circular	174	plastic	0	1	1	1	good	Zero	Yes	tap	All above	Well	SHARE WATER WIT NEIG 4 D	17/02/2007	02:08:16pm	R021711AA.cor
circular	176	plastic	0	0	0	0	good	Zero	Yes	tap	DC	Well	Household sharing tank wit neighbour	17/02/2007	03:02:56pm	R021714A.cor
circular	182	metal	0	4	2	25	good	Zero	Yes	pump	All above	Well	owner na	19/02/2007	10:38:31am	R021910A.cor
circular	184	plastic	0	3	2	14	good	Zero	No	pump	Drinking	Well		19/02/2007	10:53:21am	R021910A.cor
circular	186	plastic	0	4	3	38	good	Zero	No	pump	All above	Well		19/02/2007	11:11:26am	R021910A.cor
circular	188	metal	0	4	2	25	poor	One	No	bucket	All above	NIL		19/02/2007	11:28:16am	R021910A.cor
circular	190	plastic	0	4	2	25	good	Zero	Yes	tap	All above	From Neighbour		19/02/2007	11:41:11am	R021910A.cor
circular	192	plastic	0	2	2	6	good	Zero	Yes	pump	All above	NIL		19/02/2007	12:21:46pm	R021910A.cor
circular	194	Concrete	0	4	4	50	good	Zero	No	bucket	All above	NIL		19/02/2007	01:59:36pm	R021910A.cor
circular	198	metal	0	4	2	25	poor	Zero	No	gravity	All above	NIL	2 tanks	19/02/2007	02:28:31pm	R021910A.cor
circular	204	metal	0	4	2	25	poor	Zero	No	gravity	All above	NIL		19/02/2007	03:22:26pm	R021910A.cor
circular	206	metal	0	4	2	25	poor	Zero	No	pump	All above	NIL		19/02/2007	03:33:31pm	R021910A.cor
circular	207	plastic	0	3	2	14	good	Zero	No	tap	All above	NIL		19/02/2007	12:45:11pm	R021912A.cor
circular	209	metal	0	6	3	85	poor	Zero	No	tap	WB	From Neighbour		19/02/2007	12:55:01pm	R021912A.cor
circular	211	Concrete	0	3	2	14	good	Zero	Yes	pump	All above	NIL		19/02/2007	01:06:26pm	R021912A.cor
circular	213	plastic	0	3	2	14	good	Zero	Yes	tap	All above	NIL		19/02/2007	02:34:36pm	R021912A.cor
circular	215	metal	0	6	3	85	fair	Zero	Yes	tap	All above	NIL		19/02/2007	02:51:21pm	R021912A.cor
circular	217	plastic	0	3	2	14	good	One	Yes	tap	All above	Other		19/02/2007	03:03:06pm	R021912A.cor
circular	218	metal	0	6	2	57	fair	Zero	No	tap	All above	NIL		19/02/2007	03:04:11pm	R021912A.cor
circular	221	metal	0	6	3	85	good	Zero	Yes	tap	All above	NIL		19/02/2007	03:21:26pm	R021912A.cor
circular	223	metal	0	6	3	85	good	Zero	Yes	tap	All above	NIL		19/02/2007	03:30:26pm	R021912A.cor
circular	225	plastic	0	4	2	25	good	Zero	No	tap	All above	NIL		19/02/2007	03:43:41pm	R021912A.cor
circular	227	plastic	0	4	2	25	good	Zero	Yes	tap	All above	NIL		19/02/2007	03:51:46pm	R021912A.cor
circular	230	metal	0	6	2	57	poor	Zero	No	bucket	All above	NIL		19/02/2007	04:09:11pm	R021912A.cor
circular	232	plastic	0	4	2	25	good	Zero	No	tap	All above	NIL	4	19/02/2007	04:24:31pm	R021912A.cor

circular	234	plastic	0	4	2	25	good	Zero	No	tap	Bathing	NIL		19/02/2007	04:37:06pm	R021912A.cor
circular	237	plastic	0	3	2	14	good	Zero	No	tap	All above	NIL		19/02/2007	04:55:41pm	R021912A.cor
circular	244	metal	0	6	3	85	good	Zero	No	tap	All above	NIL		20/02/2007	10:02:31am	R022009A.cor
circular	246	plastic	0	4	2	25	good	Zero	No	tap	WCD	Well		20/02/2007	10:14:51am	R022009A.cor
circular	248	plastic	0	3	2	14	good	Zero	No	tap	WCD	Well		20/02/2007	10:23:31am	R022009A.cor
circular	250	plastic	0	3	2	14	good	Zero	No	tap	All above	NIL		20/02/2007	10:41:06am	R022009A.cor
circular	252	plastic	0	4	3	38	good	One	Yes	tap	All above	NIL	2-water-tanks	20/02/2007	10:45:06am	R022009A.cor
circular	256	metal	0	4	2	25	good	Zero	Yes	bucket	Drinking	Well		20/02/2007	11:05:21am	R022009A.cor
circular	258	metal	0	4	3	38	poor	Zero	No	bucket	WB	From Neighbour	tank-broken	20/02/2007	11:14:26am	R022009A.cor
circular	260	Concrete	0	4	2	25	good	Zero	Yes	bucket	Drinking	From Neighbour	well-not-in-use	20/02/2007	11:26:56am	R022009A.cor
circular	262	metal	0	6	2	57	good	Zero	No	tap	All above	NIL		20/02/2007	11:38:51am	R022009A.cor
circular	265	plastic	0	3	2	14	good	Zero	Yes	tap	WCD	Well		20/02/2007	11:54:26am	R022009A.cor
circular	267	plastic	0	6	3	85	poor	Zero	Yes	tap	Washing	From Neighbour	tank-is-broken	20/02/2007	12:04:56pm	R022009A.cor
circular	269	metal	0	5	3	59	good	Zero	Yes	tap	Drinking	Well		20/02/2007	12:12:01pm	R022009A.cor
circular	271	plastic	0	3	2	14	good	Zero	Yes	tap	WD	Well		20/02/2007	12:20:06pm	R022009A.cor
circular	273	metal	0	4	2	25	fair	Zero	Yes	tap	WD	Well		20/02/2007	01:47:01pm	R022009A.cor
circular	275	plastic	0	5	2	39	good	Zero	Yes	gravity	All above	NIL		20/02/2007	02:00:46pm	R022009A.cor
circular	278	metal	0	6	2	57	good	Zero	Yes	gravity	WD	Well		20/02/2007	02:26:46pm	R022009A.cor
circular	280	plastic	0	6	3	85	poor	Zero	Yes	tap	Washing	Well	tank-has-holes	20/02/2007	02:35:56pm	R022009A.cor
circular	283	plastic	0	3	2	14	good	Zero	Yes	tap	WD	Well		20/02/2007	02:54:36pm	R022009A.cor
circular	286	plastic	0	6	3	85	fair	Zero	No	gravity	WD	Well		20/02/2007	03:12:56pm	R022009A.cor
circular	289	plastic	0	4	2	25	good	One	Yes	tap	All above	Well		20/02/2007	03:30:26pm	R022009A.cor
circular	291	plastic	0	2	3	9	good	Zero	Yes	pump	All above	NIL		20/02/2007	03:44:26pm	R022009A.cor
circular	293	plastic	0	3	2	14	poor	Zero	No	tap	Washing	Well	tank-not-in-use	20/02/2007	03:54:46pm	R022009A.cor
circular	295	plastic	0	3	2	14	good	Zero	Yes	bucket	All above	Well		20/02/2007	04:01:31pm	R022009A.cor
circular	297	metal	0	3	2	14	good	Zero	Yes	tap	WCD	Well	pump-broken-tank-not-in-use	20/02/2007	04:11:56pm	R022009A.cor
circular	301	plastic	0	0	0	0	good	Zero	Yes	tap	All above	NIL	info not given	20/02/2007	10:36:21am	R022010A.cor
circular	303	plastic	0	4	2	25	poor	Zero	No	tap	All above	From Neighbour	use water from Menang hotel	20/02/2007	10:43:56am	R022010A.cor

circular	305	plastic	0	3	3	21	good	Zero	No	tap	All above	NIL		20/02/2007	11:03:06am	R022010A.cor
circular	307	plastic	0	3	2	14	good	Zero	No	tap	All above	NIL		20/02/2007	11:15:06am	R022010A.cor
circular	314	plastic	0	4	2	25	good	Zero	No	pump	All above	Disuse		20/02/2007	12:08:11pm	R022010A.cor
circular	318	metal	0	5	2	39	fair	Zero	No	pump	All above	Well	4 toilet	20/02/2007	12:27:21pm	R022010A.cor
circular	320	plastic	0	4	3	38	good	Zero	No	bucket	DC	Well		20/02/2007	12:44:01pm	R022012A.cor
circular	323	metal	0	4	2	25	fair	Zero	Yes	pump	All above	Well		20/02/2007	03:30:16pm	R022012A.cor
circular	327	plastic	0	4	2	25	good	Zero	Yes	tap	DC	Well	use drinkin & cookin fron neighbour	20/02/2007	03:52:26pm	R022012A.cor
circular	329	plastic	0	4	3	38	good	Zero	No	tap	CD	Well	sharing tank with neig	20/02/2007	04:05:31pm	R022012A.cor
circular	331	Concrete	0	4	2	25	poor	Zero	No	bucket	DC	Well		20/02/2007	04:15:11pm	R022012A.cor
circular	333	plastic	0	4	2	25	good	Zero	Yes	tap	All above	From Neighbour	brokkenn	20/02/2007	04:25:01pm	R022012A.cor
circular	335	metal	0	4	2	25	fair	Zero	No	gravity	All above	Well	toilet 4 well	21/02/2007	10:48:46am	R0022110A.cor
circular	337	metal	0	4	2	25	poor	Zero	No	bucket	DC	Well		21/02/2007	11:00:16am	R0022110A.cor
circular	341	Concrete	0	4	2	25	fair	Zero	No	gravity	Drinking	Well		21/02/2007	11:32:11am	R0022110A.cor
circular	343	metal	0	4	2	25	poor	Zero	No	bucket	All above	Well	toilet	21/02/2007	11:41:01am	R0022110A.cor
circular	347	plastic	0	4	2	25	good	One	Yes	pump	All above	NIL	own na	21/02/2007	11:58:01am	R0022110A.cor
circular	349	plastic	0	4	2	25	good	Zero	No	pump	Drinking	Well		21/02/2007	12:06:56pm	R0022110A.cor
circular	351	metal	0	5	2	39	poor	Zero	No	pump	All above	NIL		21/02/2007	12:16:41pm	R0022110A.cor
circular	353	plastic	0	4	2	25	good	Zero	No	pump	All above	NIL		21/02/2007	01:26:31pm	R0022110A.cor
circular	355	Concrete	0	4	2	25	poor	Zero	No	bucket	All above	NIL	owner na	21/02/2007	01:35:51pm	R0022110A.cor
circular	357	plastic	0	4	2	25	good	Zero	No	gravity	All above	NIL		21/02/2007	01:47:51pm	R0022110A.cor
circular	359	plastic	0	1	1	1	good	Zero	No	bucket	Drinking	Well	all other uses wit neighbour	21/02/2007	01:57:56pm	R0022110A.cor
circular	361	metal	0	5	2	39	poor	Zero	No	bucket	All above	NIL		21/02/2007	02:09:06pm	R0022110A.cor
circular	363	Concrete	0	2	2	6	good	One	Yes	bucket	Drinking	Other	2nd concretee tank	21/02/2007	02:30:06pm	R0022110A.cor
circular	365	plastic	0	1	2	2	poor	Zero	Yes	tap	Drinking	Well		21/02/2007	10:53:21am	R022110A.cor
circular	367	metal	0	5	2	39	good	Zero	Yes	tap	All above	NIL		21/02/2007	10:58:36am	R022110A.cor
circular	369	plastic	0	4	2	25	good	Zero	Yes	tap	All above	NIL	wellp	21/02/2007	11:08:16am	R022110A.cor
circular	372	plastic	0	5	2	39	good	Zero	Yes	tap	All above	NIL		21/02/2007	11:31:51am	R022110A.cor
circular	374	metal	0	6	2	57	good	Zero	Yes	pump	Washing	From Neighbour		21/02/2007	11:46:46am	R022110A.cor
circular	376	plastic	0	3	2	14	good	Zero	Yes	tap	WD	Well		21/02/2007	12:01:26pm	R022110A.cor
circular	378	metal	0	5	2	39	good	Zero	Yes	tap	All above	NIL		21/02/2007	12:07:06pm	R022110A.cor
circular	381	metal	0	5	2	39	fair	One	No	bucket	WCD	Well		21/02/2007	12:32:46pm	R022110A.cor
circular	383	plastic	0	5	2	39	poor	Zero	No	gravity	WCD	Well		21/02/2007	12:44:11pm	R022110A.cor
circular	385	plastic	0	2	2	6	good	Zero	Yes	tap	All above	Well		21/02/2007	12:51:31pm	R022110A.cor
circular	387	metal	0	5	2	39	good	Zero	Yes	tap	All above	NIL		21/02/2007	01:02:51pm	R022110A.cor
circular	390	plastic	0	3	2	14	good	Zero	Yes	bucket	All above	NIL	owner na	21/02/2007	02:56:41pm	R022114A.cor

circular	395	metal	0	6	2	57	poor	Zero	Yes	tap	Washing	From Neighbour	tank-dysfunctional	22/02/2007	09:58:01am	R022209A.cor
circular	397	plastic	0	3	2	14	good	Zero	Yes	tap	Drinking	Well	5-houses-sharing-the-tank	22/02/2007	10:04:31am	R022209A.cor
circular	399	plastic	0	3	2	14	good	Zero	Yes	pump	Drinking	Well		22/02/2007	10:12:46am	R022209A.cor
circular	401	plastic	0	5	2	39	good	Zero	Yes	tap	Washing	Well	500-litre-tank-used-for-drinking	22/02/2007	10:22:46am	R022209A.cor
circular	404	metal	0	6	2	57	poor	Zero	Yes	tap	Drinking	Well		22/02/2007	10:37:41am	R022209A.cor
circular	406	metal	0	3	2	14	poor	Zero	Yes	tap	WD	Well		22/02/2007	10:48:31am	R022209A.cor
circular	408	plastic	0	4	2	25	good	Zero	Yes	tap	CD	Well		22/02/2007	10:58:01am	R022209A.cor
circular	412	plastic	0	6	2	57	good	Zero	Yes	tap	All above	NIL		22/02/2007	11:24:41am	R022209A.cor
circular	415	plastic	0	6	2	57	good	Zero	Yes	gravity	All above	Well		22/02/2007	11:37:16am	R022209A.cor
circular	417	plastic	0	3	2	14	good	Zero	Yes	tap	All above	NIL		22/02/2007	11:48:26am	R022209A.cor
circular	419	plastic	0	3	2	14	good	Zero	Yes	tap	CD	Well		22/02/2007	11:54:56am	R022209A.cor
circular	420	metal	0	6	2	57	fair	Zero	Yes	tap	WCD	NIL		22/02/2007	11:56:46am	R022209A.cor
circular	424	plastic	0	4	2	25	good	Zero	Yes	tap	All above	NIL		22/02/2007	12:18:16pm	R022209A.cor
circular	427	plastic	0	2	1	3	good	Three	No	other	Drinking	Well		22/02/2007	12:42:21pm	R022209A.cor
circular	429	plastic	0	3	2	14	good	Zero	No	tap	All above	NIL		19/02/2007	12:45:11pm	R0219122A.cor
circular	431	metal	0	6	3	85	poor	Zero	No	tap	WB	From Neighbour		19/02/2007	12:55:01pm	R0219122A.cor
circular	433	Concrete	8	3	2	14	good	Zero	Yes	pump	All above	NIL		19/02/2007	01:06:26pm	R0219122A.cor
circular	435	plastic	0	3	2	14	good	Zero	Yes	tap	All above	NIL		19/02/2007	02:34:36pm	R0219122A.cor
circular	437	metal	0	6	3	85	fair	Zero	Yes	tap	All above	NIL		19/02/2007	02:51:21pm	R0219122A.cor
circular	439	plastic	0	3	2	14	good	One	Yes	tap	All above	Other		19/02/2007	03:03:06pm	R0219122A.cor
circular	476	plastic	0	4	2	25	good	Zero	No	pump	All above	NIL	usig	22/02/2007	12:00:31pm	tR022209A.cor
circular	478	plastic	0	3	2	14	good	Zero	No	pump	All above	NIL		19/02/2007	03:45:06pm	0R021915A.cor
circular	479	plastic	0	5	2	39	poor	Zero	No	other	All above	NIL		19/02/2007	03:49:31pm	0R021915A.cor
circular	482	plastic	0	3	2	14	good	Zero	No	pump	All above	NIL		19/02/2007	04:08:51pm	0R021915A.cor
circular	484	plastic	0	4	2	25	good	One	Yes	pump	All above	NIL		19/02/2007	04:19:36pm	0R021915A.cor
circular	486	plastic	0	2	2	6	good	One	No	pump	All above	NIL		19/02/2007	04:38:31pm	0R021915A.cor
circular	502	plastic	0	4	3	38	good	Zero	No	tap	Drinking	Well	tank disuse	16/02/2007	10:03:16am	GBR021609A2.cor
circular	504	metal	0	5	2	39	poor	Zero	No	tap	All above	Well	tank not in use	16/02/2007	10:11:36am	GBR021609A2.cor
circular	506	metal	0	5	2	39	good	Zero	No	pump	All above	Well	tank not for washing & TOIL	16/02/2007	10:23:36am	GBR021609A2.cor
circular	508	plastic	0	3	2	14	good	Zero	No	pump	DC	Well		16/02/2007	10:34:51am	GBR021609A2.cor
circular	510	metal	0	5	2	39	good	Zero	No	bucket	CD	Well		16/02/2007	10:47:01am	GBR021609A2.cor
circular	512	plastic	0	4	2	25	good	Zero	No	bucket	Drinking	Well		16/02/2007	10:57:41am	GBR021609A2.cor
circular	514	plastic	0	5	2	39	good	Zero	No	pump	All above	Disuse		16/02/2007	11:10:56am	GBR021609A2.cor

circular	516	plastic	0	2	1	3	fair	Zero	No	bucket	All above	Well	owner na	16/02/2007	11:18:06am	GBR021609A2.cor
circular	522	metal	0	5	2	39	good	Zero	Yes	pump	All above	Disuse		16/02/2007	11:56:26am	GBR021609A2.cor
circular	524	plastic	0	2	2	6	good	Zero	No	tap	DC	Well	bathing	16/02/2007	12:12:36pm	GBR021609A2.cor
circular	526	plastic	0	2	2	6	good	One	No	gravity	Drinking	Other	pump is used	16/02/2007	12:25:26pm	GBR021609A2.cor
circular	528	plastic	0	4	2	25	good	Zero	No	pump	Drinking	Well		16/02/2007	12:45:41pm	GBR021609A2.cor
circular	530	plastic	0	4	2	25	good	Zero	Yes	tap	All above	From Water Truck		16/02/2007	12:52:36pm	GBR021609A2.cor
circular	534	plastic	0	2	2	6	good	Three	Yes	bucket	All above	NIL	0	16/02/2007	03:02:56pm	GBR021609A2.cor
circular	536	plastic	0	3	2	14	good	Two	No	pump	DC	Well		16/02/2007	03:16:01pm	GBR021609A2.cor
circular	540	plastic	3	5	0	0	good	Zero	No	tap	Drinking	Well		16/02/2007	03:37:21pm	GBR021609A2.cor
circular	542	plastic	0	5	2	39	good	Zero	Yes	tap	All above	Well		16/02/2007	03:49:16pm	GBR021609A2.cor
circular	544	metal	0	4	2	25	good	Zero	No	pump	All above	NIL		16/02/2007	04:01:46pm	GBR021609A2.cor
circular	546	plastic	0	5	3	59	good	One	No	pump	All above	Well		16/02/2007	04:16:26pm	GBR021609A2.cor
circular	548	plastic	0	4	3	38	good	Zero	No	tap	Drinking	Well	tank disuse	16/02/2007	10:03:16am	GBR021609A.cor
circular	550	metal	0	5	2	39	poor	Zero	No	tap	All above	Well	tank not in use	16/02/2007	10:11:36am	GBR021609A.cor
circular	552	metal	0	5	2	39	good	Zero	No	pump	All above	Well	tank not for washing & TOIL	16/02/2007	10:23:36am	GBR021609A.cor
circular	554	plastic	0	3	2	14	good	Zero	No	pump	DC	Well		16/02/2007	10:34:51am	GBR021609A.cor
circular	556	metal	0	5	2	39	good	Zero	No	bucket	CD	Well		16/02/2007	10:47:01am	GBR021609A.cor
circular	558	plastic	0	4	2	25	good	Zero	No	bucket	Drinking	Well		16/02/2007	10:57:41am	GBR021609A.cor
circular	560	plastic	0	5	2	39	good	Zero	No	pump	All above	Disuse		16/02/2007	11:10:56am	GBR021609A.cor
circular	562	plastic	0	2	1	3	fair	Zero	No	bucket	All above	Well	owner na	16/02/2007	11:18:06am	GBR021609A.cor
circular	568	metal	0	5	2	39	good	Zero	Yes	pump	All above	Disuse		16/02/2007	11:56:26am	GBR021609A.cor
circular	570	plastic	0	2	2	6	good	Zero	No	tap	DC	Well	bathing	16/02/2007	12:12:36pm	GBR021609A.cor
circular	572	plastic	0	2	2	6	good	One	No	gravity	Drinking	Other	pump is used	16/02/2007	12:25:26pm	GBR021609A.cor
circular	574	plastic	0	4	2	25	good	Zero	No	pump	Drinking	Well		16/02/2007	12:45:41pm	GBR021609A.cor
circular	576	plastic	0	4	2	25	good	Zero	Yes	tap	All above	From Water Truck		16/02/2007	12:52:36pm	GBR021609A.cor
circular	580	plastic	0	2	2	6	good	Three	Yes	bucket	All above	NIL	0	16/02/2007	03:02:56pm	GBR021609A.cor
circular	582	plastic	0	3	2	14	good	Two	No	pump	DC	Well		16/02/2007	03:16:01pm	GBR021609A.cor
circular	586	plastic	0	5	0	0	good	Zero	No	tap	Drinking	Well		16/02/2007	03:37:21pm	GBR021609A.cor
circular	588	plastic	0	5	2	39	good	Zero	Yes	tap	All above	Well		16/02/2007	03:49:16pm	GBR021609A.cor
circular	590	metal	0	4	2	25	good	Zero	No	pump	All above	NIL		16/02/2007	04:01:46pm	GBR021609A.cor
circular	592	plastic	0	5	3	59	good	One	No	pump	All above	Well		16/02/2007	04:16:26pm	GBR021609A.cor
circular	594	plastic	0	3	2	14	good	Zero	Yes	tap	All above	Well	well-doesnt-work	21/02/2007	02:34:26pm	GR022113A.cor
rectangular	56	Concrete	8	3	2	48	good	Zero	No	pump	All above	Other		15/02/2007	03:43:16pm	R021515A_A.cor

rectangular	496	Concrete	11	3	2	66	good	Zero	No	bucket	All above	Other		15/02/2007	11:27:36am	77UR021510A.cor
rectangular	110	Concrete	3	3	3	27	poor	Zero		bucket	All above	NIL		16/02/2007	04:13:21pm	R021613A.cor
rectangular	114	Concrete	9	4	2	72	fair	Zero	No	pump	Drinking	Well		16/02/2007	04:43:51pm	R021616A2.cor
rectangular	122	Concrete	9	4	2	72	fair	Zero	No	pump	Drinking	Well		16/02/2007	04:43:51pm	R021616A.cor
rectangular	140	plastic	7	4	4	112	good	Zero	No	tap	All above	NIL		17/02/2007	01:22:56pm	R021711A.cor
rectangular	196	metal	1	1	1	1	poor	Zero	No	bucket	All above	NIL		19/02/2007	02:14:51pm	R021910A.cor
rectangular	200	metal	3	2	2	12	poor	Zero	No	tap	All above	NIL		19/02/2007	02:45:56pm	R021910A.cor
rectangular	254	Concrete	5	3	3	45	good	Zero	Yes	tap	Drinking	Well		20/02/2007	10:57:16am	R022009A.cor
rectangular	299	Concrete	9	4	2	72	good	Zero	Yes	tap	All above	NIL		20/02/2007	04:20:56pm	R022009A.cor
rectangular	310	Concrete	20	19	7	2660	good	Zero	No	pump	All above	NIL		20/02/2007	11:43:41am	R022010A.cor
rectangular	312	Concrete	9	7	2	126	good	Zero	No	pump	All above	NIL	owber na	20/02/2007	12:01:11pm	R022010A.cor
rectangular	325	Concrete	8	4	2	64	poor	Zero	No	bucket	DC	Well		20/02/2007	03:43:11pm	R022012A.cor
rectangular	339	Concrete	8	4	3	96	poor	Zero	No	bucket	DC	Well	all others	21/02/2007	11:16:41am	R0022110A.cor
rectangular	345	Concrete	6	4	12	288	good	Zero	No	pump	All above	Well		21/02/2007	11:47:46am	R0022110A.cor
rectangular	393	plastic	0	0	0	0	good	Zero	Yes	tap	All above	Well		22/02/2007	09:35:31am	R022209A.cor
rectangular	470	Concrete	8	3	2	48	good	Zero	No	bucket	All above	Other	salt water toilet drinkin from drum, tank not fiilling up	22/02/2007	10:45:26am	tR022209A.cor
rectangular	472	Concrete	8	3	2	48	good	Zero	No	pump	CD	Well		22/02/2007	11:31:51am	tR022209A.cor
rectangular	474	Concrete	8	3	2	48	good	Zero	No	pump	All above	NIL		22/02/2007	11:47:26am	tR022209A.cor
rectangular	518	Concrete	4	3	1	12	good	Zero	No	pump	All above	From Water Truck	tanker fill plastic tank	16/02/2007	11:35:21am	GBR021609A2.cor
rectangular	520	Concrete	9	3	2	54	good	Zero	No	pump	DC	Well		16/02/2007	11:44:36am	GBR021609A2.cor
rectangular	532	plastic	3	2	2	12	good	Zero	No	pump	Drinking	Well		16/02/2007	02:46:56pm	GBR021609A2.cor
rectangular	538	Concrete	3	3	2	18	good	Zero	No	gravity	DC	Well		16/02/2007	03:28:01pm	GBR021609A2.cor
rectangular	564	Concrete	4	3	1	12	good	Zero	No	pump	All above	From Water Truck	tanker fill plastic tank	16/02/2007	11:35:21am	GBR021609A.cor
rectangular	566	Concrete	9	3	2	54	good	Zero	No	pump	DC	Well		16/02/2007	11:44:36am	GBR021609A.cor
rectangular	578	plastic	3	2	2	12	good	Zero	No	pump	Drinking	Well		16/02/2007	02:46:56pm	GBR021609A.cor
rectangular	584	Concrete	3	3	2	18	good	Zero	No	gravity	DC	Well		16/02/2007	03:28:01pm	GBR021609A.cor
rectangular	130	Concrete	4	4	3	48	good	Zero	No	tap	WD	Well		17/02/2007	12:17:51pm	R021711A.cor

BUILDING REFERENCE SYSTEMS

BUILDING REFERENCE SYSTEMS									
Building ID	Use	Household number of people	Owner's Name	Sanitation system	Comment	GPS_DATE	GPS_TIME	DATAFILE	Field ID
1	house	0				15/02/2007	09:48:51am	R021509A.cor	
2	house	0				15/02/2007	09:55:41am	R021509B.cor	
3	house	11	S.Olsen	Cesspit		15/02/2007	10:17:31am	R021510A.cor	3B
5	house	1	Medang Baguga	Cesspit		15/02/2007	10:25:46am	R021510A.cor	4B
7	house	0				15/02/2007	10:39:01am	R021510A.cor	5B
9	house	8	Lusiana Tanaing	Cesspit		15/02/2007	10:45:36am	R021510A.cor	6B
11	business	15	Dumas dabwido	Cesspit		15/02/2007	10:56:11am	R021510A.cor	7B
13	house	0				15/02/2007	11:23:26am	R021510A.cor	8b
15	house	13	eidada	Cesspit		15/02/2007	11:37:46am	R021510A.cor	9b
17	business	2	double j resta	Cesspit		15/02/2007	11:51:26am	R021510A.cor	10b
19	house	0		Other		15/02/2007	10:26:36am	R021510B_A.cor	2
20	house	8	Kisin ger dago	Cesspit		15/02/2007	10:30:46am	R021510B_A.cor	77
21	house	5	Tremaine Dick	Cesspit		15/02/2007	10:41:26am	R021510B_A.cor	4
22	house	0	Bingham	Cesspit		15/02/2007	10:51:06am	R021510B_A.cor	5b
23	house	0	Samson	Cesspit		15/02/2007	11:01:01am	R021510B_A.cor	6
24	house	4	Pale Teirreragea	Cesspit		15/02/2007	11:11:41am	R021510B_A.cor	7b
25	house	6	Bruce Fitz	Cesspit		15/02/2007	11:25:11am	R021510B_A.cor	B8
26	house	7	TERANGI ADAM	Cesspit		15/02/2007	11:39:31am	R021510B_A.cor	B10
27	house	0				15/02/2007	11:49:41am	R021510B_A.cor	B9_RE
28	house	5	Manfred Tepoune	Cesspit		15/02/2007	11:52:51am	R021510B_A.cor	B11
29	house	4	Dennis DENITAGE	Cesspit		15/02/2007	12:03:06pm	R021510B_A.cor	B12
30	house	0		Cesspit		15/02/2007	12:11:56pm	R021510B_A.cor	B13
32	house	6	Moki Bernicke	Other		15/02/2007	12:31:41pm	R021512A_A.cor	B14
33	house	5	Janisa Detabene	Cesspit		15/02/2007	12:46:41pm	R021512A_A.cor	B15
35	house	4	Losandy Menke	Cesspit		15/02/2007	03:28:06pm	R021515A.cor	16b
37	house	0				15/02/2007	03:40:11pm	R021515A.cor	17b
38	house	0				15/02/2007	03:46:56pm	R021515A.cor	18b
39	house	0				15/02/2007	03:51:46pm	R021515A.cor	19b
40	Derelict	14	Ami	Cesspit		15/02/2007	03:55:26pm	R021515A.cor	20b

43	house	1	DaWOK BOP	Cesspit		15/02/2007	04:07:31pm	R021515A.cor	21b
45	house	6	ROSWITA TOKOTAKE	Cesspit		15/02/2007	04:21:16pm	R021515A.cor	22B
47	house	2	Danny Dageago	Cesspit		15/02/2007	04:43:41pm	R021515A.cor	23b
49	house	12	Miller Matisiama	Cesspit		15/02/2007	04:56:51pm	R021515A.cor	24b
51	house	9	Roderick Deduna	Cesspit		15/02/2007	05:08:11pm	R021515A.cor	25b
53	house	5	Zilla Demauna	Cesspit		15/02/2007	03:30:26pm	R021515A_A.cor	16A
55	house	12	KeFFFREY FRITZZ	Cesspit		15/02/2007	03:37:46pm	R021515A_A.cor	17A
57	house	8	Gloria Harris	Cesspit		15/02/2007	03:49:36pm	R021515A_A.cor	18A
59	house	5	Klenny harris	Cesspit		15/02/2007	03:59:06pm	R021515A_A.cor	19A
61	church	0	Church	Other		15/02/2007	04:12:41pm	R021515A_A.cor	19b
63	community hall	0	church hall	Other		15/02/2007	04:30:51pm	R021515A_A.cor	21A
64	house	7	JEANICE SEYMOUR	Cesspit		15/02/2007	04:39:06pm	R021515A_A.cor	22a
66	house	5	Lorinda Demauna	Cesspit		15/02/2007	04:54:41pm	R021515A_A.cor	23
487	house	0		Other		15/02/2007	10:09:51am	77UR021510A.cor	1
68	house	7		Cesspit		16/02/2007	10:19:56am	R021610A.cor	25b
69	house	0				16/02/2007	10:21:31am	R021610A.cor	26b
71	house	9	a.olsen	Cesspit		16/02/2007	10:38:21am	R021610A.cor	28b
73	house	9				16/02/2007	10:50:46am	R021610A.cor	29b
75	house	8	julian ben	Cesspit		16/02/2007	11:04:51am	R021610A.cor	30b
77	house	0		Cesspit		16/02/2007	11:14:06am	R021610A.cor	31b
80	house	7	abana jeremaiA	Cesspit	using 32tb	16/02/2007	12:12:06pm	R021612A.cor	34b
81	house	2	jeremaia harod	SoakAway		16/02/2007	12:28:16pm	R021612A.cor	35B
82	house	0				16/02/2007	12:31:36pm	R021612A.cor	36b
83	business	0				16/02/2007	12:33:01pm	R021612A.cor	36b
84	house	0				16/02/2007	01:32:06pm	R021613A.cor	39b0
85	house	0				16/02/2007	01:41:11pm	R021613A.cor	40b
86	house	0			no tank	16/02/2007	01:43:11pm	R021613A.cor	41b
87	house	8		Cesspit		16/02/2007	01:47:56pm	R021613A.cor	42b
88	house	0				16/02/2007	01:57:11pm	R021613A.cor	45b
90	house	7				16/02/2007	02:12:56pm	R021613A.cor	46b
92	house	0				16/02/2007	02:24:06pm	R021613A.cor	47b66
94	house	4	andrew backterfield			16/02/2007	02:32:41pm	R021613A.cor	48b

96	house	0				16/02/2007	02:52:06pm	R021613A.cor	49b
97	house	0				16/02/2007	02:52:41pm	R021613A.cor	50b
99	house	10	gary	Cesspit		16/02/2007	03:02:26pm	R021613A.cor	51b
101	house	0				16/02/2007	03:13:16pm	R021613A.cor	52b
103	house	10	nimarod potalenga	Cesspit		16/02/2007	03:25:36pm	R021613A.cor	53b
104	house	0				16/02/2007	03:39:31pm	R021613A.cor	54b
107	business	0				16/02/2007	03:54:01pm	R021613A.cor	55b
109	house	0				16/02/2007	04:06:36pm	R021613A.cor	56b
111	house	10	Dorina Denatage	Cesspit		16/02/2007	04:22:31pm	R021616A2.cor	47B
113	house	10	Reuben Kun	Cesspit	Guttering-asbestos 1 side-200mm	16/02/2007	04:37:11pm	R021616A2.cor	48B
115	house	8	Inge Dekarube	Cesspit		16/02/2007	04:53:46pm	R021616A2.cor	49B
117	house	5	Kelvin KEPHAS	Cesspit		16/02/2007	05:02:16pm	R021616A2.cor	B
119	house	10	Dorina Denatage	Cesspit		16/02/2007	04:22:31pm	R021616A.cor	47B
121	house	10	Reuben Kun	Cesspit	Guttering-asbestos 1 side-200mm	16/02/2007	04:37:11pm	R021616A.cor	48B
123	house	8	Inge Dekarube	Cesspit		16/02/2007	04:53:46pm	R021616A.cor	49B
125	house	5	Kelvin KEPHAS	Cesspit		16/02/2007	05:02:16pm	R021616A.cor	B
127	house	11		Cesspit		17/02/2007	11:48:06am	R021711A.cor	56b
129	house	0				17/02/2007	11:59:16am	R021711A.cor	6
131	house	0		Cesspit		17/02/2007	12:20:41pm	R021711A.cor	599n
133	house	6		Cesspit		17/02/2007	12:32:06pm	R021711A.cor	60b
135	house	5	dassdd	Cesspit		17/02/2007	12:37:51pm	R021711A.cor	61b
136	house	0		Cesspit		17/02/2007	12:44:06pm	R021711A.cor	62b
137	house	0				17/02/2007	12:53:36pm	R021711A.cor	63b
139	house	8		Cesspit		17/02/2007	01:12:46pm	R021711A.cor	64n
141	house	0				17/02/2007	01:30:51pm	R021711A.cor	65b
142	house	7	franko	N/A		17/02/2007	01:39:36pm	R021711A.cor	66b
143	house	7	rick	Cesspit		17/02/2007	01:48:31pm	R021711A.cor	67b
145	house	0		Cesspit		17/02/2007	02:03:01pm	R021711A.cor	7
147	house	0				17/02/2007	02:21:06pm	R021711A.cor	69b
149	house	0				17/02/2007	02:33:31pm	R021711A.cor	70b
151	house	0				17/02/2007	02:44:31pm	R021711A.cor	71b
152	house	3	mu	Cesspit		17/02/2007	02:51:06pm	R021711A.cor	72b

154	house	0				17/02/2007	11:54:56am	R021711AA.cor	51B
155	house	8	Clifford Simon	Cesspit		17/02/2007	12:00:21pm	R021711AA.cor	52
157	house	3	Jason Agir	Cesspit		17/02/2007	12:14:16pm	R021711AA.cor	53A
159	house	20	Anteres Ephraim	Cesspit		17/02/2007	12:33:36pm	R021711AA.cor	54
161	house	7	Ouwak Dageago	Cesspit	guttering- metal &Pvc	17/02/2007	12:50:06pm	R021711AA.cor	55B
163	house	5	Joselin Dagago	Cesspit		17/02/2007	01:00:46pm	R021711AA.cor	56A
165	house	5	Cordelia Notte	Cesspit	90% capture	17/02/2007	01:12:56pm	R021711AA.cor	57B
167	house	10	Eva Adam	SoakAway		17/02/2007	01:24:01pm	R021711AA.cor	58
169	house	10	Esmeralda Harris	Cesspit	80 from roof & 100 underground	17/02/2007	01:33:06pm	R021711AA.cor	59
171	house	10	Petronella DETAbene	Cesspit		17/02/2007	01:46:21pm	R021711AA.cor	50
173	house	0	Richie HOLSTED	Cesspit		17/02/2007	01:55:56pm	R021711AA.cor	61B
175	house	10	Nelson Tamakin	SoakAway		17/02/2007	02:55:06pm	R021714A.cor	62b
181	house	0		Cesspit	owner not present	19/02/2007	10:31:41am	R021910A.cor	1b
183	house	10	Triphena M	Cesspit		19/02/2007	10:42:11am	R021910A.cor	64B
185	house	0	NA		Owner NA	19/02/2007	11:07:31am	R021910A.cor	65B
187	house	2	willie star	SoakAway		19/02/2007	11:17:26am	R021910A.cor	66a
189	house	13	peter duburiya	SoakAway		19/02/2007	11:33:06am	R021910A.cor	67b
191	house	10	yvette depaune	Cesspit		19/02/2007	12:15:36pm	R021910A.cor	68b
193	house	7	joseph detageouwa	Cesspit		19/02/2007	01:49:36pm	R021910A.cor	69a
195	house	5	grund detabene	SoakAway		19/02/2007	02:04:26pm	R021910A.cor	70a
197	house	0	na			19/02/2007	02:19:36pm	R021910A.cor	71a
199	house	4	benny harris	SoakAway		19/02/2007	02:33:31pm	R021910A.cor	72a
201	house	3	ad0lph capelle	Cesspit		19/02/2007	02:49:26pm	R021910A.cor	73a
202	house	6	coreen adonia	N/A	sanitation unknown	19/02/2007	02:59:31pm	R021910A.cor	74a
203	house	14	Wilhelmina Eobob	Cesspit		19/02/2007	03:12:46pm	R021910A.cor	75a
205	house	10	julian capelle	Cesspit		19/02/2007	03:25:56pm	R021910A.cor	76
208	house	11	susanstar	Cesspit		19/02/2007	12:48:26pm	R021912A.cor	88b
210	house	8	sarah-kepai	Cesspit		19/02/2007	12:58:16pm	R021912A.cor	89b

212	house	0			Owner not available	19/02/2007	02:33:11pm	R021912A.cor	90b
214	house	0				19/02/2007	02:36:36pm	R021912A.cor	91b
216	house	0				19/02/2007	02:58:46pm	R021912A.cor	92b
219	house	0				19/02/2007	03:12:16pm	R021912A.cor	93b
220	house	0				19/02/2007	03:13:11pm	R021912A.cor	96b
222	house	0				19/02/2007	03:27:16pm	R021912A.cor	97bb
224	house	8				19/02/2007	03:33:06pm	R021912A.cor	98b
226	house	0				19/02/2007	03:48:51pm	R021912A.cor	99b
228	house	0				19/02/2007	03:59:51pm	R021912A.cor	100b
229	house	5	fredrick-canon			19/02/2007	04:06:06pm	R021912A.cor	101b
231	house	0				19/02/2007	04:18:46pm	R021912A.cor	0
233	house	0				19/02/2007	04:33:31pm	R021912A.cor	103b
235	house	0				19/02/2007	04:39:31pm	R021912A.cor	104b
236	house	7	helen-D	Cesspit		19/02/2007	04:43:11pm	R021912A.cor	104b
243	house	7	rek-csacow	Cesspit		20/02/2007	10:01:26am	R022009A.cor	106b
245	house	7				20/02/2007	10:04:51am	R022009A.cor	107b
247	house	0				20/02/2007	10:19:11am	R022009A.cor	108b
249	house	6	olssen	Cesspit	u	20/02/2007	10:31:56am	R022009A.cor	109b
251	house	0				20/02/2007	10:42:16am	R022009A.cor	110b
253	house	4	christie-educlan	Cesspit		20/02/2007	10:52:01am	R022009A.cor	111b
255	house	10	rosilda-dediya	Cesspit		20/02/2007	11:02:26am	R022009A.cor	112b
257	house	9	nicky-biang	Cesspit		20/02/2007	11:09:31am	R022009A.cor	113b
259	house	6	tomenang-taumea	Cesspit		20/02/2007	11:20:06am	R022009A.cor	114b
261	house	5	h			20/02/2007	11:34:11am	R022009A.cor	115b
263	house	0				20/02/2007	11:41:21am	R022009A.cor	116b
264	house	6				20/02/2007	11:49:06am	R022009A.cor	117b
266	house	8	moses-			20/02/2007	11:59:26am	R022009A.cor	118
268	house	0				20/02/2007	12:08:16pm	R022009A.cor	119b
270	house	0				20/02/2007	12:16:06pm	R022009A.cor	120b
272	house	4	jaques-duriendl	Cesspit		20/02/2007	01:43:06pm	R022009A.cor	121v
274	house	10	robert-kaierua	Cesspit		20/02/2007	01:55:46pm	R022009A.cor	122b
276	house	5	manfred	Cesspit		20/02/2007	02:08:51pm	R022009A.cor	123b
277	house	3	sydagoigo	Cesspit		20/02/2007	02:24:16pm	R022009A.cor	124b
279	house	8	clam-iewugin	Cesspit		20/02/2007	02:31:21pm	R022009A.cor	125b

281	house	0				20/02/2007	02:41:16pm	R022009A.cor	126b
282	house	7	eric-amano	Cesspit		20/02/2007	02:48:06pm	R022009A.cor	127b
284	house	4	baren-agigo	Cesspit	water-and-toilet-from-neighbour	20/02/2007	02:58:16pm	R022009A.cor	127b
285	house	0	frances-garabwan	Cesspit		20/02/2007	03:05:26pm	R022009A.cor	129b
287	business	0	lee			20/02/2007	03:16:16pm	R022009A.cor	130b
288	house	17	fanny-tom	Cesspit		20/02/2007	03:25:56pm	R022009A.cor	131b
290	house	0				20/02/2007	03:39:46pm	R022009A.cor	132b
292	house	20	eibonago			20/02/2007	03:49:01pm	R022009A.cor	133b
294	house	8	anthony-hyram	Cesspit		20/02/2007	03:57:26pm	R022009A.cor	135b
296	house	15	roksana=bill	Cesspit		20/02/2007	04:06:46pm	R022009A.cor	134b
298	house	8	frauline-agigo	Cesspit		20/02/2007	04:15:36pm	R022009A.cor	136b
300	house	8	Deral		Hesitant 2 give info	20/02/2007	10:31:11am	R022010A.cor	82
302	house	7	Calistus Diringa	Cesspit		20/02/2007	10:40:46am	R022010A.cor	83
304	house	3	Maein Deiragea	Cesspit		20/02/2007	10:55:31am	R022010A.cor	84
306	house	0	Na	N/A	no one living	20/02/2007	11:12:11am	R022010A.cor	85
308	house	0			no	20/02/2007	11:19:56am	R022010A.cor	86
309	government	20	government	Other	sanitation na	20/02/2007	11:30:31am	R022010A.cor	87
311	church	0	na	Cesspit	owner overseas	20/02/2007	11:46:31am	R022010A.cor	88
313	business	9	Asa DEIRERAGEA	Cesspit	2 TOILET	20/02/2007	12:02:41pm	R022010A.cor	89
315	house	0	sas 89	Cesspit	use tank 89	20/02/2007	12:10:41pm	R022010A.cor	90
316	house	0	na	N/A	owner na	20/02/2007	12:15:26pm	R022010A.cor	91
317	house	10	Jonathan Joram	Cesspit		20/02/2007	12:21:21pm	R022010A.cor	92
319	house	8	bettina Deireragea	Cesspit		20/02/2007	12:37:31pm	R022012A.cor	93
321	house	4	na	Cesspit		20/02/2007	12:47:16pm	R022012A.cor	94
322	house	3	Ridell Akua	Cesspit		20/02/2007	03:25:11pm	R022012A.cor	95
324	house	10	Pansy star	Cesspit		20/02/2007	03:38:26pm	R022012A.cor	96
326	house	9	Rickson Demaunga	SoakAway		20/02/2007	03:47:21pm	R022012A.cor	97
328	house	4	Roland Ange	VIP		20/02/2007	03:58:06pm	R022012A.cor	98
330	house	10	Alfred Tsiode	Cesspit		20/02/2007	04:09:06pm	R022012A.cor	99
332	house	13	Teber Tom	Cesspit		20/02/2007	04:19:46pm	R022012A.cor	100
334	house	10	Gadar Aoa	Cesspit		21/02/2007	10:43:01am	R0022110A.cor	101
336	house	8	Yoyo Jonathan	Cesspit		21/02/2007	10:53:56am	R0022110A.cor	102

338	house	13	Magerrie Agege	Cesspit		21/02/2007	11:09:21am	R0022110A.cor	103
340	house	8	Dowonto Tabuna	Cesspit		21/02/2007	11:23:41am	R0022110A.cor	104
342	house	7	Ryna Roland	Cesspit		21/02/2007	11:35:21am	R0022110A.cor	105
344	house	2	na	Cesspit		21/02/2007	11:46:01am	R0022110A.cor	106
346	house	0		Cesspit	owner na	21/02/2007	11:53:06am	R0022110A.cor	107
348	house	8	Victoria Garoa	Cesspit		21/02/2007	12:01:46pm	R0022110A.cor	108
350	house	16	Aisa Enger	Cesspit		21/02/2007	12:10:36pm	R0022110A.cor	109
352	house	6	Shirlene Tokabore	Cesspit		21/02/2007	01:20:31pm	R0022110A.cor	110
354	house	0	nna	Cesspit	owner na	21/02/2007	01:31:56pm	R0022110A.cor	111
356	house	4	Neil Tagam0un	Cesspit		21/02/2007	01:40:46pm	R0022110A.cor	112
358	house	0		Cesspit	using tank with neighbour	21/02/2007	01:49:51pm	R0022110A.cor	113
360	house	5	John T	Cesspit		21/02/2007	02:01:36pm	R0022110A.cor	114
362	house	10	Ddonaldd Apetanuui	Cesspit		21/02/2007	02:18:56pm	R0022110A.cor	115
364	house	12	juvita-aiyunge	Cesspit	i	21/02/2007	10:52:16am	R022110A.cor	137b
366	house	6	lucia-dabwadaw	Cesspit		21/02/2007	10:54:21am	R022110A.cor	38b5g
368	house	5	clifford-eoe	Cesspit		21/02/2007	11:01:31am	R022110A.cor	39b
370	house	17	demauw-bill	Cesspit	using-tank-139bt	21/02/2007	11:10:56am	R022110A.cor	140b
371	house	11	bobby-eoe	Cesspit		21/02/2007	11:22:31am	R022110A.cor	141b
373	house	7	ruby-willis	Cesspit		21/02/2007	11:36:41am	R022110A.cor	142b
375	house	22	telano-samson	Cesspit		21/02/2007	11:52:16am	R022110A.cor	143b
377	house	0				21/02/2007	12:02:56pm	R022110A.cor	144b
379	house	1	sh3	Cesspit		21/02/2007	12:11:01pm	R022110A.cor	145b
380	house	9	amos-cook	Cesspit		21/02/2007	12:24:46pm	R022110A.cor	146b
382	house	0				21/02/2007	12:39:31pm	R022110A.cor	147b
384	house	7				21/02/2007	12:47:56pm	R022110A.cor	148b
386	house	14	terry-tatum	Cesspit		21/02/2007	12:57:11pm	R022110A.cor	149b
388	house	7	Robert Obeta	Cesspit	No tank, water from neighbour	21/02/2007	02:34:01pm	R022114A.cor	116
389	house	0	sleeping			21/02/2007	02:51:36pm	R022114A.cor	117
391	house	0				22/02/2007	09:22:31am	R022209A.cor	274
392	transport	0	govt-of-nauru		to-be-measured-in-imagery	22/02/2007	09:26:11am	R022209A.cor	275
394	house	10	mimopo-thoma	Cesspit		22/02/2007	09:49:26am	R022209A.cor	276
396	house	9	terencep-tebao	Cesspit		22/02/2007	10:01:11am	R022209A.cor	477

398	house	15	eniga-debao	Cesspit		22/02/2007	10:06:51am	R022209A.cor	278
400	house	10	ali-amwano	Cesspit		22/02/2007	10:17:41am	R022209A.cor	279
402	house	0	kogos			22/02/2007	10:26:36am	R022209A.cor	280
403	house	9	amoth-edward	Cesspit		22/02/2007	10:31:06am	R022209A.cor	281
405	house	0				22/02/2007	10:43:06am	R022209A.cor	282
407	house	9	bernard-akubar	Cesspit		22/02/2007	10:52:06am	R022209A.cor	283
409	house	3	marita-ika	Cesspit	no-tank-water-from-neighbour	22/02/2007	11:03:16am	R022209A.cor	284
410	house	0		Cesspit		22/02/2007	11:11:16am	R022209A.cor	285
411	church	0	catholic-church	Cesspit		22/02/2007	11:19:11am	R022209A.cor	286
413	house	5	lily-amwano	Cesspit		22/02/2007	11:25:46am	R022209A.cor	287
414	house	14	tagabout-adam	Cesspit		22/02/2007	11:32:21am	R022209A.cor	288
416	house	11	dell-seciyl	Cesspit		22/02/2007	11:42:06am	R022209A.cor	289
418	house	7	peter-kepai	Cesspit		22/02/2007	11:49:56am	R022209A.cor	290
421	house	7	jack-kepai	Cesspit		22/02/2007	11:58:06am	R022209A.cor	291
422	house	4	osana-jeremaih	Cesspit		22/02/2007	12:05:21pm	R022209A.cor	304
423	business	3	amino-jeremaih	Cesspit		22/02/2007	12:13:46pm	R022209A.cor	305
425	house	10	exoda-harris	Cesspit	no-tank-just-a-well	22/02/2007	12:19:56pm	R022209A.cor	306
426	school	320	yaren-pri-school	Cesspit	it-has-4-5litres-tank	22/02/2007	12:36:11pm	R022209A.cor	307
428	house	7	bop-agigo	Cesspit	tank-is-broken-well-not-in-use	22/02/2007	12:49:56pm	R022209A.cor	308
430	house	11	susanstar	Cesspit		19/02/2007	12:48:26pm	R0219122A.cor	88b
432	house	8	sarah-kepai	Cesspit		19/02/2007	12:58:16pm	R0219122A.cor	89b
434	house	0				19/02/2007	02:33:11pm	R0219122A.cor	90b
436	house	0				19/02/2007	02:36:36pm	R0219122A.cor	91b
438	house	0				19/02/2007	02:58:46pm	R0219122A.cor	92b
441	house	0				19/02/2007	03:12:16pm	R0219122A.cor	93b
442	house	0				19/02/2007	03:13:11pm	R0219122A.cor	96b
444	house	0				19/02/2007	03:27:16pm	R0219122A.cor	97bb
446	house	8				19/02/2007	03:33:06pm	R0219122A.cor	98b
448	house	0				19/02/2007	03:48:51pm	R0219122A.cor	99b
450	house	0				19/02/2007	03:59:51pm	R0219122A.cor	100b
451	house	5	fredrick-canon			19/02/2007	04:06:06pm	R0219122A.cor	101b
453	house	0				19/02/2007	04:18:46pm	R0219122A.cor	0

455	house	0				19/02/2007	04:33:31pm	R0219122A.cor	103b
457	house	0				19/02/2007	04:39:31pm	R0219122A.cor	104b
458	house	7	helen-D	Cesspit		19/02/2007	04:43:11pm	R0219122A.cor	104b
460	house	0	naa	N/A	owner na	22/02/2007	09:24:31am	tR022209A.cor	292
462	house	9	Sarah Komatsu	Cesspit		22/02/2007	09:33:26am	tR022209A.cor	293
464	house	5	Sharon Komatsu	Cesspit	use water and toilet with 293	22/02/2007	09:49:16am	tR022209A.cor	294
465	house	10	Edward Dilon	Cesspit	3 shacks sharing neighbours tank	22/02/2007	10:07:06am	tR022209A.cor	255
467	house	11	Raniben Adar	Cesspit		22/02/2007	10:19:46am	tR022209A.cor	296
469	house	10	Susan	Cesspit	not using tank	22/02/2007	10:38:51am	tR022209A.cor	297
471	house	10	Tyrone Deiye	Cesspit	Guttering leaking	22/02/2007	11:28:11am	tR022209A.cor	298
473	house	12	Lukinro Kam	Cesspit		22/02/2007	11:37:06am	tR022209A.cor	299
475	house	10	Bibi Angabate	SoakAway		22/02/2007	11:57:21am	tR022209A.cor	300
477	house	6	Seni Olsson	Cesspit		19/02/2007	03:35:21pm	0R021915A.cor	77
480	house	6	Alec Stephen	SoakAway		19/02/2007	03:56:01pm	0R021915A.cor	77
481	house	10	Darcy Phillip	Cesspit		19/02/2007	04:01:01pm	0R021915A.cor	78
483	house	2	George Edwards	Cesspit		19/02/2007	04:14:46pm	0R021915A.cor	78
485	house	5	Sprent Dabwido	Cesspit		19/02/2007	04:31:16pm	0R021915A.cor	81
501	house	8	Lois Spanner1	Cesspit	1 gutter poor,1gutter fair	16/02/2007	10:00:06am	GBR021609A2.cor	24B
503	house	0	na	Cesspit	guttering broken, HO NA	16/02/2007	10:07:21am	GBR021609A2.cor	25A
505	house	7	RAVINER AGIR	Cesspit	excellent guttering sys but 50% cap	16/02/2007	10:16:01am	GBR021609A2.cor	26B
507	house	5	lolita peter	Cesspit	g on 2 sides but 1 not in use	16/02/2007	10:26:41am	GBR021609A2.cor	27B
509	house	10	Daniel Aeomage	Cesspit		16/02/2007	10:39:11am	GBR021609A2.cor	29B
511	house	10	Henry Itaia	Cesspit		16/02/2007	10:51:01am	GBR021609A2.cor	29B
513	house	9	Michal Depaune	Cesspit		16/02/2007	11:02:01am	GBR021609A2.cor	30B
515	house	0	NA	N/A	owner not available	16/02/2007	11:14:26am	GBR021609A2.cor	31B
517	house	5	ROWAN DETENAMO	Cesspit		16/02/2007	11:21:06am	GBR021609A2.cor	32B

519	house	10	MIRIAN DETENAMO	Cesspit		16/02/2007	11:38:26am	GBR021609A2.cor	33B
523	house	7	Aramit DEDUNA	Cesspit		16/02/2007	12:04:26pm	GBR021609A2.cor	35B
525	house	4	Raelyn Joramm	Cesspit		16/02/2007	12:16:31pm	GBR021609A2.cor	36B
527	house	0	Raelyn Joram	Cesspit		16/02/2007	12:34:11pm	GBR021609A2.cor	37B
529	house	0	Tevaki	Cesspit	DISUSE	16/02/2007	12:47:41pm	GBR021609A2.cor	38B
531	house	10	Parlik Agir	Cesspit		16/02/2007	02:35:11pm	GBR021609A2.cor	39
533	house	4	Shawn Holstad	Cesspit		16/02/2007	02:52:26pm	GBR021609A2.cor	40
535	house	0	na	Cesspit		16/02/2007	03:09:41pm	GBR021609A2.cor	41B
537	house	3	marie renzo	Cesspit		16/02/2007	03:20:01pm	GBR021609A2.cor	42B
539	house	5	Lovena Botelanga	Cesspit		16/02/2007	03:31:21pm	GBR021609A2.cor	43B
541	house	10	Eidengab Adam	Cesspit		16/02/2007	03:43:36pm	GBR021609A2.cor	44B
543	house	3	Angam Depaune	Cesspit		16/02/2007	03:56:11pm	GBR021609A2.cor	45B
545	house	10	FLorence	Cesspit		16/02/2007	04:07:11pm	GBR021609A2.cor	46B
567	house	7	Bern Douwouw	Cesspit		16/02/2007	11:50:16am	GBR021609A.cor	34B
569	house	7	Aramit DEDUNA	Cesspit		16/02/2007	12:04:26pm	GBR021609A.cor	35B
571	house	4	Raelyn Joramm	Cesspit		16/02/2007	12:16:31pm	GBR021609A.cor	36B
577	house	10	Parlik Agir	Cesspit		16/02/2007	02:35:11pm	GBR021609A.cor	39
579	house	4	Shawn Holstad	Cesspit		16/02/2007	02:52:26pm	GBR021609A.cor	40
581	house	0	na	Cesspit		16/02/2007	03:09:41pm	GBR021609A.cor	41B
583	house	3	marie renzo	Cesspit		16/02/2007	03:20:01pm	GBR021609A.cor	42B
585	house	5	Lovena Botelanga	Cesspit		16/02/2007	03:31:21pm	GBR021609A.cor	43B
587	house	10	Eidengab Adam	Cesspit		16/02/2007	03:43:36pm	GBR021609A.cor	44B
589	house	3	Angam Depaune	Cesspit		16/02/2007	03:56:11pm	GBR021609A.cor	45B
591	house	10	FLorence	Cesspit		16/02/2007	04:07:11pm	GBR021609A.cor	46B
593	house	18	veronica-degia			21/02/2007	02:26:51pm	GR022113A.cor	150b
595	house	15	clive0-degia	Cesspit		21/02/2007	02:37:16pm	GR022113A.cor	151b
596	house	0		Cesspit		21/02/2007	02:42:16pm	GR022113A.cor	153b
598	house	5	kendrick-degia	Cesspit		21/02/2007	02:48:01pm	GR022113A.cor	152b
599	house	0				21/02/2007	03:06:21pm	GR022113A.cor	154b
133	house	6		Cesspit		17/02/2007	12:32:06pm	R021711A.cor	60b
149	house	0				17/02/2007	02:33:31pm	R021711A.cor	70b
	TOTAL	1930							
	MEAN	6.3							