MAKETU/LITTLE WAIHI WASTEWATER SCHEME – A SOLUTION EXECUTED!

Ulrich Glasner, Utilities Asset Manager, Western Bay of Plenty District Council
Kelvin Hill, Utilities Manager, Western Bay of Plenty District Council

ABSTRACT

The question of affordability versus sustainability for the Maketu/Little Waihi Wastewater Scheme has presented many challenges.

Our previous paper of September 2010 had focused on the four key issues, namely:

- Affordability and inter-generational equity
- Environmental effects
- Cultural issues
- Engineering and physical constraints

This paper focuses on the execution process in delivering the proposed infrastructure and provides a road map on the various obstacles and challenges we encountered in achieving our goal. It will also include how the logistics of the project team was arranged.

Our journey commenced in September 2010 with a resource consent being granted and the implementation of the comprehensive design. Subsequently over the next six months, the tender and procurement phases were rolled out.

With the focus on affordability, the decision was taken to ensure that the risk profile for the project was maintained as low as possible. The project team considered the expertise available on the market at the time and concluded that several contracts would better serve our desired outcome; the contracts being grinder pump supply, reticulation, wastewater treatment plant including electrical upgrades for individual properties.

Extensive consultation was required leading up to and during the physical construction works with key stakeholders including obtaining a NZ Historic Places Trust authority, which was complicated by a further requirement to gain individual property sign off for all 531 properties.

The paper will highlight a number of issues that had to be dealt with by the project team. These include:

- Ownership of grinder pumps
- Electrical upgrades to properties
- Multiple dwellings on one title
- Multiple pan properties
- Non consented structures
- Industrial and commercial premises
- Service providers (power)
- Property owners refusing to connect

In conclusion the report will address the overall financial cost; including community feedback on whether we achieved a successful solution.

KEYWORDS

Affordability, Consultation, Ownership, Financial Costs, Challenges, Construction

1 INTRODUCTION

The communities of Maketu and Little Waihi are two discrete coastal communities within the region of Western Bay. Maketu and Little Waihi estuaries are regionally significant coastal ecosystems; these communities are all unsewered.

Maketu and Little Waihi are located on the east coast of the North Island approximately 12kms east of Te Puke. Maketu (a culturally significant area) is a headland located between two estuaries with Maketu township nestled in a low lying valley to the northwest boundary on the Maketu Estuary and Town Point being the headland running north from the mouth of the estuary. Little Waihi lies under the southeast side of the headland and is a compact, low lying settlement bordering the northwest side of the Waihi estuary. All communities serve a wide range of people in terms of lifestyle and usage. While the majority of residents at Little Waihi are permanent, those at Maketu include established permanent residents, tenants and owners who use their residence as a holiday "bach". In the low lying valley at Maketu a number of open drains run to the estuary and have been found to be contaminated with septic tank effluent. The water table is high and appears to be tide influenced. The hill areas include the land surrounding the Maketu flats area and Town Point (Okurei Point) where the topography varies from gentle to steep slopes. Most low lying soils in Maketu and Little Waihi appear to exhibit poor soakage, whilst those on the hills are relatively permeable with good drainage characteristics, although they are stratified and can transmit seepage waters horizontally at various layers.

Little Waihi is a small settlement which was established in an informal manner with many illegally erected buildings, without clear title. The Te Arawa Trust Board are owners of much of the land which they lease to the residents. Little Waihi is low lying, prone to flooding and with a high water table. This area includes reclaimed land bordering the Waihi Estuary and a spit which runs south into the estuary that is utilized as a camp site including some semi-permanent campers. Directly to the north, the cliffs which rise above the settlement direct stormwater into the area. A community water supply is provided to the entire area of benefit.

The area is of high recreational interest and potential and during summer experiences a large population increase from temporary holiday residents, tourists and campers. Harvesting of shellfish in both estuaries is intensive and has continued, despite the erection of signs advising that the areas near the shore in the Waihi Estuary are contaminated. A community water supply is provided to the entire area of benefit.

The topography varies throughout the area of benefit. Maketu flats and Little Waihi are low lying and have been or are potentially, subject to flooding. Maketu hills are largely undulating to gently rolling slopes but some lots are moderate to steep.

2 IDENTIFYING THE ISSUE

All properties within the communities of Maketu and Little Waihi rely on a septic tank disposal system to treat household sewerage and wastewater.

There are already significant concerns in Maketu / Little Waihi relating to environmental and health risks from contamination of the estuaries and foreshore area associated with septic tank failures in both communities. A septic tank survey conducted by Regional Council in 1997 indicated that 50% of Maketu and 75% of Little Waihi of existing septic tanks are not operating correctly.

In March 1996 a report on the environmental and public health impacts focusing on the Little Waihi settlement, found that extreme levels of septic tank effluent contamination of the groundwater was occurring, this supporting the findings of the Environment Bay of Plenty Regional Council (EBOP) report of 1992. The report concluded that faecal streptococci, faecal coliforms and enterococci results identified the groundwater was grossly contaminated by septic tanks, that some houses were unsafe and/or unsanitary and that solutions for

sewerage disposal be worked on in partnership with the parties concerned. Significant elevated ammonium nitrogen concentrations were recorded.

The Regional Council have previously established that effluent from septic tanks and on-site disposal systems at Maketu and Little Waihi are contaminating shellfish in both estuaries. A more recent survey was carried out in 2009 under a Joint Agency approach, involving WBOPDC, Tauranga City Council, EBOP, NZ Food Safety Authority, ESR, Toi te Ora Public Health and BOP District Health Board Hauora a Toi . The report looked at the quality of shellfish in the estuarine areas within the Bay of Plenty, including Little Waihi. The Study found that enteric virus contamination of shellfish was occurring in the Waihi Estuary. In addition, the Medical Officer of Health has also raised concerns about the seriousness of health risks associated with septic tank contamination issue at a public community meeting held at the Whakaue Marae in October 2009.

The community have complained to WBOPDC and EBOP about septic tank seepages and the effect these seepages are having on public health issues related to bathing water quality in the harbour.

In addition to these factors, population pressure on coastal areas particularly in the Western Bay of Plenty is high and SmartGrowth predictions show that this growth likely to continue.

All parties recognise that steps need to be taken. The Bay of Plenty On-Site Effluent Treatment (OSET) Regional Plan states that finding solutions for sewage treatment at Maketu and Little Waihi is of high priority. These communities are identified as areas where degraded water quality is a significant issue. The OSET Plan currently requires all septic tanks to be surveyed and regularly maintained every three years.

The OSET Plan requires that from December 2013 all residents either connect to a reticulated system, provide an advanced treatment system on-site or obtain resource consent from the Regional Council for their existing system as a discretionary activity. As such, many of the private householder disposal beds at Maketu / Little Waihi will require significant upgrade or replacement to meet the OSET Plan requirements.

Maketu and Little Waihi communities are amongst the lowest social economic groups with the Western Bay of Plenty region, with a deprivation index of 9.7. There is potential to create significant financial hardship within the communities by the implementation of a wastewater scheme, or any attempt to upgrade existing facilities to a minimum standard. The introduction of a subsidy grant applicable for community wastewater scheme offers a significantly better position than individuals dealing with their own properties with no government subsidy available.

It is for these reasons that WBOPDC has undertaken a comprehensive study and consultation of the options for disposal of wastewater from Maketu / Little Waihi communities.

3 CONSENTS REQUIRED

3.1 RESOURCE CONSENT

In December 2009 WBOPDC applied for resource consent to discharge treated municipal wastewater to land by way of sub-surface irrigation at Arawa Avenue, Maketu. The duration of the consent was sought for 35 years.

The application was publicly notified in the Te Puke Times and Bay of Plenty Times on 31 March 2010. Notice of the application was served on 36 interested parties and submissions closed on Friday 30 April 2010.

In response to the public notification 147 submissions in opposition and one in favour of the scheme were received. The hearings were held at the Orchard, Te Puke on Monday 19 July – Wednesday 21 July 2010.

A 35 year consent was granted in late August 2010.

3.2 NEW ZEALAND HISTORIC PLACES TRUST AUTHORITY

In addition to the resource consent for the discharge of treated wastewater WBOPDC were required to seek three NZHPT authorities and 531 land owner entry consents. An NZHPT Authority was required for the wastewater treatment plant and disposal field site, one for the reticulation infrastructure in the road reserve and one for each individual household connection (in total 531).

3.3 LAND OWNER ENTRY CONSENT

A project team of 3 staff (Project Manager, Field Supervisor and Administrator) were based full time in Maketu to gain the necessary signatures for landowner entry consent and NZHPT Authorities. After signing the landowner entry consents, appointments needed to be negotiated with the property owners for the electrical house upgrades. Approximately 25% of the houses in Maketu / Little Waihi are only occupied on the weekends or during school holidays. This made it necessary to work after hours to receive all consent forms before the physical work could start. A spreadsheet was developed to cover and control all the necessary aspects (see Appendix A).

3.4 VERMICOMPOSTING PLANT

In March 2012 WBOPDC was granted resource consent for a vermicomposting farm at the southeast corner of the wastewater treatment plant area. The produced bio-solids are mixed with fibre from a paper mill and applied in windrows. After approximately one year the final product can be used as a fertilizer and applied to land in accordance with the Guidelines for the Safe Application of Bio-Solids to Land in New Zealand (NZWWA, 2003).

4 DESIGN AND TENDERING PROCESS

In September 2010 URS New Zealand Ltd was engaged to prepare a tender document for a design-build and operate contract based on the FIDIC Gold Book. Reference is made to Martin Evans', URS New Zealand Ltd and Graeme Brown's, WBOPDC paper "One of a Kind – Unique Treatment of Grinder Pump Effluent" for further details.

The design and tender of the reticulation and installation of the grinder pumps, was undertaken by Hydrus Engineering Consultants in Rotorua. Hydrus were also responsible for the preparation of the tender documents for the procurement for the grinder pump system.

The key drivers in the final design choice for the wastewater scheme were based on the following:

- Lowest operational and maintenance costs
- Ability to stage the treatment plant
- Infiltration to chosen system to be a minimum
- Proven type system operating within NZ of a similar size to the proposed Maketu / Little Waihi scheme
- Design-build and operate treatment plant option chosen to reduce risk of operating costs and ensure compliance to specification of design
- Property owners connected immediately – treatment plant is operational (no extra cost required as no requirement for individual drain layer)
- Council manages capital and operational components of grinder pump on long term basis
- Property owner only required to ensure pipework from own property to grinder pump is kept in good condition

The physical works tender process was completed by the end of March 2011, allowing project staff to reconfirm the overall cost of the Maketu / Little Waihi Wastewater project.

The tender process was undertaken in three distinct phases which were aligned to the project procurement process, namely:

- Phase 1 Interceptor / Grinder Pump Procurement Tender Contract No 10/1033
- Phase 2 Onsite Property Collection and Reticulation Tender Contract No 10/1032
- Phase 3 Treatment Plant and Disposal Field Tender Contract No 10/1030 and 10/1031
- Phase 4 Upgrade of Electrical House Connections / Telemetry Tender Contract No 10/1034 and 10/1035

Resulting outcomes from this tender process confirmed that the published capital expenditure and operational / maintenance costs are within the published figures conveyed to the community.

Phase 1 - Interceptor / Grinder Pump Procurement Tender Contract No 10/1033

Three major manufacturers of grinder pumps currently operate within New Zealand, all three offer similar technology with minor differences in terms of performance and operational costs. The three tenders received on the 11th February 2011 for the Interceptor / Grinder Pump Procurement Tender were evaluated against a weighted attribute process with the following results.

1.	Ecoflow Ltd	$2,128,370
2.	ITT Water and Wastewater	$2,300,006
3.	Mono Pumps (NZ) Ltd	$2,561,940
4.	Engineers estimate	$2,163,260

Allowance for exchange rates by all three tenders was included in the tender submission as a risk component to Council. Accordingly an adjustment to the tender price was subject to financial exchange rate between the NZ$ / US$. Ecoflow Ltd won the contract offering the most competitive tender. The tender has been adjusted for additional pump units required.

Phase 2 - Onsite Property Collection and Reticulation Tender Contract No 10/1032

Six tender submissions were received on the 28th February 2011 for the Reticulation and Onsite Property Collection Tender Contract No 10/1032. Each tender was evaluated against a weighted attribute process, with an interaction tender meeting being held with each tender on 10th March 2011 with the following results:

1.	Loveridge Ltd	$3,847,972
2.	Armadillo 2007 Ltd	$4,604,699
3.	HEB Construction	$4,799,895
4.	Brown Drainage & Construction Ltd	$5,406,670
5.	Hawkins Infrastructure	$5,575,111
6.	Downer	$5,728,290
7.	Engineers estimate	$6,522,425

The tender evaluation process had two components, a non-priced attribute which scores the tenders ability in areas of expertise, namely; relevant experience / track record, technical skills, management and quality assurance skills and methodology.

The second component being the pricing envelope was only opened when successfully scoring sufficient points from the first component. The two scores are combined to establish the overall successful tenderers ranking.

The tendering process confirmed that the contract would be awarded to Loveridge Ltd.

Phase 3 - Treatment Plant and Disposal Field Tender Contract No 10/1030 and 10/1031

The tender process for a design-build and operate wastewater treatment plant concluded on the 15th February 2011 with four tender submissions being received. Tenders were evaluated in a two stage weighted attribute process with the following results:

1.	Spartan Construction Ltd	$4,247,465
2.	Hawkins Infrastructure (conforming)	$6,728,820
3.	Downer	$7,883,222
4.	Tenix New Zealand Ltd	$8,500,000
5.	Hawkins Alternative Tender Bid	$5,784,517
6.	Engineers estimate	$4,500,000

All four tender submitters have opted for an Sequential Batch Reactor (SBR) type design wastewater treatment plant.

Spartan Construction Ltd.'s tender submission included a number of additional refinements to the design for addressing future growth and enhanced levels of treatment furthermore they offered the most competitive tender at $4,247,465. Spartan Construction Ltd was therefore awarded the contract.

Phase 4 – Upgrade of Electrical House Connections / Telemetry Tender Contract No 10/1034 and 10/1035

The contract for the upgrade of the electrical house connections was awarded to City Care, Council's operations and maintenance contractor.

During the consultation phase City Care inspected 244 houses out of a total of 531. Based on the gained information of necessary upgrades the "worst case scenario" for electrical upgrades was estimated at $466k.

Figure 1: Reticulation of the Maketu / Little Waihi Community

5 CONSTRUCTION

The project was constructed in three distinct components:

- Onsite individual property works (install grinder pump and associated service piping)
- Reticulation of the community (pipework in the streets and construction of two pump stations and rising main to treatment plant)
- Construction of treatment plant and associated disposal field

The on-site property collection reticulation encompasses the installation of the grinder pumps including electrical supply, the replacement of the existing service piping from house to the grinder pump and out to boundary kit, the decommissioning of the septic tank including pump out collapsing and filling and finally the reinstatement of the property grounds.

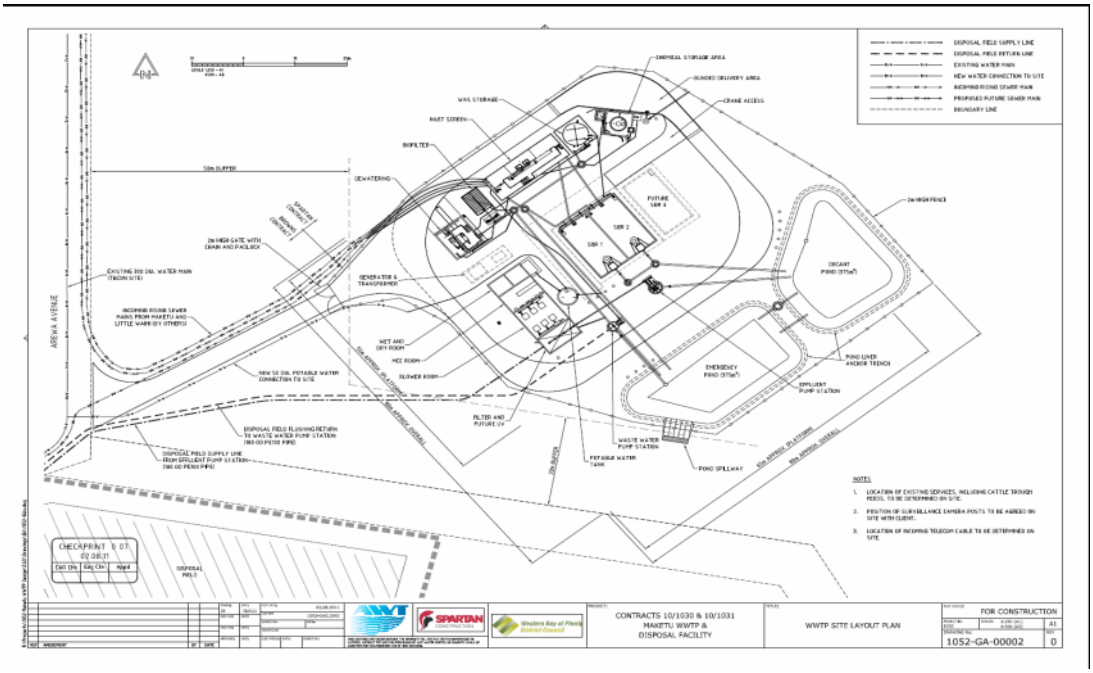

Figure 2: Design Layout of the Wastewater Treatment Plant

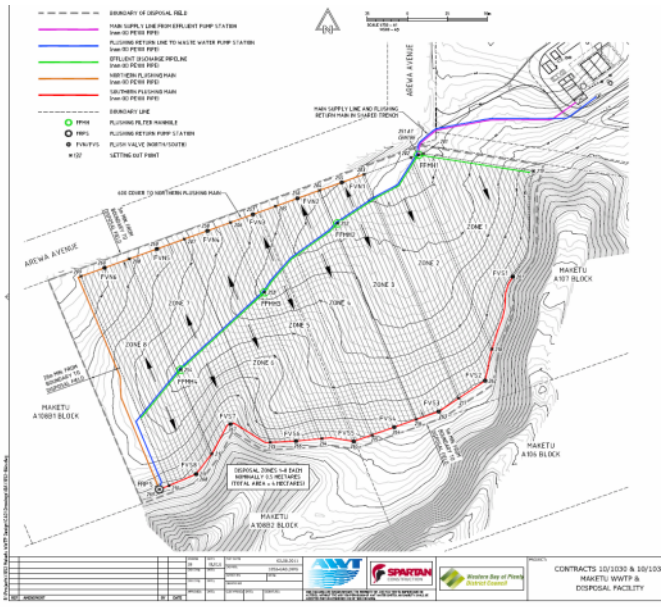

Figure 3: Design Layout of the

5.1 FUNDING / TIMEFRAMES

Bay of Plenty Regional Council (BOPRC), through its "On-Site Effluent Treatment (OSET) Regional Plan 2006", identified high nutrient levels in the Maketu and Little Waihi estuaries causing a significant drop in water quality and contamination of shellfish. This has impacted on the health of the public and surrounding environment. Underperforming and poor maintenance of existing conventional septic tank systems were identified as a contributing factor within the Maketu and Little Waihi communities.

The Maketu and Little Waihi Wastewater Scheme was initiated by the Western Bay of Plenty District Council (Council) to eliminate the use of conventional septic tanks and reduce the nutrient levels in the Maketu and Little Waihi estuaries.

Council secured funding for the scheme from central government and BOPRC of $10.5m and $2.49m including GST respectively. Following extensive investigations the Operational Services Committee accepted and approved a proposal to use a Low Pressure Grinder Pump System complete with a SBR Treatment process on 24 March 2011.

On-site works began on 25 July 2011 and was scheduled to be completed by 31 August 2012. The original programme was scheduled to be completed by 31 May 2012. Programme slippage was mainly due to;

- Expanding the scheme to include 12 extra connections further down Wilson Road North
- 30 potential connections on a Te Arawa Lakes Trust block behind Lyndhurst Avenue, Little Waihi requiring verification to be connected.
- The contractor having to revisit 33 properties in Catchments 1 & 2

5.2 WASTEWATER TREATMENT PLANT – SPARTAN CONSTRUCTION LTD

Construction of the Treatment Plant is 99% complete and has been operational since 16 January 2012. A lack of inflow of effluent has challenged the contractor to complete the commissioning and testing of the plant and meet Discharge Resource Consent compliance. However, as more property wastewater connections have come on stream, inflow into the plant has increased sufficiently enough to stabilise the process and enable commissioning to be completed. Consequently, the plant is now complying with the Resource Consent requirements. This is encouraging, considering the plant is still in its trial phase and is expected to further improve operationally as the operators become more familiar with the process and sort out "the process bugs" – predominantly electrical / programming issues.

The contractor is currently in the trial operational phase and will operate and maintain the plant for one year prior to hand-over to Council in May 2013.

Some minor works will continue at the plant to improve operability;

- Installing additional valves and flow meters
- Setting up sampling room
- Constructing additional accessways / pathways
- Installing security cameras / alarm

All but one programme milestone was not met and completed on schedule. Due to the graduated rate of grinder pump connections - inflow into the plant, the start up and commissioning phases slipped by 4 weeks. The original grinder pump connection schedule intended connecting up the three camp grounds, Maketu Pies and 60 residential properties prior to Christmas to get sufficient flow into the plant. However, the schedule was revised

due to the plant being unable to process a large instantaneous inflow at start-up. The plant needed a constant increase in flow to enable the biological process to establish itself.

Forecast expenditure will exceed budget due to additional items requested by the Project team;

- Tar sealed drive
- Curb & channelling
- Excavation works on embankments & disposal field
- Extra cattle fencing around embankments
- Minor works mentioned above

Budget	$4.55m
Actual to date	$4.71m
Forecast	**$4.80m**

There were no significant issues during the construction of the plant. Health and safety incidents were very minor and archaeological discoveries insignificant – plant is built over an old farm house site.

To date, 477 connections have been completed and in-flow into the plant is averaging 190 cu.m/day – capacity of plant is 635 cu.m/day.

Spartan Construction Ltd completed construction of the plant on time and to budget – bar variation requests from Council. The programme for testing and commissioning of the plant has slipped and some minor works is currently in progress. Overall, the plant is fit for purpose and the Project team is confident that it will easily meet if not exceed expectations in time. The project acknowledged the valuable contribution of Spartan Construction Ltd in making this a successful project.

5.3 RETICULATION / PUMP INSTALLATIONS – LOVERIDGE DRAINAGE LTD

Loveridge Drainage Ltd started construction on the reticulation, raising mains and pump stations in June 2011. Programme milestones for the reticulation and rising mains were completed on schedule. The timeline for the pump stations was allowed to slip as the focus changed from connecting up properties in Catchment 1 to Catchment 2.

Pump Stations (PS) 1 & 2 are fully operational, with minor works being completed on PS1 – construction of a concrete drive and security fence.

A bonus in the construction of the reticulation has been directional drilling 90% of the mains. The disruption to the community and environment has been minimal as compared to traditional trenching methodologies.

- Reticulation - 27km of mains pipe

60 properties in catchment 2 were connected to the mains between 5 December – 16 December 2011. Construction works ceased over the Christmas and New Year period and resumed on 16 January 2012.

Pump installations / connections – as of 19 July 2012:

- Total 531
- Completed 479
- Outstanding 52

Outstanding connections;

- All works on the Te Arawa Lakes Trust property – 30 houses, behind Lyndhurst Avenue in Little Waihi were "on-hold" from the beginning of the construction. The Trust has recently given approval to connect all properties on the Little Waihi estuary. These incurred additional costs to the project as the contractor had to re-establish on site – extra costs are reflected in forecast spend.

- Wilson Road North extension – 12 houses / 500m of mains. Mid-way through the project Council sought extra funding to include 12 extra dwellings further along Wilson Road North. Despite being outside the "maintenance zone", Regional Council approved an extra $120k of funding to connect these houses to the scheme.

- Missed properties – 12 in Catchments 1 & 2. Issues vary from no power, waiting on wastewater flow meters, dwellings under construction, long drops (no ablution block) to not wanting to connect to the scheme – 9 properties. The project team is currently working through these issues.

These issues have impacted on the projects scheduled completion date – 31 May 2012, pushing it out to 31 August 2012.

Forecast expenditure will exceed budget by 3% due to the items outlined above:

Budget	$3.90m
Actual to date	$3.35m
Forecast	**$4.06m**

The team will be investigating wastewater flows from a cross-section of sources by installing wastewater flow meters on selected commercial and domestic properties. The data will be used to support future wastewater rating models.

A number of archaeological discoveries were made and archived.

- 2 x human remains – Koiwi
- Most were middens.

No significant health and safety incidents have occurred to date. The contractor has incurred some vandalism and property theft.

Loveridge Drainage Ltd is performing exceptionally well. Despite a slow start in the beginning mainly due to a hold-up with the Historic Places Trust consent and Councils Road Opening Notice they completed the construction of the Reticulation on schedule. Pump installations also started slowly, however this was ramped up as more resources were secured.

Of particular note has been their customer focus and flexibility in dealing with the community. Whilst there has been some minor complaints about the timing of some reinstatement works on residents properties this has mainly occurred as a result of poor communication i.e. the re-instatement team(s) enters the property after the installation works and the septic tank has been cleaned out, sometimes up to a week later.

5.4 PUMP SUPPLY – ECOFLOW LTD

Considerable savings were made by purchasing foreign exchange ($USD) at the beginning of the project. This has enabled the purchase of 15 extra units for future development of vacant sections within the maintenance zone.

Pump Units:

Simplex Pumps	519
Duplex Pumps	12
Spare units	15
Total	546
Budget	$2.8m
Actual to date	$2.3m
Forecast	**$2.58m**

5.5 ELECTRICAL

Power Supply - transformer and power connection costs for the treatment plant and pump stations have come in significantly under budget.

Household electrical upgrades have also been significantly under budget. Our initial survey identified major issues with power supply within the Maketu and Little Waihi communities. The initial budget took into account a potential upgrade of the power supply in each dwelling – average $1,300 per house. Following subsequent meetings with the power supplier Powerco, the main issue is the deterioration of the current low voltage infrastructure in Maketu and Little Waihi, owned and operated by Powerco. Actual average cost per house $700.

Budget	$1.002m
Actual to date	$0.635m
Forecast	**$0.696m**

5.6 COMMUNICATION MANAGEMENT

Community engagement was provided by various media. These included:

- Six weekly public meetings
- Six weekly newsletters (alternating between public meeting schedules)
- Regular contributions to the local newsletter – Mai Maketu
- Regular reporting of significant project milestones – site blessing, plant opening etc
- Opening a project office in the Maketu Community Centre.

Following on from Council approving the scheme, engagement with the community was disappointing. Public meeting attendances dropped away considerably. There was a high level of uninformed residents which had been challenging for the team, particularly when seeking Land Owner Entry Consents or scheduling on-site meetings / works.

One particular highlight was the successive engagement of two local residents as project co-ordinator on the project team. Their local knowledge and rapport with residents was invaluable and a real bonus for the team.

6 CHALLENGES / ISSUES

6.1 POWER SUPPLY

During the community consultation phase it became apparent to WBOPDC that there were power supply issues in Maketu / Little Waihi communities. Council raised this issue with Power Co prior to starting the project. Council expanded the scope of the project to include an electrical survey of each property and upgrade any electrical capacity / compliance issues at each property.

City Care Ltd were engaged to carry out the survey and upgrades and to mount the grinder pump control panel on each property.

Tests were carried out in accordance with current regulations which included insulation, continuity, earth loop independence and visual tests.

The grinder pumps need a start up voltage of a minimum of 216 volts which is programmed into the controller.

After nearly 90% of the grinder pumps were installed some property owners experienced issues with their power supply. From discussions with the power supply company it became apparent that the power from the distribution transformers was produced at 230 volts. However there is a 6% allowance and the minimum voltage they are obliged to provide to the customers point of supply is 216 volts. Coupled with losses inside the property, the final voltage to the grinder pumps could be less than the minimum required.

6.2 MULTIPLE DWELLINGS

The definition for a dwelling is “a self contained residential unit designed for or occupied exclusively, one household and includes apartments, semi-detached and detached houses, home units, townhouses and similar forms of residential development”.

In Maketu and Little Waihi 44 properties were identified as having multiple dwellings.

6.3 OWNERSHIP OF EQUIPMENT

Council owns the grinder pump and wastewater pipeline from the pump unit to the boundary kit and pipework up to the wastewater treatment plant. Council is responsible for the long term maintenance and replacement for each property (predicted 10 – 15 year life span for the pump).

6.4 NON CONSENTED STRUCTURES

Onsite investigations through obtaining landowner entry consents, revealed a significant number of properties that fell into the “non standard property connections” list. The list is split into three categories, namely:

1. No existing sanitary fixtures (ie; long drop toilet)

2. No power supply

3. No consent dwelling

A number of these properties are located on Maori owned land and in some instances have been constructed prior to the 1920's. Given some of the delicate issues around these buildings, Council continues to maintain dialogue with each owner on the proposed way forward. While a regulatory response may be the simple answer, the consequences of such action will not achieve the required outcome, but create more resentment and hostility.

6.5 INDUSTRIAL AND COMMERCIAL PREMISES

The Maketu / Little Waihi Wastewater Scheme services a number of commercial and industrial operations within the catchment area.

These include:

Maketu Beach Holiday Park	10 pans
Hill Top Holiday Park	17 pans
Bledisloe Holiday Park	22 pans
Maketu Mechanical Workshop	3 pans
Maketu Fire Station	2 pans
Maketu Surf Life Saving Club	2 pans
Two Local Marae's	10 pans
Maketu School	9 pans

All have multiple ablution facilities, as such the capacity requirements for the treatment plant sizing have to accommodate for this. Unfortunately for these property owners a separate UAC rate is applied based on the number of pans located on each property site.

The one exception being the Maketu Pies business, given the volume of wastewater and its characteristics, is being charged under Council's Trade Waste regime.

The Uniform Annual Charge in relation to providing a wastewater service can be broken into two components.

1. Fixed Cost – accounts for the financial items associated with constructing the wastewater scheme (servicing of loan payments, interest payments, overheads).

2. Variable Cost – accounts for the operational costs of running the day to day activities of the infrastructure and treatment plant (ie; maintenance, parts, chemicals).

The calculation is based on the total costs of capital and operational expenditure for one years (12 months) operation.

For the 2012/2013 financial year the fixed costs and variable costs have been assessed as:

= Fixed Cost + Variable Cost

= $321,666 + $265,050

= $586,716

Therefore the fixed cost rate:

= 321,660 = 55%

586,716

And the variable cost rate:

= 265,050 = 45%

586,710

The calculation for determining the fixed charge value is:

= 641 x 55% (fixed cost) + 641 x 45% x 0.25 (variable cost)

= $352.55 + $72.11

= $424.66

6.6 PROPERTY OWNERS REFUSING TO CONNECT

Nine property owners have voiced their position in terms of not wishing to comply with Council's requests to allow entry onto the property to install the necessary infrastructure.

All of the properties are located within the Bay of Plenty Regional Council (BOPRC) maintenance zone and the expectation is that all properties must connect to the Wastewater Scheme.

The Maketu / Little Waihi Wastewater Scheme incorporates the connection of all properties from the road boundary kit to the property as part of the main contract. The properties is connected immediately with no requirement for the property owner to engage a drainlayer.

Council's preferred process has always been to gain mutual agreement between parties. Unfortunately the only option left is to progress the connection process using statutory requirements under the Local Government Act 1974.

7 FINAL COST

	Budget	**Spend**
Grinder Pump Kits	2,800,000	2,580,000
Reticulation	3,900,000	4,067,000
Treatment & Disposal	4,550,000	4,808,000
Secondary Contractors	1,002,000	696,812
Engineering	840,000	600,000
Land Purchase / Lease	987,000	457,652

Consenting Works	1,251,000	1,251,000
Contingency	1,000,000	0
Total	**16,330,000**	**14,460,464**

Because of the high level of funding, property owners will only pay a Uniform Annual Charge of $642 plus GST.

Figure 4: Final Plant Layout

1. Inlet works and grit removal and associate biofilter for odour control
2. SBR reactors
3. Effluent Storage Pond
4. Effluent Pump Station
5. Control Room and Blower Building.
6. Disposal Field
7. Dewatering Building
8. Temporary WAS Storage
9. Chemical Storage Area
10. Worm Farm Area

8 CONCLUSIONS

The Maketu / Little Waihi Wastewater Treatment Plant was officially opened in April 2012 marking the conclusion of some twelve years of consultation, design preparation and the final execution of the physical works.

The journey has not been an easy road with a number of barriers to overcome along the way. Affordability for the community has remained the key focus for staff responsible for implementing the wastewater scheme. This has brought about a number of major changes during the design stage from two years ago to ensure a robust and long term solution that is both affordable and acceptable to the community and key stakeholders.

The project has been successful on two fronts; the physical works were completed within a twelve month period and the project came in under budget due to a number of cost savings initiated by the project team.

At the time of going to print, the wastewater treatment plant has been successfully delivering on its performance measures for the last four months with an expectation that the results of the $15 million expenditure will be quantifiable from the improvements measured via the environmental monitoring.

ACKNOWLEDGEMENTS

The authors wish to thank Martin Evans, URS and Joseph Stewart, Project Manager WBOPDC for the information provided on the Maketu / Little Waihi Wastewater Scheme.

REFERENCES

Bioresearches (2000), Maketu – Pukehina District Wastewater Treatment Scheme Assessment of Environmental Effects, Maketu Gully Option

Duffill Watts & King Ltd (2007) Review of Maketu, Little Waihi and Pukehina Wastewater Disposal Options (total report)

Duffill Watts & King Ltd (2008) Maketu, Little Waihi and Pukehina Wastewater Scheme, Preliminary Design Report (total report)

MWH (2004), Maketu, Little Waihi and Pukehina Beach Wastewater Treatment Plant and Reticulation, Assessment of Effects on the Environment Preliminary Draft

Thomas, Fraser (1997) Maketu – Pukehina Beach Sewerage Project, Stage 1 Report Investigation & Evaluation of Problem (total report)

Thomas, Fraser (2000) Maketu – Pukehina Beach Sewerage Project, Summary Report (total report)

Thomas, Fraser (2004) Maketu, Little Waihi and Pukehina Beach Sewerage Scheme Preliminary Design Report (total report)

Thomas, Fraser (2006) Maketu - Pukehina Beach Wastewater Scheme, Maketu Gully Optimised Effluent Irrigation Investigation (total report)

URS (2003), Maketu, Little Waihi and Pukehina Beach Wastewater Scheme Review of Alternative Wastewater Options

URS (2009), Maketu, Little Waihi Wastewater Project Option Review

WBOPDC (2010) Hill, Kelvin and Glasner, Ulrich - Maketu / Little Waihi Wastewater Scheme; Affordability Versus Sustainability

NOMENCLATURE

AEE	Assessment of Environmental Effects
ANZECC	Australian and New Zealand Environment Conservation Council
BNR	Biological Nutrient Reduction
Directional Drilling	Placement of a pipeline using construction technique for installation of a pipeline within a borehole cavity drilled through the ground
EBoP	Environment Bay of Plenty
I/I	Infiltration and Inflow. Being water flows into the sewerage system that enter either via infiltration through cracks in manholes, pipework or other defects or inflows being water entering via overland flow through septic tank lids, manhole lids and similar locations
lps	Litres per second
m/s	Metres per second
m^3	Cubic metres
m^3/s	Cubic metres per second (cumecs)
MHWS	Line of mean high water springs tide
MBR	Membrane Bioreactor
MOU	Memorandum of Understanding
mm	Millimetres
mPVC	Modified polyvinylchloride
Nominal Diameter	Approximate size of a pipeline
NZHPT	New Zealand Historic Places Trust
OSET	On –Site Effluent Treatment
PS	Pump station
Rising main	Pipeline under pressure from pumped system. Connects from low to high level points.
RMA	Resource Management Act 1991
SAF	Submerged Air Floatation
SBR	Sequential Batch Reactor
STEG	Septic Tank Effluent Gravity
STEP	Septic Tank Effluent Pressure
Telemetry	Remote controlled radio communications system
TN	Total Nitrogen
TP	Total Phosphorus
WBOPDC	Western Bay of Plenty District Council
WWTP	Wastewater Treatment Plant
Wetwell	Underground concrete tank which houses submersible wastewater pumps and acts as a collection tank for wastewater inflows.
HRI	High Rate Irrigation

Appendix A