

**TE HIHIRI O TE RA:
SUSTAINABLE ENERGY OPTIONS
2010**



TE HIHIRI O TE RA

To capture the dynamic energy of the Sun

Mihimihi

Te pu, te more, te weu, te aka, te rea, te wao nui, te kune, te whea.

He honore, he kororia ki nga Atua, he maungarongo ki te whenua, he whakaaro pai ki nga tangata katoa.

Mauriora !

Kei te mihi ki a Papa Darcy, tetahi morehu o te C Company, Maori Battalion, ara, te kakano o tenei kaupapa.

Me te mihi ki a koe Hirini, me ou whakaaro rangatira. Kua whakatakato te whakapapa o nga Atua, a kua rarangihia te wairua o tumatauenga me te Maori Battalion i roto o tenei kaupapa. Ko te tumanako, kia whakapiripiri, whakapakari hoki nga whanau katoa.

He mihi hoki ki a Mere raua ko Marsha, nga kai tautoko, kua tautokohia i tenei kaupapa, mai i te hui tuatahi.

Ki nga tungange a Ron raua ko Reweti, kei te kaha korua ki te hapai i te mana o te C Company, tae noa atu ki te Manutuke Marae o Maori Battalion huri noa ki nga Manutuke Marae me nga Whanau o te Tairawhiti.

Na reira he mihi aroha mo nga awhina ki a maua ko Colin.

Jody Toroa

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EXECUTIVE SUMMARY

Report Introduction

This report provides an energy management and saving survey of a Marae and associated facilities located in Manutuke, Gisborne. They include Manutuke Marae, which includes 2 Wharenui and a Dining Room; the adjoining Manutuke Kohanga Reo, Manawaru Kaumatua Flats, Toko Toru Tapu Church and the home of Returned 28 Maori Battalion Veteran and Manutuke Marae kaumatua, Rapiata Ria. This project was named Te Hihiri o Te Ra (To capture the energy of the Sun) by Rapiata Ria and fellow Rongowhakaata kaumatua.

The report provides an assessment of technical product specifications, which was undertaken by Colin Murphy of The Core STI Ltd. Colin provides an analysis of products and infrastructural issues that can be addressed to improve energy savings and management for the Manutuke sites. The report also provides an account of the engagement with the Manutuke community, which was undertaken by Jody Toroa of Manutuke Marae. Jody provides an account of the engagement with the community and level of participation and buy in to this project. The findings from both Colin and Jody's work has been merged to provide key findings and recommendation for this project going forward into the next phase.

Key Findings

This project was initiated by agencies Te Puni Kokiri and the Energy Efficiency and Conservation Authority alongside Iwi providers Te Runanga o Turanganui a Kiwa and Turanga Health.

Before the introduction of alternative energy and energy efficient installations can be implemented, there is a need for remedial and preparation work first. This will reduce the overall energy loading and address the technical and safety issues that have been identified during this scoping exercise (See Appendix 4: Breakdown of Initial Remedial Work by Site)

The application of alternative energy based on Photovoltaic (Solar) generation, is the preference for this site based on data from NIWA that shows that this region has one of the highest levels of sunshine hours for the country. For this same reason, the same principal of Photovoltaic (Solar) generation Hot Water Systems can be introduced across the sites.

The generation and supply of energy back through the metering system / energy grid is the most practical option but it requires further analysis and comparison to investment in energy capacity storage on site.

Supply lines should be replaced by an underground ring system across all the installations. The Manawaru Kaumatua Flats, Toko Toru Tapu Church, Manutuke Marae and Kohanga are all supplied and metered separately, which means each of the installations are paying a line and meter charge, in addition to the electricity unit charge. If these were to be supplied and metered from a single point the benefits would include higher levels of energy efficiency and a greater ability to source energy through provision to the national grid.

Installation works must meet the Legislative and Standards required, be low maintenance and long lasting to ensure a viable solution is provided. Contractors of Installation works will need to have a commitment to provide for an onsite training component, so that whanau are able to gain transferable skills and experience in the energy efficiency sector.

In order to ensure a sequential strategic agenda of Energy Efficiency kaupapa delivery within Turanganui a Kiwa and even Te Tairāwhiti, Turanganui Iwi providers should advocate, engage and promote a collaborative relationship with, and eventually become the local based accredited provider of EECA initiatives, to design and deliver a regional programme.

Iwi in collaboration with EECA and private sector interests, have an opportunity to develop a tailored package which will have the potential to address improved 'Whanau Wellbeing', through higher standards of living, employment creation, education modelling and economic leverage with power supply. A regional programme has greater intervention and a higher level of efficiency potential, to meet the required needs of whanau from Kainga to Manutuke Marae within Turanganui a Kiwa and indeed Te Tairāwhiti.

Manutuke Marae should be the portal for Te Hihiri o te Ra becoming an educative and practicable energy efficiency model and energy efficiency advocate for all, particularly Manutuke Marae, Whanau and Communities of Turanganui a Kiwa and Te Tairāwhiti.

BACKGROUND

Project Inception

An Informal Heads of Agreement was born from a meeting of 20 May 2009 between the CEO of Te Puni Kokiri (TPK) and CEO of Energy Efficiency and Conservation Authority (EECA), to further common interests.

As a result, TPK and EECA have agreed in principle to develop a joint work programme to leverage greater gains for Maori outcomes in skill development and training; employment; cultural infrastructure; housing; and papakainga.

TPK Tairāwhiti and the Manager of Maori Energy Sector, EECA have initiated dialogue around test piloting a project in Manutuke, with the aim of ensuring project success indicators are trialled, captured and then utilised for transfer to other Maori communities.

TPK Tairāwhiti, Te Runanga o Turanganui a Kiwa (TROTAK) CEO; Turanga Health CEO; and Manutuke Manutuke Marae have met to outline key project parameters they envisage for this community. They have highlighted a need for this project to be sustainably focussed, by ensuring it meets the economic, cultural and social needs of this community.

TROTAK and associated health company, Turanga Health both represent the iwi interests of the three Turanga tribes, including Rongowhakaata, neighbouring Ngai Tamanuhiri and Te Aitanga a Mahaki. TROTAK has agreed to umbrella this project, in their role as the Iwi authority that manages the Manawaru Manawaru Kaumatua Flats in Manutuke.

History



Manutuke Manutuke Marae is located in Manutuke Village, on Whakato Road, approximately 15 km's west of Turanga, Gisborne. It represents the hapu of Ngati Kaipoho and Ngai te Aweawe of Rongowhakaata and is the converging point of this project, Te Hihiri o te Ra.

The evolvement of Manutuke Manutuke Marae was initiated by Otene Pitau who acknowledged the wishes of his papa whangai Raharuhi Rukupo in 1910, when the third Maori Anglican Toko Toru Tapu Church – Toko Toru Tapu and the clustering of Manutuke Marae was established on the Manutuke Block.

This followed with the relocation of the wharehui Te Poho o Rukupo, Te Poho o Hinehou and Te Poho o Epeha. Te Poho o Hinehou later became the Maori Battalion, a purposeful dining room, dedicated to those who had served in World War 1 and World War 2. Functional facilities were to follow; kitchen, men's room and ablution blocks.

Manawaru Manawaru Kaumatua Flats and the Manutuke Kohanga Reo were incorporated into the Manutuke Marae complex with the 'Maori Communities' revitalisation initiatives of the 1970 - 1980 Maori Affairs policies led by the Rongowhakaata Combined Manutuke Marae Association and Manutuke Manutuke Marae Whanau. 28 Maori Battalion, C

Company Veteran, Kaumatua Rapiata Ria, lives in Manutuke alongside the Toko Toru Tapu Church within his whanau papakainga.

Te Toko Toru Tapu Toko Toru Tapu Church



Toko Toru Tapu is arguably the most important Maori Toko Toru Tapu Church in Aotearoa and probably the most historic Toko Toru Tapu Church within the Tairāwhiti. For Rongowhakaata it represents a place of worship and living testament to our Rangatira Raharuhi Rukupo. Rukupo prophesied, *“His anxiety for the prosperity and well-being of the people was so great that he did not suffer the near approach of his end to prevent him from concluding his advice and parting instructions to the tribe. He exhorted them to repair the Toko Toru Tapu Church and to locate themselves in its vicinity; and he charged them to keep clear of debts, and to hold their lands — not to sell.”*¹

An ambitious comprehensive restoration plan was initiated by Rongowhakaata and Community in 2005, with first stage of external and structural works to commence in October 2010 **(Where is the TTT booklet)**.

Manutuke Marae Whanau has a committed functional relationship with the Toko Toru Tapu Church Restoration Komiti. They have discussed options around sharing the costs of

¹ Mohi Turei 15, September, 1874

installing a fire sprinkler system and the ongoing maintenance costs of the Marae recreational and Church grounds, including the Manutuke Urupa.

In terms of the electricity supplied, the Toko Toru Tapu Church has a separate connection to the network of the Manutuke Marae supply. There is an inter generational electrical wiring system and suspended electrical heating (4 of 8 heaters functional) which date 1970 retro. There is also hanging drop lighting with 2 spot lights near altar

Te Poho o Rukupo Whareniui



Te Poho o Rukupo was erected in 1878 at Pakirikiri Pa located at Wherowhero Lagoon, Manutuke side. It is a commemoration to the Rongowhakaata Rangatira and master carver Raharuhi Rukupo completed five years after his passing, by carvers of his wanaanga led by younger brother Pera Tawhiti. Thirty two years later Raharuhi's whangai son Otene Pitau was to lead the relocation of both Te Poho o Rukupo and Te Poho o Hinehou now Maori Battalion to the Manutuke Block beside the Toko Toru Tapu 4 Toko Toru Tapu Church. Te Poho o Rukupo was firstly restored in 1970 and again in 2005, with the wall cavities insulated in the 1970 period and roof later in 2005.

A power box is located in the rear of the house with sole double power point at lower level. Wiring is relatively recent with 12 suspended lights, energy efficient bulbs and exterior lights being 2 spots. Security sensor lights to both sides of the whare recently fitted. The 2 rear

windows are single glazed with a wide stained glass window at the front. The floor is uncarpeted, tongue and groove flooring and no heating. Mould is travelling through internal tahuhu due to dampness and lack of appropriate ventilation

Ablutions

The ablutions are situated to the south side of the Manutuke Marae behind Te Poho o Rukupo within close proximity to the Toko Toru Tapu Church, and constructed of concrete block work with steel roofing. The wahine/tane toilets are separate from the shower blocks with hot water sourced to the showers only. The showers have four units and basins in each whilst the toilets are four in the wahine and two in the tane with a urinal. Ventilation is free flow with no heating provided, lights or approximately 2 incandescent lamps in each area.

Maori Battalion Dining Room and Kitchen



Relocated from Pakirikiri Pa along with Te Poho o Rukupo in 1913, Maori Battalion originally was Te Poho o Hinehou, built by Rukupo and his brother's in acknowledgement of their mother Hinehou. Pakirikiri Manutuke Marae served as the Maori political centre to deal with the turbulent subdication of our people through the ongoing colonisation policies of the Crown. Ngati Kaipoho hosted hundreds upon thousands for days, weeks in support of Rukupo and Iwi political leaders of that time.

On return of those who survived the World War 11, debates were led by Rongowhakaata Kaumatua to rededicate Te Poho o Hinehou in remembrance to all those from Te Tairawhiti that had served in both WW 1 and WW 11. Recent memorial boards recognise the later campaigns where those of Rongowhakaata have participated.

There is no insulation in the ceiling, walls and under floor. The wiring is over 3 generations old with lighting in the dining room, kitchen. The backroom has fluorescent tubes. The windows are single glaze providing natural lighting, without thermal drapes. There are French doors to the north west, which provide passive energy values; light and heat. The electric wall heaters in the dining room were removed in 2005 due to expense, safety and age. Gas is utilised for cooking, with 2 commercial stoves and 4 gas rings. There is instant electric water boiler for hot drinks, commercial toaster and microwave. Refrigeration is household fridge/ freezer, chest freezer and chillier 4 x 4 mtr dated 1970.

Te Poho o Epeha Wharenui



Te Poho o Epeha represents the Ngai Te Aweawe Hapu and complements Rukupo and Maori Battalion, located to its present site in the early 20th Century from the nearby Umukapua Block. Over the years it has served as a Wharenui, Sports Centre with full circle back to a Wharenui. Restoration works of the whakairo were completed in 2007 with full structural

enhancements; new roof, cladding, insulation in roof and walls, repiling and replication of the original wooden verandah in 2008.

The roof and walls are insulated but not the flooring. Epeha has a carpeted floor but no heating. Lighting is suspended fluro tubes, with exterior spots to the front and rear. The windows to the front and sides provide natural light, ventilation and passive warmth. The wiring installations dated 1970's with power points and light switches located at fuse box to the rear of Wharenui.

Manutuke Manutuke Marae Kohanga Reo



Manutuke Kohanga Reo was established through ingenuity and commitment to the Kohanga Reo Movement in the mid 1970's by whanau of Manutuke Manutuke Marae. The building was relocated from Gisborne Railway Station to its present site and has been purpose fit for mokopuna from this point on. Over the years compliance to the Kohanga Reo National Trust has meant the introduction of appliances and practices. Manutuke Kohanga facilitates the nurturing of te reo to an average of 18 mokopuna within the learning year.

Water heating is the traditional hot water cylinder, used only for washing dishes. There is no insulation in the walls, ceiling or floors. There has been the installation of a heat pump as power bills were \$400 per month, gas heater bottle refill was \$30 per week. The Heat pump installation has halved the power bill and created a warm healthy environment for

Mokopuna and Kaiako. Appliances ;, household stove, microwave, wall heaters, television, dvd and video, computer and fax machine, stationary unflued gas heater and never use dishwasher to save energy. Lighting a mix of hanging and fixed household bulbs. Carpeted flooring, windows single glazed with thermal drapes

Manawaru Manawaru Kaumatua Flats



'I know of no greater urgency than to see our people well housed, and no greater joy than to see many of our elders enabled to live beside and to keep our Manutuke Maraes warm.' These words were expressed by the Hon. Matiu Rata, Minister of Maori Affairs, June 1975, when opening the Manawaru Kaumatua Flats.

Manawaru Kaumatua Flats have been the home of many Kaumatua over the years and has fulfilled the aspirations of the Hon. Matui Rata to this day. The provision of support systems from the Runanga, Turanga Health and Manutuke Manutuke Marae whanau ensure the wellbeing of Kaumatua is met within the resources available. External upgrades were initiated by the Runanga in 2008, with the maintainece being an ongoing responsibility of the Runanga also. Gardens are utilised at the rear of the facility by some of the Kaumatua also.

Electrical wiring installations are upgraded on case by case basis with general condition being that of mid 1970 period. There is no insulation in walls or roof and presence of condensation, dampness and mould. The cooking appliances are conventional stoves of early period, whilst refrigeration is dependent on the Kaumatua. Windows are single

glazed, with the double bed roomed flats having sliding doors, but all flats at different periods of the day have a passive solar energy flow. Thermal drape curtains would assist with containing warmth. Heating is mid 1970's electric wall heaters. Electrical power point positions required updating and review as they are low and limited access for elderly. Water heating is hot water cylinders. Kaumatua utilise unflued gas heaters, fan heaters and electric with one still using the wall heater. Lighting is approximately 6 fittings per whare, with external lighting to the rear and front. There is a frequent use of multi plugs and extension cords in one flat.

Private Residence of Darcy Ria



Returned 28 Maori Battalion Veteran Darcy Ria's whare is purposeful to his needs and was built by his family for both Mr and Mrs Ria early 1980. It is insulated well, sited well to harness the passive solar energy and all electrical fittings and appliances meeting his needs.

Uncle Darcy's house was originally heated by an electric wall heater which collapsed during the project. A Heat pump was installed through the Whanau; Kohanga and Kaumatua recommended 'Air Installs' utilising the community card subsidy. Installer's accommodated Uncle Darcy's needs

with speed, with immediate benefit and improvement to his well being and home environment.
Financial savings have been obvious with the monthly power bill reductions.

ENERGY ASSESSMENT

Alternative Energy

The application of alternative energy generation based on Photovoltaic (Solar) generation, as discussed in [EECA's photovoltaic fact sheet 04](#) is the most likely preference for this site, based on data from NIWA that shows that this region has one of the highest levels of sunshine hours for the country (see **Appendix 1**).

Any Photovoltaic Installation must demonstrate electrical safety and have the ability to be managed in normal use and under abnormal condition by people with limited experience. Any installation of this equipment must be able to demonstrate that it is able to be shut down safely in the case of fire.

Photovoltaic needs to be looked at as only forming 70% of the total energy production for the site so suggestions from the companies tendering for the project need to be sorted.

Storage systems other than battery banks need to be looked at because of the huge on-going expense and level of maintenance they require. Again the companies tendering should offer solutions but one that is out there is the use of flywheels used and manufactured by [Beacon Power](#) in the US who use them in conjunction with large solar generating sites because they are very efficient, compared with battery banks and inverters.

At present because of the distance from this site to the networks substation, this site is not suitable for generation of electricity back into the system. If the network company made infrastructure changes this may be possible in the future.

Wind generation is not an option because at this site it is either non-existent or is too strong to generate electricity from. Geothermal is not present in the immediate area and also is therefore not an option. Hydro is not practical here as the closet water source does not have the flows etc, to be of any use. Furthermore, the area is flat so no possibility of using the terrain to any effect with the water. The use of Fossil fuel generators is also not an option as it does not meet the goals of the project, where we are trying to use sustainable energy supplies.

Installations

From the work of the scoping exercise it has been established that a lot of remedial and upgrading work needs to be done on the installations affected and the system supplying them that we are responsible for.

The power infrastructure on the site needs to have major upgrades to make this viable which includes:

- a) Removing old disused cabling from all the installations;
- b) Balancing the load over the three phases supplying the Manutuke Marae and Kohanga Reo as the loads are extremely imbalanced. In the Manutuke Marae when the tests were carried out we found high currents on the neutral also, at around 28 – 35 amps which also indicate safety issues outside this which require further investigation and rectification. The [Power Quality Report](#) and [Manutuke Manutuke Marae Power Quality Monitor Report for 16th June 2010](#) records the findings of the tests carried out on the day;
- c) Installation of plugs in appropriate locations in the flats to reflect the changing needs that people have to apply electrical devices today from when they were originally constructed;
- d) The types of protective devices in the installation should be upgraded to modern devices as those currently being used in the flats are no longer available and the switchboards have no spare capacity.
- e) The majority of the installations on the site are supplied via overhead lines which from the boundary the responsibility of the site owners. This system is in need of maintenance as it is but I would note that it will not give us the flexibility we need to implement this project. I would recommend that these lines be replaced by an underground ring system across all the installations being supplied;

Current Energy Usage

The data below sets out the energy usage on the various installations at present. All installations use electricity, with LPG being used for cooking at the Manutuke Marae. The power account data we managed to gather gives an indication of the typical usage of the various installations involved.

During the testing of the Manutuke Marae three phases were drawing between 20-30 amps with spikes of 60 amps when equipment was kicking in. The balancing of the Manutuke

Marae will have an effect on this but will only be able to be known after the remedial work has been carried out.

Typical Daily Usage of those buildings that fit this profile are:

- Flats used typically 18 Units per day in the worst cases;
- Kohanga Reo used typically 43 Units per day;
- The Power Accounts give an example but as the building is being restored the loading on this can only be seen as a guide and not what it will be.
- LPG Gas is used on the Manutuke Marae for cooking. The current amount of bottles used is determined by the functions being held so no typical usage was noted

Reduction of Load

There is a need to reduce the loading that currently exists, which can be done by:

- Replacing old and inefficient appliances in the flats with new appliances with high energy efficiency ratings. This includes the normal fixed appliances like Range, heaters and hot water system but also Fridge/Freezers so that loading requirements can be controlled within a reasonable tolerance to ensure the new systems are not overstretched.
- Investigating alternative heating systems for both the water and room heating as this would reduce the overall electrical load from what is in the flats now but also the use of additional heating or cooling devices used on an ad-hoc manner. Two options are, using heat pumps that are combined water heating and room heating units; or using fixed LPG gas room heaters and water heaters.

Note those installing any new equipment need to talk to the clients and provide alternatives of how it could be installed to take into account issues like, controlling access to any devices like external units of heat pumps to ensure they are not accessible by children or create an access issue to the properties concerned; do not detract from the presence of the buildings they are associated with.

- The Kohanga Reo currently does not use much hot water but still operates a water cylinder system which needs to operate all the time to maintain the water being stored

at an appropriate temperature. They need to assess what the usage will be long term and if shown to be minimal possibly look at instantaneous water heaters that will only draw when the need arises rather than the continuous load of the cylinder.

- Replacing old inefficient lighting with modern energy efficient alternatives. Philips has supplied several brochures and a PowerPoint Presentation to help explain this. They are: Philips PPT on Reduction of Hazardous Substances; Who said there were no choices; Energy Saving Bulbs A3 Poster; Philips EcoClass30 Lamps.

Insulation Options

It has been established that two out of the three buildings on the Manutuke Marae have insulation in the walls, ceiling and non-have under floor insulation although it is possible to gain access to that area. The dining/kitchen hall is the only one not insulated in the ceiling and walls;

The Manawaru Manawaru Kaumatua Flats are on concrete slabs so no further insulation can be applied there but it is noted that the flat roofs are not insulated. These need to be insulated in some way and perhaps the companies tendering for the insulation work could suggest solutions that provide a view of the widest possible selection of products. The thermal efficiency of the windows and doors also needs to be increased.

The insulation of the Toko Toru Tapu Church Toko Toru Tapu is being dealt with as part of the restoration project and as the roof there is of a similar thin construction to the Manawaru Kaumatua Flats, they have the same insulating issues.

The Kohanga Reo needs insulation both in the ceiling and under floor. There is access to both areas in this building. It is not recommended to cover the ground under the buildings as bacteria etc. would build up under such material and in the long term, would lead to health related issues appearing that would need to be dealt with.

Polystyrene and expanding foam based insulation react with plastic materials such as those used in the construction of electrical wiring, in such a way that they destroy the integrity of the products. It is not recommended that these insulation products be used.

Alternatively, it is recommended that the following options be considered and or investigated further. Air-Cell Under floor Insulation, when properly installed, will provide a barrier that prevents cold air getting up into the buildings and the loss of warm air down through the floor. The material provides a barrier to both, as it will not transfer heat or cold across its construction. Nova therm polyester Insulation is another option that can be used in the buildings that have adequate roof

space for its application. There is also a need to check all windows to ensure they are in good condition and that draughts are kept to a minimum. By ensuring all catches operate properly to secure windows and applying draught stop where appropriate. It would also be advisable to double glass windows on the South facing windows and on windows that do not get any or much winter sun. Finally, thermal curtains need to be put in for all windows to ensure effective heat retention.

Electrical Connection to the Network

Currently the Manawaru Kaumatua Flats, Toko Toru Tapu Church, Manutuke Marae and Kohanga are all supplied and metered separately, which means the installations are paying a line and meter charge in addition to the electricity unit charge. Ideally these would be supplied and metered from a single point, with a single power bill applied to all and then split up on the basis of their usage. The connection would be treated as a commercial, so the line charge would be more than any one of the individual line charges now being paid but this would still not equal what is now being paid if all the existing charges were to be combined. Also a bonus of doing this would be that as a commercial connection, the electricity would be received at a cheaper unit cost.

It is recommended that this option in conjunction with putting a new ring supply system into the installations; be undertaken. The ring circuit gives redundancy in the supply system.

Responsibility for the connection and power bill and coordinating the payments required by the other users should be managed by a single source, which perhaps the Manutuke Marae Committee could undertake.

The rules regarding connecting distributed electricity generation to Eastland Networks system is contained in [Appendix ?](#), along with the drawing that the network company have of the connections in this area of Manutuke;

For Rongowhakaata and Tairawhiti tribes in meeting to address the goal is to generate enough to be able to sell back to the network but if not the other options of being sustainable or partial supply will be looked at also. The method of generation and any products used to reduce load are required to be environmentally friendly, not just in their use but from birth to disposal. Both Philips Lighting in New Zealand and Schneider Electric have indicated that they would be happy to assist with a community Hui where information

on alternative solutions for electrical systems in the home and energy efficient lighting solutions are involved.

COMMUNITY BUY IN AND EDUCATION

Conclusion

The Whanau of Manutuke - Maori Battalion Manutuke Marae are a wide range of participants who embraced by the Te Hihiri o te Ra kaupapa, not for personal gains but if this going to be of benefit to our Manutuke Marae and Whanau, kei te pai, I'm involved.

Personal experiences directed positive engagement in some pathways taken and relationships that have been established. Critical feedback provided a reality check – measurement of what and who is not working for whanau; be product, service provider and national policy.

Generally there is a willingness to understand the technologies that are now available, share the knowledge of what is out there now in our whanau homes that is working and make some changes for positive healthy and financial outcomes to occur, whilst recognising resource is an obvious limitation to engaging in further energy efficient initiatives.

The Housing NZ 'Rural Homes' programme facilitated by both Te Runanga and Turanga Health as well as the 'Healthy Home Initiative' through the Gisborne District Council became a reference point and benchmark to where some of the participants had improved the well being of their Whanau. Conversely this was also indicative of non-engagement in any alternative energy or energy wise campaigns promoted nationally.

Education and Communication with Whanau

Discussions and engagement on this project have occurred with the Manutuke Manutuke Marae Whanau, Manutuke Kohanga Reo kaiako and whanau, Manawaru Kaumatua Tenants, Rapiata Ria and whanau, Toko Toru Tapu Toko Toru Tapu Church Restoration Komiti, Rongowhakaata Combined Manutuke Marae Association, Manutuke Primary School, Rongowhakaata Kaumatua Group, and Turanga Health Kaumatua Group. There are many walks of the Rongowhakaata and Turanga community and the stakeholders reflect those who have connections to our Manutuke Marae be it 'whakapapa' or 'kaupapa' whanau.

While information on Energy Alternatives, Energy Efficiency Initiatives and Programmes are widely and freely available on the internet, the approach taken with the community was to interactively present and discuss the kaupapa with them. This occurred in three phases,

which sought to introduce the kaupapa; undertake some research and discussion; and then investigate the technical requirements of the project, ie:

Phase 1	Overview the intention of the kaupapa and introduce Colin Murphy, Technical Contractor
Phase 2	Interviews, Hui, Survey, information sharing with Stakeholders and assist technical site assessments for audit purposes
Phase 3	Investigate the response of local 'Energy Provider's' to the requirements of the Te Hihiri o te Ra Project

Tools of Engagement

As is appropriate to communication with Maori, Kanohi ki te Kanohi; Hui and Survey were the primary tools of engagement used to convey the project to the community. The Kanohi ki te Kanohi meetings were aimed at providing introductions on the purpose of the kaupapa, enable the establishment of trust with Colin and source insights and personal information on energy use and costs. The group Hui provided a presentation of the project plan and gave an overview of the inception of the project between TPK, ECCA and Iwi. Surveys allowed questions of whanau who own their homes to be asked, including the presence of insulation and provided by who, heating type used and costs; energy and warmth savers in their homes and the take up of the Gisborne District Council Rate Rebate Scheme.

Overview of Phase 1 and 2 responses

Stakeholder	Phase 1 – Overview	Phase 2 - Audit
Manutuke Kura	Exciting kaupapa, opportunity for taurira to participate at implementation phase	Remain informed with a view to lesson plans, research on technologies, active learning
Rongowhakaata Manutuke Marae	Exciting kaupapa, with wider benefits for all Manutuke Marae and Whanau, potential cost savings, caution on new technologies, need to take action	Thematic issues, collective power energy savers and initiatives, direct approach to technologies, working models required for whanau to learn from, fool proof, sustainable Manutuke Marae kaupapa - kaitiekitanga
Rongowhakaata Kaumatua	Endorse Te Hihiri o te Ra as kaupapa, references to whanau initiatives, positive personal experiences on heat pump installations, use the system, mana motuhake	Proactive support of Air Installs- 4 referrals, best deal ongoing support, just a call away Te Runanga and Turanga Health need to ensure all whanau are involved - strong focus on how future survival of whanau. The land, sun, water, moana are what remains they nurture us
Toko Toru Tapu Trust	Humbled by the inclusion, remedy to sustainability issues, support in any way, direction of relationships is positive and informing	Wider engagement of Toko Toru Tapu Church community nationally, technical information forthcoming with restoration, example to all
Ria Whanau	Humbled by inclusion, addresses energy consumption issue, need for wider whanau engagement	Address immediate need by installing Heat Pump by Air Installs as recommended by Kaumatua, benefits obvious

<p>Manawaru Kaumatua Flats</p>	<p>Excited, open to identifying issues and sharing information, timely, health and affordability issues, little options</p>	<p>Keen to trial energy savers, hopeful implementation in any way, address health and safety issues, praise for 'high level' support ECCA, TPK, Turanga Health and Te Runanga, educate as Rangatahi are the drivers, participate at all levels</p>
<p>Manutuke Kohanga</p>	<p>Open information shared, functional issues, efforts to conserve energy over the years, major barriers through compliance, energy costs unsustainable, priority wellbeing of mokopuna and Kaumatua</p>	<p>Personal experiences, barriers with Healthy Homes, open to all initiatives and educating whanau, Air Install - Heat Pump radical improvement to Kohanga and energy expense</p>
<p>Manutuke Manutuke Marae</p>	<p>Whanaungatanga, responsibility to manaaki and tiaki whanau of Manutuke Manutuke Marae, exciting, working with our vision of sustainable Manutuke Marae humbled by project, is it achievable, taurahere email responses –pride for hau kainga and encouraged by levels of engagement with ECCA, benefits work for all our Manutuke Marae, whanau especially – big responsibility for us</p>	<p>Training for energy managers, invest in upgrades alongside project re-roof and insulate Maori Battalion heat pumps in Rukupo will be beneficial for whare, Te Hihiri becomes a learning hub for kura, on web other Manutuke Marae, tohu for 2013 celebration, more opportunity for Rangatahi to live and learn kaitiekitanga</p>

Manutuke Manutuke Marae Electrician	Positive response to project, participated in audit loading exercise identified enhancements over 5 year window	Acknowledged the need to pick up higher learning on installation of solar technologies and compliance committed to local knowledge and support
Chief Executives, Te Runanga o Turanganui a Kiwa and Turanga Health	Due diligence – whanau expectations must be respected – identify sequential steps – strategic direction	Sustainability of relationships at all levels, identify capacity opportunities, monitor policy, response indicators to whanau
Toko Toru Tapu Toko Toru Tapu Church Project Manager	Maintaining compliance and sourcing materials, robust servicing plan will work for single metering	Parallel development with Toko Toru Tapu Church restoration – supportive offer of technical assistance when required
Gisborne Rewinds	Local supplier of technologies, proven track record with whanau, technical advice available	Grid feed and policy understanding high level of expertise with power circle proposed

Survey

Information provided by Whanau in Phase 1 and 2 indicated that there was a general keenness to engage in energy saving and enhancement initiatives coming through Te Hihiri o Te Ra kaupapa. There are barriers faced by some of our Whanau who were only able to participate in the initial stages of the EECA – Energy Wise campaign, be it insulation installation. Some had utilised the EECA – Energy Wise campaign to install heating alternatives. There were limitations from the ‘Energy Provider’s’ programme in being able to canvas, respond to technical problems and meet the needs of Whanau. A sample survey was initiated to gauge further analysis of Kaumatua and Whanau ‘buy in’ to Energy Wise initiatives available. From Manutuke Manutuke Marae Whanau and Turanga Health Kaumatua Programme, 24 people who owned their own home participated in the 11 questions survey. (see Appendix 5: Survey).

Findings:

Insulation - questions 1 to 4

90 % of homes are insulated, with half of them being fully insulated, the remainder having a mix of ceiling and under floor insulation with limited wall insulation.

50% of the insulation provided was private which indicates the homes were brought from 1980 onwards (insulation compliance) 25 % were supported through the Rural Housing programme while 20% applied through the GDC – Healthy Homes scheme.

Note: One Kaumatua had used the internet and gone to Energy Wise site to initiate application.

Heating – questions 5 to 7

Heating in the homes is predominantly wood fires 60%, with electric heater 50%, gas heater 16% , flued gas 2 homes with heat pumps in 2 homes and one Kaumatua using an oven as a radiator. Noting also the wood fire is used in combination with electric and unflued gas heaters. 66% of the respondents indicated these efforts do not heat the whole of their home.

Proportionately for the months of winter energy costs escalate – wood \$300 mean, gas per month as secondary heat source \$50 as sole source \$130 Power costs for electric heater secondary source \$30 and heat pump \$20 with 2 participants unsure.

Note: a Kaumatua using their stove to heat the home

Initiatives – questions 8 to 10

60% of participants have thermal drapes, 50 % have hot water cylinder wraps and 75 % would consider energy efficient lighting. Whanau are welcome to ideas and initiatives that are safe, it was noted that a Kaumatua had an unpleasant experience from a energy efficient bulb exploding.

Community Services Card

60 % of the participants have successfully used their CSD community services card to apply for rates rebate through GDC Gisborne District Council, 30 % were declined and 10 % did not bother.

Phase 3 – Scope the response of Local Energy Providers to the Project

The provision of insulation and heating initiatives with the Tairāwhiti Region is an open market; in the sense that people can sign up to the ‘Healthy Homes’ GDC project, search the yellow pages for Air Conditioning Unit Installers and choose from a range of 0800 numbers, or the ‘word of mouth’ take direction from Whanau positive experiences.

Output

Success Indicator

<i>To develop an alternative energy package that meets the needs of the Manutuke community participants</i>	<i>Alternative energy package presented to the Community Implementation and training needs identified</i>
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TPK Project Progress Report 5.05.10

ECCA accredited provider working the Tairāwhiti Region recommended by Hirini Reedy was **Energy Options** and the local installer of Insulation and Heat Pumps recommended by Whanau and Kaumatua **Air Installs**.

Terms of Reference for both providers:

1. What Insulation and heating options for Te Hihiri o te Ra ; could they provide :
energy efficient, durable and code compliance, standard of manufacture
2. Provide schedule of what products were available to them

3. Building up Skill Sets within our community – are they interested?
4. Feasibility of pilot project – Heat Pump installation in 24 Kaumatua homes at preferably zero cost

Energy Options

Community Trust Opotiki HQ with bases in Bay of Plenty, Rotorua, Hawke's Bay, Eastern Bay of Plenty and Gisborne East Coast. They are the lead provider in Gisborne, East Coast with existing contract with Eastland Energy Trust and ECCA to provide the 'Healthy Homes' programme 130 on waiting list at this point with **26 Referrals from Turanga Health**.

Workers installing insulation are paid by contract, per house insulated rain or sunshine.

Response to above brief: Danielle Le Compte, Regional Manager

There would be no insulation available for Te Hihiri o te Ra kaupapa as it is not in the scope of Healthy Homes project. The only possibility is application back into ECCA and Eastland Energy Trust as a 'Special Project'

1. They are only using ECCA approved products – limitation for Te Hihiri being not meeting what is required for Manawaru. They did not seem flexible in respect to alternative solutions.
2. Training and Capacity Building is not available, as they contract out insulation installers on a per house basis. Therefore Iwi initiative of any type is not a possibility
3. Noted the limitations of people not picking up on subsidy for Heat Pump installation, subsidised insulation 33% and major health issues - gas heaters un flued.
4. 24 Kaumatua homes Pilot would need to be wrapped up as a 'special project'

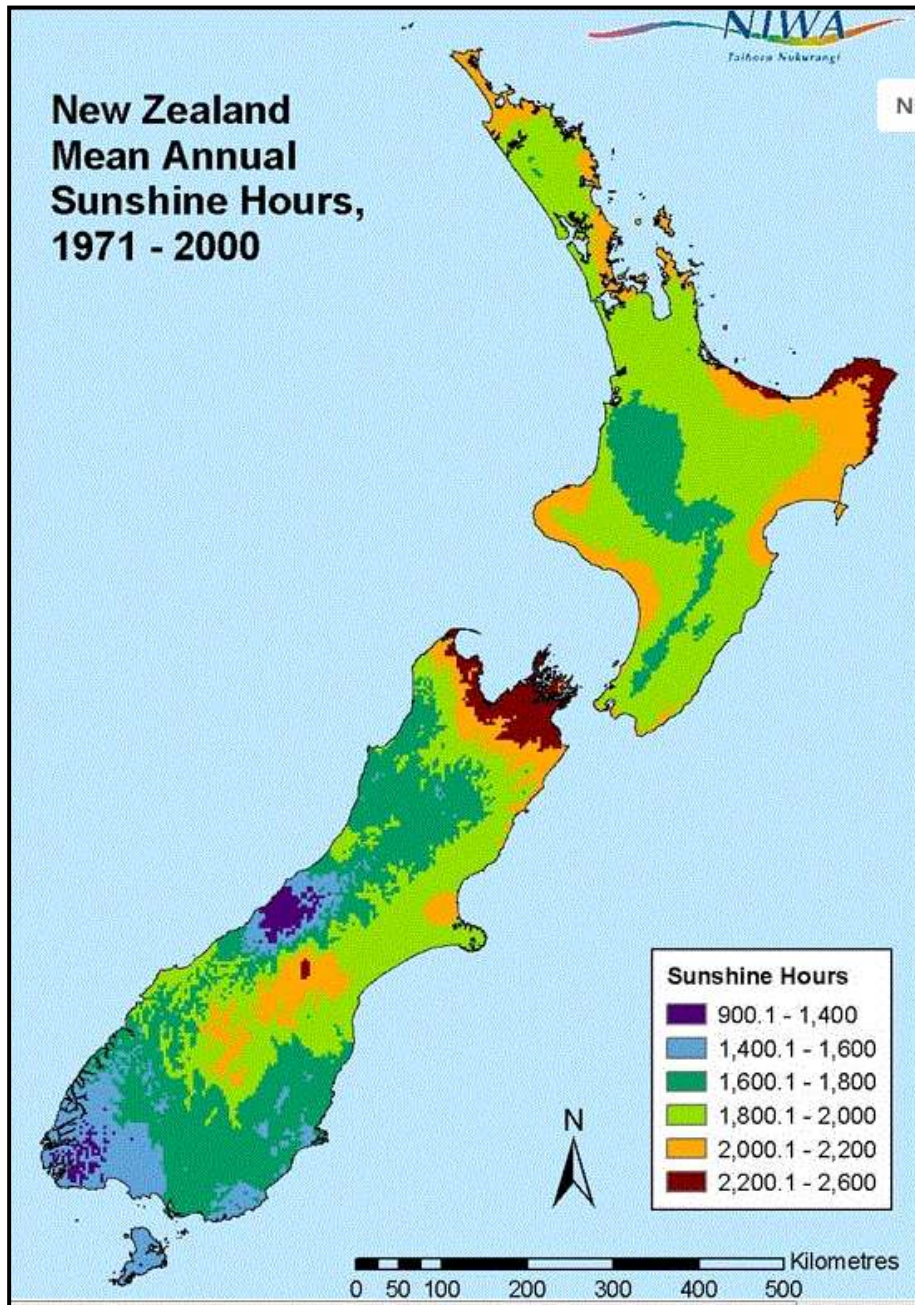
Air Install

Local based company Air Installs, who recently purchased Heat Pump supplier - Air Direct, new trading name CLIMATISE, have provided services to Manutuke Kohanga Reo, 6 Rongowhakaata Kaumatua, Whanau and Turanga Health.

Response to above brief: Sid Wallace and Carl Hamlin company owners

1. Te Hihiri project : Climatize are willing to scope the project in terms of products for all facilities and assist in funding applications, through EECA subsidy scheme.
2. An immediate issue was Uncle Darc as his wall heater had blown up, to which Colin checked out and advised it would be more beneficial to install a Heat Pump now, Climatize installed Heat Pump ahead of process application approval
3. Products: Basically can source from anywhere but will deal directly with main brands to ensure long term support and reliability.
4. Training and Capacity: see the benefit and opportunity for a parallel working relationship, providing the training required, administrative and compliance framework.
5. 24 Kaumatua Homes Pilot : positive to concept, have drilled down heat pump installation to \$1,300 with CSD subsidy, further meetings to scope viability of providing Regional Energy Programme, partnership with Te Runanga and Turanga Health

Appendix 1: NIWA Data



MEAN MONTHLY SUNSHINE (hours)

Data are mean monthly values of total bright sunshine hours for the 1971-2000 period for locations having at least 5 complete years of data

GISBORNE	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	YEAR
	241	201	185	156	148	124	130	154	173	210	215	234	2180

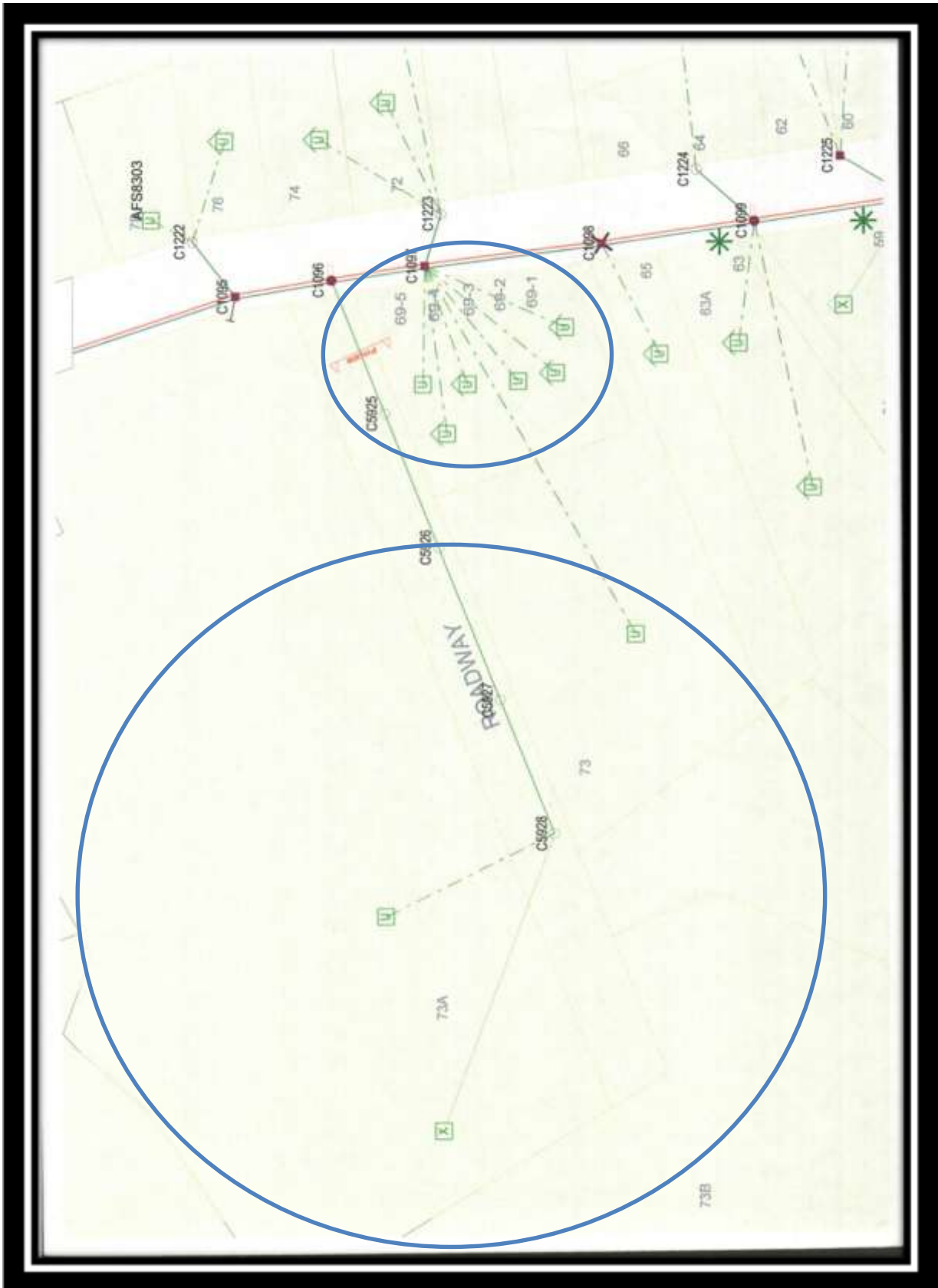
Appendix 2: Eastland Network Data:

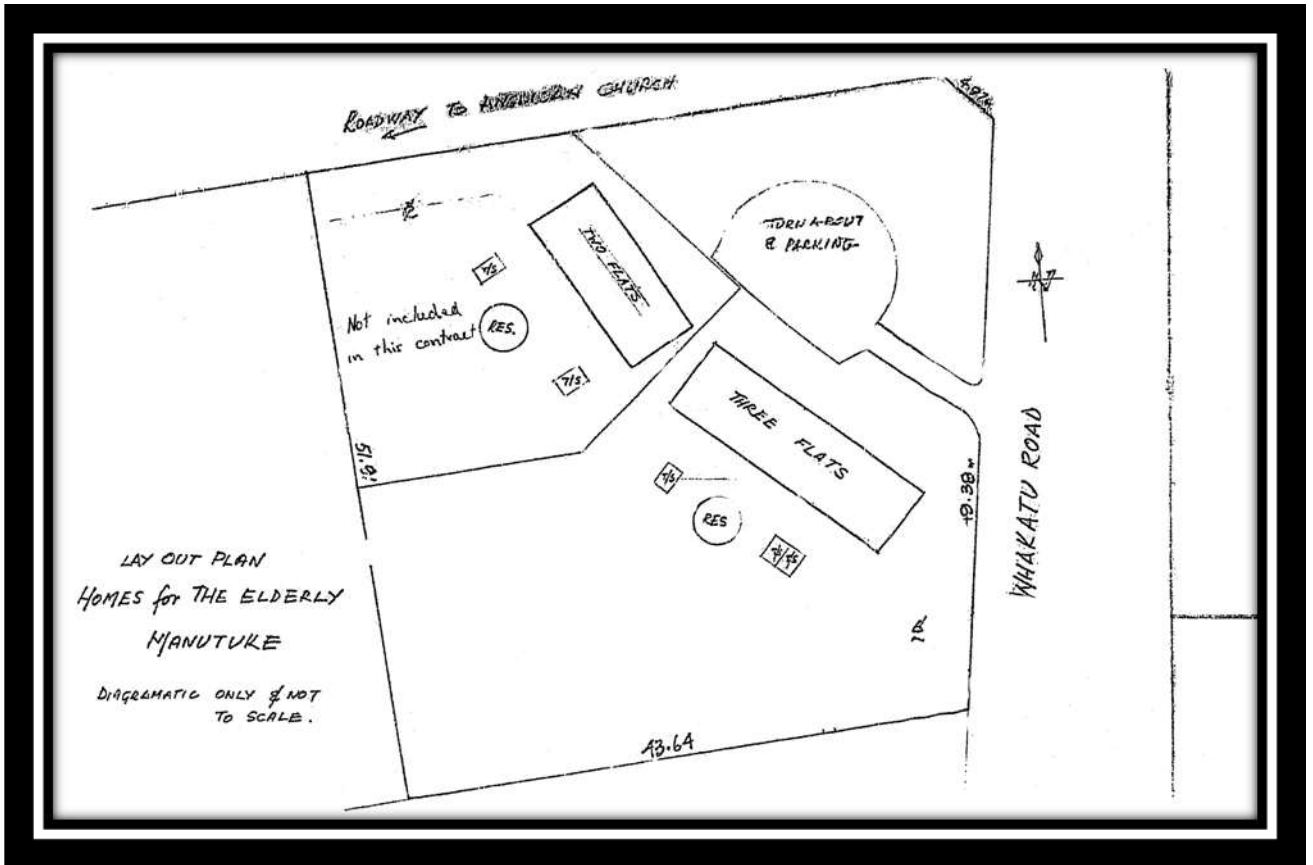
The rules regarding connecting distributed electricity generation to Eastland Networks system is contained in there document named [Connection and Operation of Distributed Generation](#) that is available from their website @ <http://www.eastland.co.nz/Network/>.

- Eastland Networks document refers to compliance with:
 - AS 4777.1;
 - AS 4777.2;
 - AS 4777.3;
 - AS/NZS 3000.

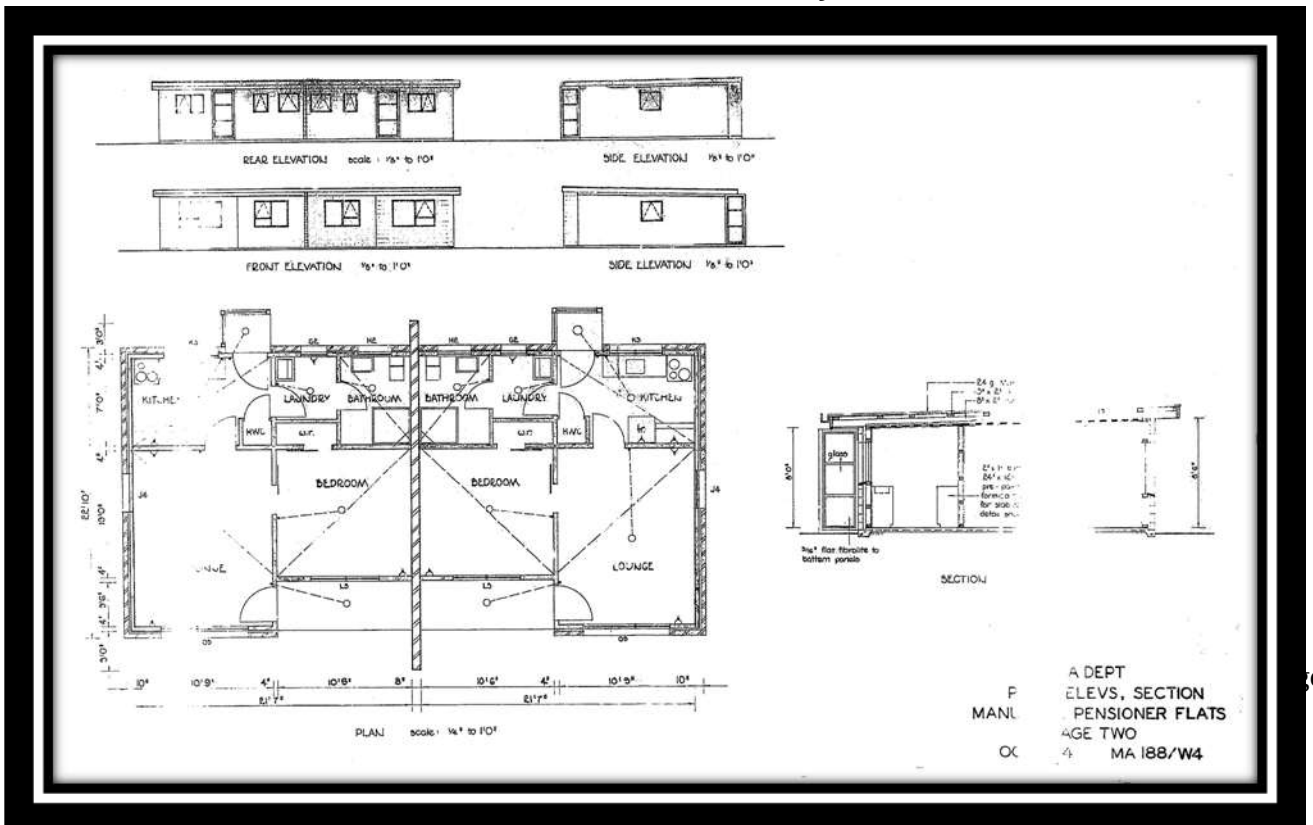
On the next page is the Connection diagram from Eastland Network. It indicates what is supplied but is not completely accurate as to where it is supplied from.

Appendix 3: Site Layout Drawings

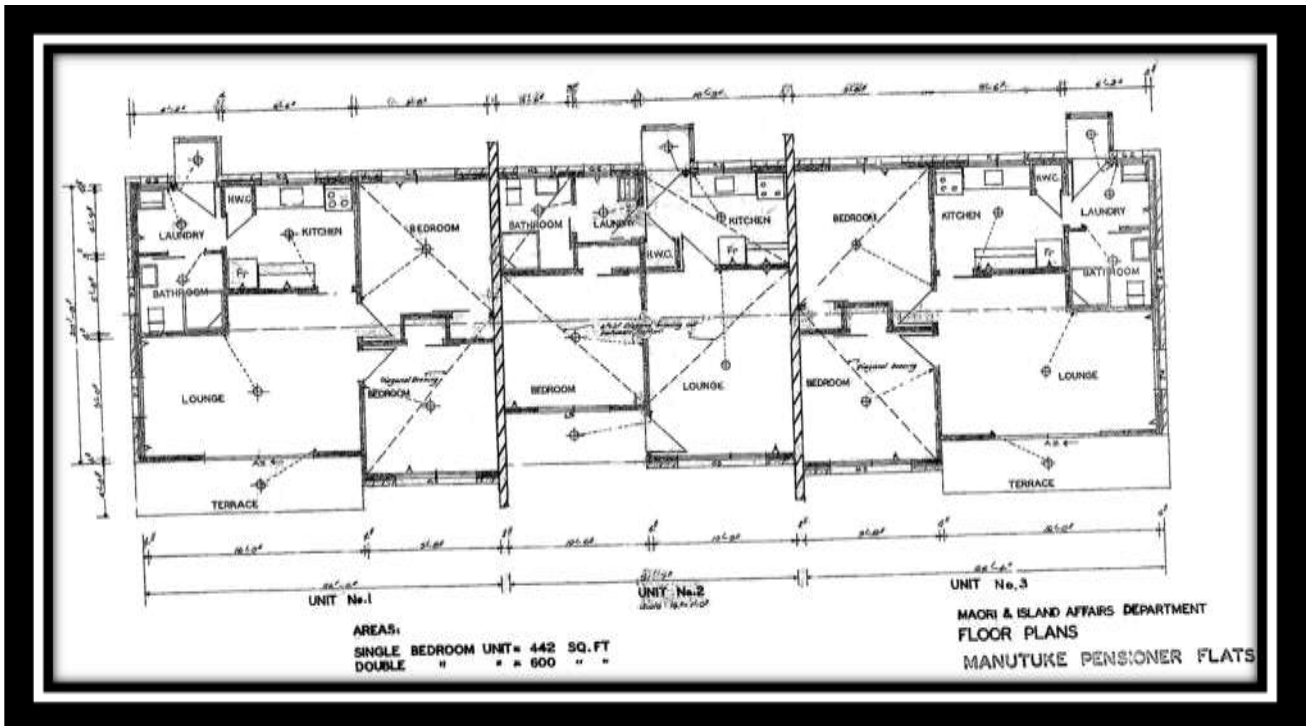


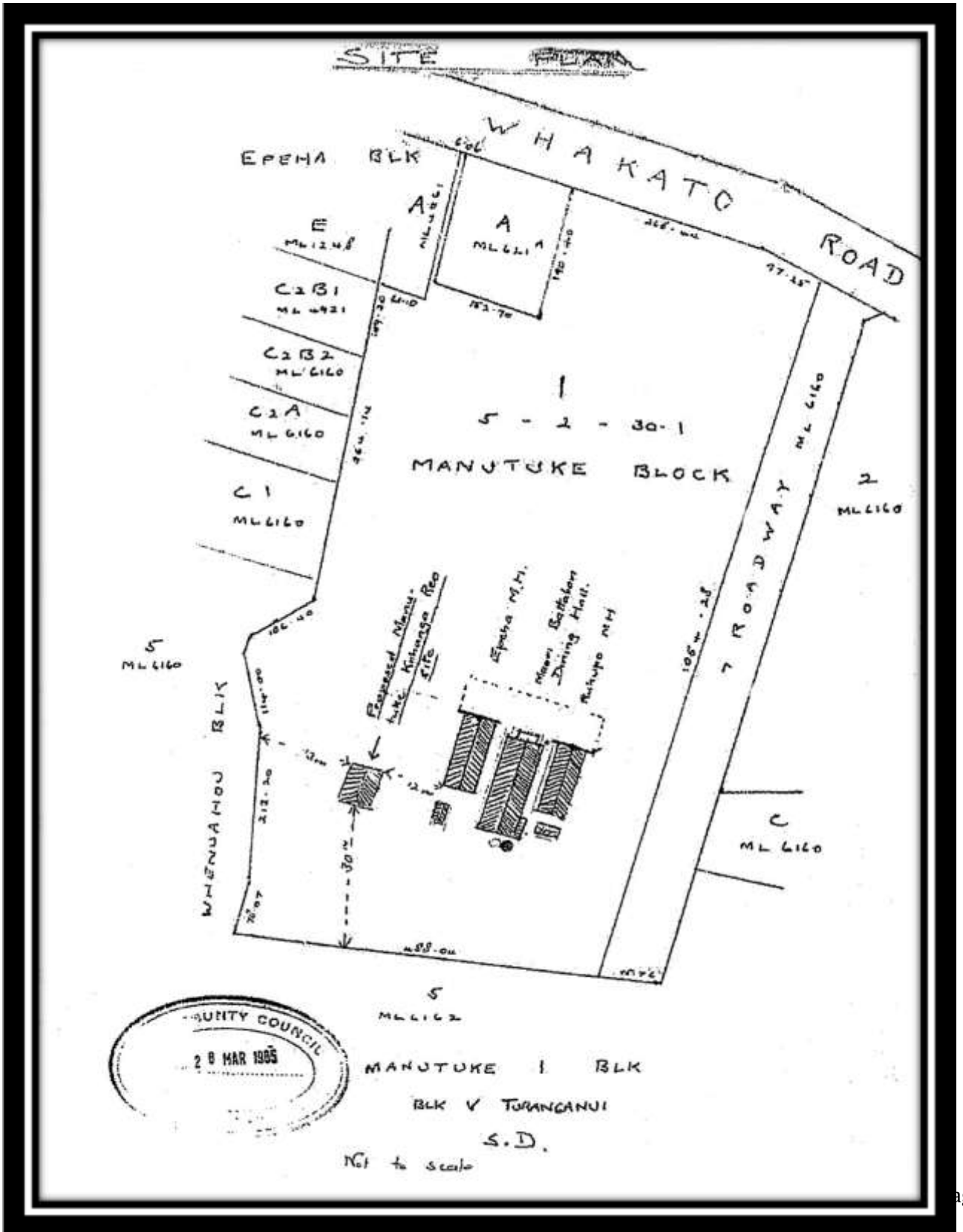


Manawaru Kaumatua Flat Site Layout



Manawaru Manawaru Kaumatua Flats (Units 4 and 5 above and 1, 2 and 3 Below)





Manutuke Manutuke Marae and Kohanga Reo Site Layout

Appendix 4: Breakdown of Initial Remedial Work by Site

<p>Electrical Installations</p>	<ul style="list-style-type: none"> ▪ Removing old disused cabling from all the installations; ▪ Balancing the load over the three phases supplying the Manutuke Marae and Kohanga Reo as the loads are extremely imbalanced. In the Manutuke Marae when the tests were carried out we found high currents on the neutral also, at around 28 – 35 amps which also indicate safety issues outside this which require further investigation and rectification. The Power Quality Report and Manutuke Manutuke Marae Power Quality Monitor Report for 16th June 2010 records the findings of the tests carried out on the day; ▪ Installation of plugs in appropriate locations in the flats to reflect the changing needs that people have to apply electrical devices today from when they were originally constructed; ▪ The types of protective devices in the installation should be upgraded to modern devices as those currently being used in the flats are no longer available and the switchboards have no spare capacity. <p>The majority of the installations on the site are supplied via overhead lines which from the boundary the responsibility of the site owners. This system is in need of maintenance as it is but I would note that it will not give us the flexibility we need to implement this project. I would recommend that these lines be replaced by an underground ring system across all the installations being supplied;</p>
<p>Electrical Supply</p>	<ul style="list-style-type: none"> ▪ Replacing old and inefficient appliances in the flats with new appliances with high energy efficiency ratings. This includes the normal fixed appliances like Range, heaters and hot water system but also Fridge/Freezers so that loading requirements can be controlled within a reasonable tolerance to ensure the new systems are not over stretched.
<p>Electrical Loading</p> <p>Insulation Installations</p>	<ul style="list-style-type: none"> ▪ Air-Cell Under floor Insulation as when it is properly installed it will provide a barrier preventing the cold air getting up into the buildings and the loss of warm air down through the floor as the material provides a barrier to both as it will not transfer heat or cold across its construction; ▪ Nova therm polyester Insulation in the buildings with adequate roof space for its application. ▪ Checking all windows to ensure they are in good condition and that draughts are kept to a minimum by ensuring all catches operate properly to secure windows and applying draught stop where appropriate. I would recommend that double glassing of windows on the South facing windows and on windows that do not get any or much winter sun. Also I would recommend that thermal curtains are put in for all windows to ensure effective heat retention.

Electrical Supply System	<ul style="list-style-type: none">▪ I would recommend that we take on this option in conjunction with putting a new ring supply system into the installations;<ul style="list-style-type: none">○ The ring circuit gives us redundancy in the supply system;○ Responsibility for the connection and power bill and coordinate the payments required by the other users. I would suggest the Manutuke Marae Committee take on this responsibility. <p>The rules regarding connecting distributed electricity generation to Eastland Networks system is contained in Appendix 2 along with the drawing that the network company have of the connections in this area of Manutuke;</p>
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Appendix 5: Survey

KAUMATUA QUESTIONNAIRE

1. Can I ask you questions about the heating and insulation in your home ?

Yes No

2. Is your home insulated

Yes No Partly Don't know

3. If yes, where is it insulated ?

Underfloor..... Walls Ceiling.....

4. Who insulated your home ?

Private.... Healthy Homes programme through GDC

Rural Homes programme through the Runanga

5. What is the main source of heating in your home?

Wood fire Heat pump Electric Heater Gas heater –flued

Un flued gas heater Other

6. Does this heat the whole house?

Yes..... No.....

7. What are you monthly heating costs ?

.....

8. Do you have suitable curtains, eg thermaldrapes etc keeping out drafts?

Yes..... No.....

9. Do you have a cylinder wrap in your home?

Yes No

10. Would you consider energy efficient light bulbs ?

Yes No