

PLANNING FOR UNPRECEDENTED WASTEWATER INFRASTRUCTURE EXPANSION IN TAUPO

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ABSTRACT

The Taupo area is unique and has experienced substantial growth over the past five years. Given the sensitive nature of the Lake Taupo environment, both Taupo District Council (TDC) and Environment Waikato have concerns with the projected level and rate of growth.

In order to effectively plan for the projected growth, TDC implemented through the RMA planning process Structure Plans for the various catchments. The purpose of a Structure Plan is to ensure that environmental “bottom lines” could be met as a result of the development and to consider the effects of all development on a catchment by catchment basis as opposed to one particular subdivision at a time.

This paper sets out the scientific and engineering investigations implemented to establish the potential environmental effects and the wastewater infrastructure required to protect the surrounding receiving environment and ultimately Lake Taupo. The study focuses on the development of a Wastewater Master Plan to meet the long term infrastructure requirements and this allows TDC to effectively implement through development contributions and rating funding mechanisms appropriate wastewater systems for the future.

KEYWORDS

Master Plan, Structure Plan

1 INTRODUCTION

The Local Government Act 2002 [Section 10] defines the purpose of local government as:

“to enable democratic decision-making and action by, and on behalf of, communities and to promote the social, economic, environmental and cultural well-being of communities, in the present and in the future”.

With the varied areas over which each district council has jurisdiction, planning documents are vital to manage development resources, funds and assets for the catchment areas. The Taupo District for example covers a wide catchment area and includes the whole of Lake Taupo, the Tongariro and Upper Waikato rivers, substantial geothermal resources, expansive areas of exotic pine and native forests, farmlands, and a portion of the Tongariro National Park, Kaimanawa Ranges and the Central Plateau mountains. The main urban areas within the district are Taupo, Turangi and Mangakino with a number of smaller settlements around the shores of Lake Taupo which include Kinloch, Acacia Bay, Waitahanui, Hatepe, Motutere and Whareroa, amongst others. Figure 1 depicts the catchment areas within the Taupo District and also shows the approximate coverage areas of the twelve sewerage schemes currently owned and operated by TDC, along with areas that TDC plans to service in the next 10 years.

Figure 1: Taupo District Catchment Areas



The total land area covered by the district is estimated at 6,354Km² with an estimated district wide population of approximately 33,600 as documented by Statistics New Zealand (June 2004).

With the vast area covered by the district, effective mechanisms for managing growth within both the rural and urban areas are required.

The fundamental requirements for planning strategies are detailed below:

- To protect the environment whilst at the same time allowing the sustainable development of the communities
- Ensuring Council plays a responsible role in the economic and social development of the district
- Requirement to have a clearer view of occurrences and locations of growth pressures district wide as well as within discrete catchments to allow for the assessment of the cumulative effects of these
- Requirement to strategically manage district growth
- Prioritising pressures on the infrastructure in the various schemes district wide and ensuring effective use of ratepayer dollars
- Annual budgeting purposes – requirements within the district have to be prioritised in accordance to the available annual budgets and level of importance or immediate pressures

This paper focuses on the wastewater reticulation, treatment and disposal planning strategy aspects and utilises the Taupo District as a case study.

2 EXISTING COUNCIL STANDARDS

2.1 EXISTING COUNCIL POLICIES, STANDARDS AND PLANS

The Local Government Act 2002 (LGA 2002) requires Councils to prepare two planning documents namely, the Long Term Council Community Plan (LTCCP) and the Annual Plan. These documents are therefore a statutory requirement for all Local Government bodies within New Zealand and are unique to each district. The LTCCP is intended to serve as a council's main planning document that establishes project requirements within the district, the corresponding budgeted cost and source of revenue for the project. The LTCCP is typically a 10 year planning document (10 years is a statutory minimum) and is updated intermittently (at intervals no longer than 3 years). The Annual Plan complements the LTCCP by providing information of the council's strategies for the year and budgets allocated. This is based on the policies and budgets outlined in the LTCCP, is published annually and allows for unforeseen changes in the timing of projects and changes in the original estimated cost of projects as set out in the LTCCP. These changes may arise due to the introduction of new compliance standards, inputs from the community or new environmental or other eventualities that require action from Council hence requiring for project reprioritising in some cases.

In addition to the above legally required documents, Councils may adopt additional planning strategies and tools to assist in the management of assets, funds and growth within the individual districts. TDC for example has opted to adopt the following additional plans:

Asset Management Plans (AMPs)

These documents outline TDC's long term plan to manage infrastructure in association with Council adopted strategies, policies and plans, and include strategies for the future of each asset whilst taking into account the projected level of service required by the community serviced, its effective management, its priority against all other assets owned by the district and a financial budget for the asset. AMP's are prepared for each of the asset groups that TDC manages. TDC's current Wastewater AMP provides a medium term planning overview of the abovementioned management requirements and planned work programmes for each wastewater asset over a 10 year period (currently July 2006 to July 2016).

The purpose of the Wastewater AMP is to:

- Satisfy community and statutory requirements in a cost effective manner whilst managing risk to an acceptable level.
- Improving wastewater treatment systems, distribution networks, extending reticulation and treatment schemes to areas currently not serviced and adopting maintenance strategies with the aim to improve sustainability of schemes and minimise environmental effects.
- Serve as a tool to integrate management, financial, engineering and technical aspects to meet the level of service demands of the community in a cost effective manner.

Development Contributions Policy (DCP)

This document, adopted by TDC in 2004, is targeted at assisting TDC in determining financial contributions to be borne by developers in order to fund the increased demand on services brought about by the incorporation of a development into a centralised district (scheme such as a community wastewater reticulation, treatment and disposal system). Previous to the adoption of the DCP, TDC was only able to recover a limited amount of costs from developers, thus relying on the utilisation of rates to expand the capacity of the respective schemes to accommodate subdivisions and developments within the district.

2.1.1 FACTORS LEADING TO THE REQUIREMENT FOR A WASTEWATER MASTER PLAN

Although the plans and strategies currently adopted by TDC are comprehensive and provide for effective management of infrastructure within the district, the requirement arose for an additional planning document to fully integrate the planning tools currently in place and to allow for effective management of the wastewater schemes. A Master Plan was developed for TDC's wastewater schemes within the Taupo Bay area. This encompasses the schemes for Taupo, Acacia Bay and Waitahanui/Five Mil bay. The purpose of the Master Plan is to:

- Serve as a tool to integrate existing planning documents and strategies for the wastewater infrastructure within the catchments covered by the plan.
- Serve as an interactive 'live' document which is updated at more frequent intervals than the LTCCP to reflect the progress of Council's projects and to accommodate new pressures and eventualities as they arise.
- Set out the timing and prioritising of planned projects in an effective and user-friendly manner over the course of the plan (20 years).
- Serve as a long and short term budgetary tool for Council
- Developing a common standard for allocation of growth, backlog and renewal costs to developers and existing users.
- Providing various levels of information for project infrastructure, planning and budgeting (from detailed project information to summary lists/totals) to suit the level of detail required by tier of management.

3 COMPILATION OF THE MASTER PLAN

3.1 BASIS OF COMPILATION

The primary purpose of the Wastewater Master Plan compiled for TDC was to set the basis for determination of project funding based on growth, backlog and renewals for three adjacent catchment areas within the district, namely, Taupo Central, Acacia Bay and Waitahanui. It was decided to combine these three adjacent catchments (with separate existing schemes) in the same Master Plan as previous feasibility studies had recommended centralising the three existing schemes at Taupo when the existing Acacia Bay and Waitahanui Wastewater Treatment Plants reach their design capacities.

The baseline information utilised to form the framework around the plan comprised primarily of growth projections within each catchment area, previously conducted engineering feasibility studies, asset capacity and cost evaluations for Council, capital expenditure and cost allocation methodology, phasing of expenditure, and infrastructural strategies adopted by Council. These are further detailed in the following subsections.

3.1.1 POPULATION PROJECTIONS

Population projections for the district were primarily based on Taupo District Council's Growth Model 2006 – 2041. This was supplemented by other TDC information sources comprised of existing occupied and vacant residential lot statistics derived from (224c and building consent statistics), existing industrial and commercial lot statistics, projected occupancy trends for the district and growth projections/strategies for commercial and industrial areas.

3.1.2 FLOW PROJECTIONS FOR RETICULATION SIZING AND TREATMENT PLANT/DISPOSAL ASSET SIZING

Housing equivalent unit (HEU) projections were derived for each catchment from the population projections and Taupo District engineering standards. Average and instantaneous peak flow forecasts to the wastewater treatment plants and reticulation schemes were then estimated. These flows, in conjunction with known infrastructure capacities, were used to project dates when each particular infrastructure asset (treatment plant and disposal assets, pipelines and pump stations) capacity will be exceeded and require expansion to cope with future demands.

3.1.3 CAPITAL EXPENDITURE AND COST ALLOCATIONS

In order to evaluate the capacities of existing infrastructural assets and investigate options to improve the overall capabilities of various schemes, it is commonplace for local authorities to commission engineering studies. The recommendations and cost estimates from these studies are in turn used as the basis for estimating the timing and extent of investments required in the future. Such studies previously conducted for TDC were utilised as information sources for Master Plan compilation. Where warranted (either due to substantial change in HEU derived from the new population figures or the age of the report and hence the cost estimates) revised budgetary cost assessments were prepared. These capital expenses were then further allocated to growth, backlog and renewals. These three cost allocation categories are described further below:

- **Growth**
This represents the portion of the work that is motivated by anticipated future increases in demand. These costs are allocated to future users.
- **Backlog**
This portion of the expenditure covers the perceived excess of demand over current capacity for the assets concerned. The cost allocated to backlog results either from an increase in level of service provided to the existing users at the time of incorporation of an infrastructural asset or from expansion to compensate for a gradual increase in demand which has already occurred. Examples of an increased level of service include modifications to achieve higher treatment quality in a wastewater treatment plant or an increase in disposal efficiency at a disposal site. Backlog also includes a portion of the cost to increase the capacity of an asset that is currently overloaded and is a cost to the existing users of asset.
- **Renewal**
This refers to the replacement of assets that have reached the end of their working life with new assets of equivalent function and capacity. The renewals costs incorporated in the Master Plan refer to the identified renewals component of a capacity increase or level of service improvement to an existing asset. Pure renewal costs to existing assets (where no capacity increase or level of service improvement is proposed) are not included in the Master Plan. These pure renewals costs are covered by TDC's AMP. The costs allocated to renewals in the Master Plan is a cost to all users of the asset at the time of the planned renewal works and can be extracted and utilised for budgeting purposes by TDC.

The formulae utilised in determining these cost allocations are detailed below:

$$\text{Nett Cost (N.C.)} = [T.C.] - [R.C.]$$

$$\text{Backlog allocation (B.C.)} = [N.C.] \frac{[E.D.] - [E.C.]}{[P.C.] - [E.C.]}$$

$$\text{Growth allocation (G.C.)} = [N.C.] - [B.C.]$$

$$= [N.C.] \frac{[P.C.] - [E.D.]}{[P.C.] - [E.C.]}$$

where

- T.C. Project total cost
- R.C. Renewal cost
- N.C. Nett Cost
- B.C. Backlog Cost
- G.C. Growth Cost
- E.D. Existing demand
- E.C. Existing capacity
- P.C. Proposed capacity: the capacity of the asset after upgrade/expansion.

3.1.4 PHASING OF EXPENDITURE

Given that expenditure that relates purely to renewals work is not included in the Master Plan, the timing of expenditure is determined primarily by infrastructural capacity demands or level of service improvement trigger events (eg. effluent disposal consent expiry and renewal). These increase demand or level of service triggers dictate the period when each asset will require a replacement or an upgrade. The Master Plan provides for a further level of detail by breaking each project down into the time-based phases of planning, engineering and consenting, construction, and commissioning. This serves to give forewarning of upcoming milestones and allows sufficient time and budgets for the preliminary work required for each project. Table 1 below details the typical default time allowances used for the preliminary work based on estimated project capital costs.

Table 1 Typical Time Allowances for Project Phases

Project Capex	Period allowed (months)		
	Consenting and Engineering	Construction	Commissioning
< \$1.0m	12	6	2
> \$1.0m	18	6	2

Clearly, allowances for preliminary work will vary with each project dependent in particular on the degree of preliminary investigation and community consultation (if required for approvals). Where it was recognised that a particular project is likely to vary from the default allowances in Table 1, then more appropriate time allowances were made.

3.1.5 INITIAL REVIEW OF TIMEFRAMES AND CASHFLOW

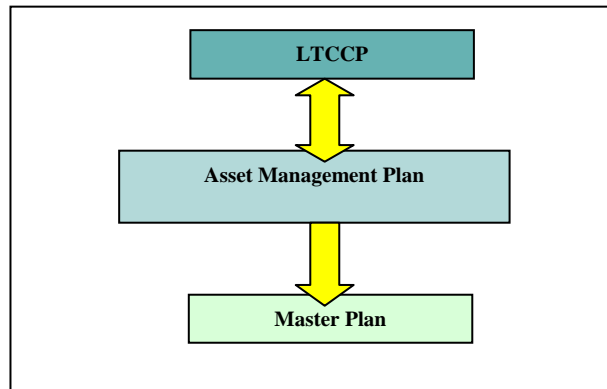
Previous projects identified by TDC for wastewater assets were incorporated in the initial issue of the Master Plan. The initial revision of the Master Plan timeframes (created purely from projected demand versus theoretical capacity) was reviewed by TDC engineering management to identify potential issues such as excessive expenditure, excessive community disruption or excessive drain on TDC or other key resources in any particular year. A ‘reality check’ on timeframes was also conducted. This information was used to generate a second revision resulting in more realistic timeframes for expenditure and project completion.

4 MASTER PLAN UTILISATION

4.1 INCORPORATION INTO PLANNING SCHEME

As detailed in Section 2.1.1, the Wastewater Master Plan is aimed at providing a user friendly planning tool to integrate existing Council wastewater planning documents and allow for the regular update of intended future projects. Figure 2 depicts the integration of the Master Plan into TDC’s other planning mechanisms.

Figure 2: Information Pathway Between TDC Planning Documents



4.2 PRESENTATION

The Master Plan architecture can be adapted to fit into the existing framework of planning schemes adopted by individual local authorities. In the case of TDC, the Plan was divided into two volumes:

- Volume 1 – User manual and project summary reports
- Volume 2 – Interactive planning documents (Schedules, Gantt charts and maps)

Table 2 details the documents included in Volume 2 of the TDC Wastewater Master Plan.

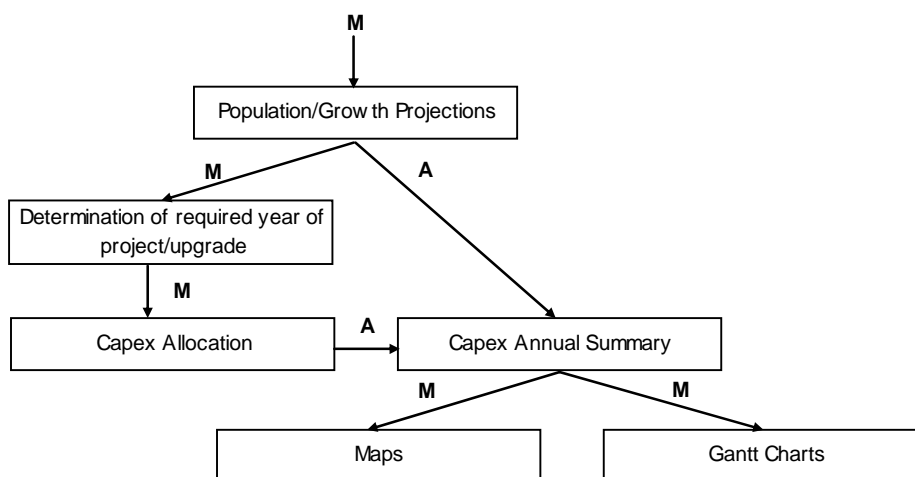
Table 2: Volume 2 documentation

Document	Purpose
Capital Allocation Schedule	Details projected costs and the allocation of capital expenditure to growth, renewals and backlog.
Capital Annual Summary Schedule	Stages the capital expenditure over the 20 years covered by the Plan. Colour-coded to indicate whether the projects are imminent or longer-term.
Gantt Charts	Shows approximate periods when various elements of the infrastructure are expected to reach their capacity limits and have to be upgraded, supplemented or replaced. These also mirror the entries, timing and colour-coding in the cost schedules.
Maps	GIS Maps detailing the locations of the assets planned for upgrade. These also take the form of a master sheet in pdf format linked to larger-scale sheets for individual areas. In the electronic form, clicking on a particular area in the master sheet opens the relevant detailed sheet of the area. Assets to be upgraded are colour coded to indicate timing. Process flow diagrams of each treatment plant covered by the Plan. Assets planned to be upgraded are colour coded to indicate timing.

Figure 3 details the intra-Plan information update pathway for the Master Plan which will be utilised as existing planned projects are completed or new project demands arise.

Figure 3: Information Pathway within the Master Plan

Note: "M" refers to manual and "A" refers to automatic update



4.2.1 PROJECT CODING SYSTEM

Each planned project is allocated a code for tracking and summarising purposes. The coding structure utilised for the Taupo Wastewater Master Plan was based on TDC's AMP. These are broken down into 5 summary levels and are structured in accordance to the following format:

PP.qq.k.l.m

The following tables detail the level breakdowns associated with the coding system adopted for the TDC Wastewater Master Plan. Please note that Level 4 of the coding system refers to discrete assets or projects classified under the major asset component group (Level 3).

Table 2: Taupo Wastewater Master Plan Project coding system – Levels 1 and 2: Catchment and asset group

Code	Level	Meaning	Current Values	
PP	1	Catchment	AB	Acacia Bay
			TC	Taupo Central
			TS	Taupo South
			WA	Waitahanui/Five Mile bay
qq	2	Asset group	ps	Pump station
			rt	Reticulation
			tm	Telemetry & Monitoring
			tp	Treatment
			dp	Disposal

Table 3: Taupo Wastewater Master Plan Project coding system – Level 3: Asset components

Code	Level	Meaning	Current breakdowns (according to asset group)					
				Pump station	Reticulation	Telemetry & Monitoring	Treatment	Disposal
k	3	Major asset component	1		Piping		Inlet Works	Liquid
			2				Primary	
			3				Secondary	
			4				Tertiary	
			5				Ancillaries	

Table 4: Taupo Wastewater Master Plan Project coding system – Level 5: Capital works

Code	Level	Meaning	Current Values
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m	5	Cost breakdown	1	Preliminary & General
			2	Non-works Costs
			3	Contingency
			4	Installation

***Note: Level 4 refers to discrete assets or projects classified under the major asset component group (level 3).*

The intention of the initial revision of the Taupo Wastewater Master Plan was to focus on the wastewater treatment and disposal aspects within the three catchments covered by the Plan. At the time of compilation of the initial revision of the plan, TDC was undertaking a comprehensive modelling and engineering investigation of the main Taupo sewerage reticulation system which includes evaluation of reticulation pump stations and sewer network capacity. The outcomes of this work will be incorporated into the Master Plan once the study is completed.

An example of the application of this coding system to a project within the Taupo Wastewater Master Plan is project TC.dp.1.3.1 which is the preliminary and general works associated with the replumbing of the existing Rakaunui Rd Land Disposal Scheme (LDS). “TC”, “dp”, “1”, “3” and “1” thus refer to “Taupo Central”, “disposal system”, “liquid disposal”, “replumbing of Rakaunui LDS” and “preliminary and general works” respectively.






As previously indicated, this Master Plan concept is flexible and can be adapted to changing needs or more extensive application. The interactive documents in Volume 2 incorporate information filtering systems to allow individual projects to be summarised to any of the 5 levels described and hence allows for various levels of management to access the required detail of cost and project information in accordance to their requirements. As such, the Master Plan is targeted to cater to a wide range of users, from those requiring summarised projected expenditure for a wastewater scheme through to individual project requiring detailed references to base costs, project references and assumptions utilised (if any) for each project.

4.2.2 MAP/GANTT CHART COLOUR CODING SYSTEM













Similar to the project coding system, the colour coding system utilised within the Master Plan is flexible and can be manipulated in accordance to the end users’ requirements. Ideally, all interactive documents within the Master Plan will follow a single coding system to reflect estimated project milestones. However, as in TDC’s case, existing planning documents have dictated the colour coding scheme for the Master Plan and as such, the capital and project summary documents have been coded in accordance with the convection used in the TDC LTCCP. The maps on the other hand have been coded to reflect the annual coding system currently utilised by TDC planners.

Figure 4: Colour Coding System Applied to Taupo Wastewater Master Plan

COLOUR CODING FOR CAPITAL ANNUAL SUMMARY AND GANTT CHARTS
 In accordance with Taupo District Council's Long Term Council Community Plan (LTCCP)

	:	current - 2009
	:	2010 - 2012
	:	2013 - 2016
	:	2017 - 2021
	:	2022 - 2026

COLOUR CODING FOR MAPS
 In accordance with existing TDC Capital Expenditure Planning Map System

	:	2005/2006
	:	2006/2007
	:	2007/2008
	:	2008/2009
	:	2009/2010
	:	2010/2011
	:	2011/2012
	:	2012/2013
	:	2013/2014
	:	2014/2015
	:	2015/2016
	:	2016 +

Subsequent sections will trace a single project (TC.dp.1.3 – replumbing of the existing Rakaunui Rd LDS) through Volume 2 of the Taupo Wastewater Master Plan.

4.2.3 CAPEX ALLOCATION

The first schedule within Volume 2 is structured as a master sheet incorporating various levels of cost summaries to enable flexibility of level of detail extracted. For example, a user can access the overall capital expenditure for the five main asset groups (namely pump stations, reticulation, telemetry and monitoring, wastewater treatment plant and disposal system) or review the detailed cost breakdown for each individual asset, inclusive of costs attributed to: preliminary and general investigations, engineering design and procurement of required consents, contingency and installation.

The capital cost allocation formulae detailed in Section 3.1.3 have been imbedded in the schedule to allocate each individual cost to growth, renewal and backlog. This has been structured in such a way as to allow for ease of revision by Council should the allocations change in the future.

The projected years for expansion of existing assets or incorporation of new assets have been summarised within the Capex Allocation Schedule. A “reference” column is included in the schedule and this identifies the source of information. This column may direct the reader to an extended list of reference documents included in Volume 2 of the Plan should the reader wish to research further.

Figure 5 illustrates a portion of the Capex Allocation Schedule showing where the example project sits (TC.dp.1.3 highlighted).

Figure 5: Taupo Wastewater Master Plan Capital Allocation Schedule – TC.dp.1.3

Code	Description	Total	Capex (\$)			Reference (for rates) <i>Refer to List of Reference</i>	Estimated Accuracy of Costs (+/- %)	Year
			Growth	Renewals	Backlog			
TC	TAUPO PCP and LDS	\$ 46,634,000	\$ 30,581,000	\$ 293,000	\$ 15,760,000			
TC.ps	Pump Stations	\$ -	\$ -	\$ -	\$ -	-	-	-
TC.rt	Reticulation	\$ -	\$ -	\$ -	\$ -	-	-	-
TC.tm	Telemetry & Monitoring	\$ -	\$ -	\$ -	\$ -	-	-	-
TC.tp	Taupo PCP	\$ 21,728,000	\$ 12,225,000	\$ 293,000	\$ 9,210,000	-	-	-
TC.dp	Disposal/Reuse and Replumb	\$ 24,906,000	\$ 18,356,000	\$ -	\$ 6,550,000	-	-	-
TC.dp.1	Taupo LDS Expansion (Liquid Disposal)	\$ 24,906,000	\$ 18,356,000	\$ -	\$ 6,550,000	TDC Information	-	-
TC.dp.1.1	Purchase New Disposal Land	\$ 8,600,000	\$ 7,197,233	\$ -	\$ 1,402,767	TDC Information	10%	2007
TC.dp.1.2	Obtaining Resource Consents from EW	\$ 300,000	\$ 171,167	\$ -	\$ 128,833	Estimate	30%	2007
TC.dp.1.3	Replumbing Existing Rakaunui Rd LDS	\$ 840,000	\$ -	\$ -	\$ 840,000	TC.3	20%	2008
TC.dp.1.3.1	Preliminary & General	\$ -	\$ -	\$ -	\$ -	-	-	2008
TC.dp.1.3.2	Non-works Costs (Design and Consents)	\$ 204,133	\$ -	\$ -	\$ 204,133	-	-	2008
TC.dp.1.3.3	Contingency	\$ 140,000	\$ -	\$ -	\$ 140,000	-	-	2008
TC.dp.1.3.4	Installation	\$ 495,869	\$ -	\$ -	\$ 495,869	TC.3	-	2008
TC.dp.1.4	Installation of Rakaunui PS and New View Rd LDS	\$ 8,904,000	\$ 7,227,000	\$ -	\$ 1,677,000	TC.3	20%	2008
TC.dp.1.5	Rising Main from Existing Rakaunui Rd LDS to View Rd LDS	\$ 6,262,000	\$ 3,761,000	\$ -	\$ 2,501,000	TC.3	20%	2008
TC.dp.2	Sludge Processing (Solids Disposal)	\$ -	\$ -	\$ -	\$ -	-	-	-

Note: The above figure has been filtered and compressed for illustration purposes.

As detailed in Figure 5, the estimated cost of the replumbing works associated with the Taupo LDS (TC.dp.1.3) was \$840,000 at the time of generation of the Plan. This baseline cost was sourced from reference TC.3 (AWT - February 2007 - View Rd Land Disposal System Preliminary Design Report). The list of references included in Volume 2 is hyperlinked to the above Capex Allocation Schedule. The Capex Allocation Schedule shows the completion of the works within the current financial year (financial year ending 2008). The cost of this project has been allocated purely as backlog to existing users and will not be borne by new developers. As described previously, 3 more general project summary levels are available for TC.dp.1.3 hence allowing for cost information to be summarised for each particular level.

The total projected capital works to be budgeted by TDC up to the end of the 2026 financial year for Taupo Central is estimated at \$46.6million, of which \$30.6million is to be funded by developers and \$16million is to be funded purely by rates.

4.2.4 ANNUAL CAPEX SUMMARY

The Annual Capex Summary schedule provides a more visual view of the phasing of the projected expenditure and is utilised to complement the above master (Capex Allocation) schedule.

Each asset upgrade or expansion can be related to the projected HEU or wastewater flow rate for the specific year. This has been colour-coded to indicate the relative urgency of the upgrades in terms of the LTCCP colour coding system. The information in the Annual Capex Summary schedule is fed from the growth projections and the master Capex Allocation Schedule. As illustrated in Figure 6, this schedule highlights critical dates when the design capacities of the various assets are estimated to be reached, cost forecasts for each asset group over time project years and an annual summary of costs to be utilised by Council for annual budgetary purposes.

4.2.6 GIS MAPS AND PLANT PROCESS FLOW DIAGRAMS

The final interactive documents presented in the Master Plan are the GIS maps and plant process flow diagrams. These are colour-coded in the Taupo Wastewater Master Plan in accordance to the existing coding system utilised by TDC planners to distinguish between imminent and longer-term projects and to correspond with projected milestones in the capex schedules and Gantt charts.

Figure 8: GIS Maps – TC.dp.1.3

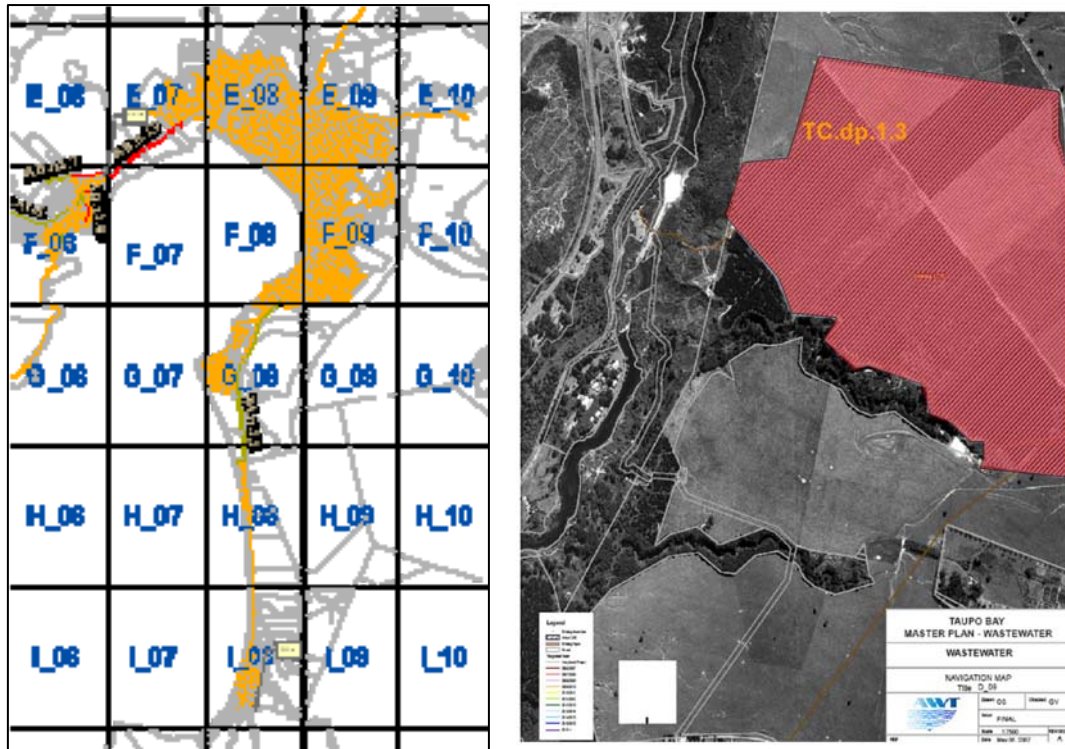
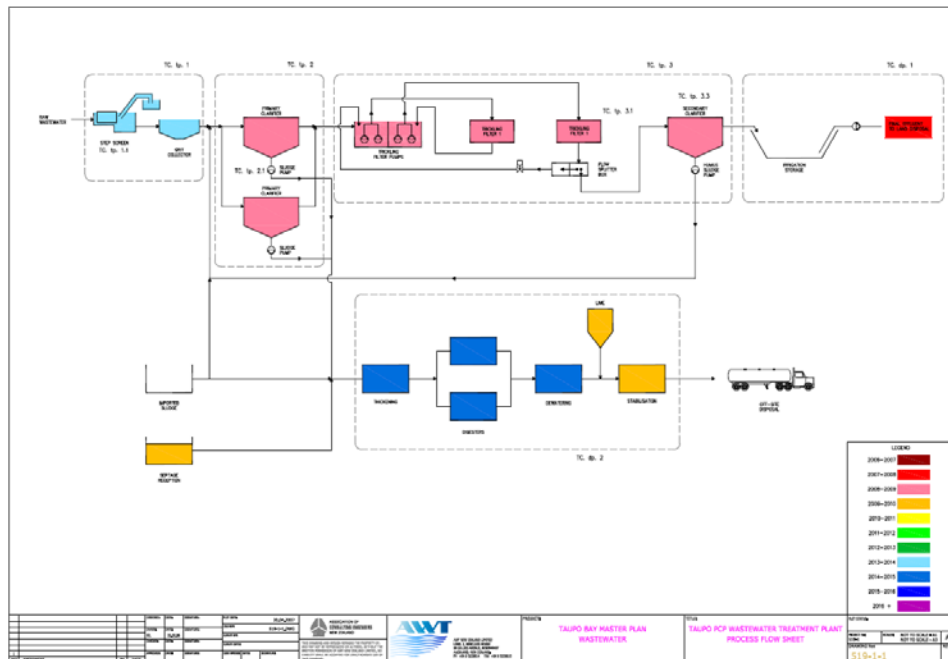


Figure 9: Wastewater Treatment Plant Process Flow Diagram – TC.dp.1.3



As indicated in both Figures 8 and 9, TC.dp.1.3 is colour coded red indicating the requirement for completion of this project by the end of the financial year terminating in June 2008. These maps serve as useful planning tools for Council.

5 ISSUES AND ADDITIONAL CONSIDERATIONS

5.1 MAXIMISING USE OF THE MASTER PLAN

CAPACITY VERSUS FINANCE DRIVEN ANALYSIS

As indicated previously, the initial revision of the Master Plan and the staging of projects were conducted purely on a capacity driven basis with no consideration of the financial or practical implementation issues being made. This approach resulted in an uneven distribution of cash flows over the period covered by the Plan. Local Authorities are subject to funding constraints and hence smoothing of the capital expenditure was necessary. Furthermore, major capital projects faced by smaller local authorities (i.e. District Councils) take up a significant proportion of the Council’s limited in-house resources as well as those of local consultants and contractors to implement. Figure 10 below depicts the projected cash flows determined on a purely capacity driven basis for the Taupo Wastewater Master Plan whilst Figure 11 details a smoothed cash flow graph determined on a financial and practicality driven basis for the three areas covered by the Plan in accordance with project prioritising strategies adopted by Council upon review of the capacity driven only analysis.

Figure 10: Taupo Master Plan Cash flow graph 2007 – 2027 (Capacity driven basis)

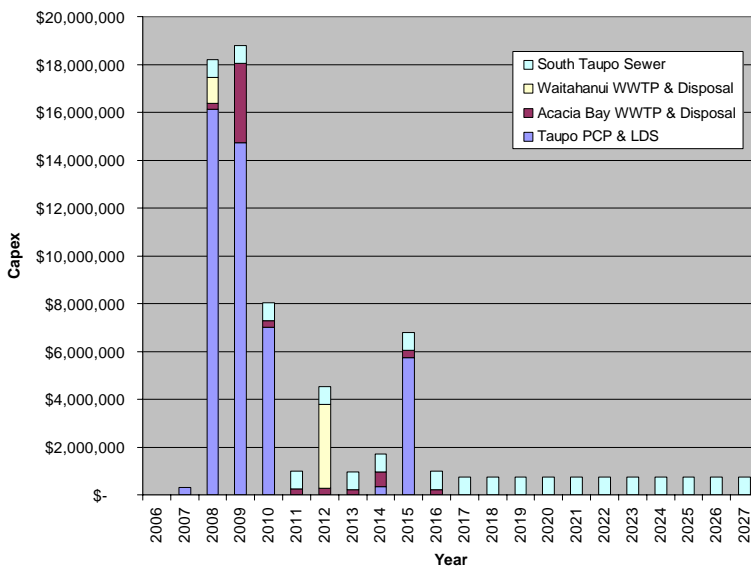
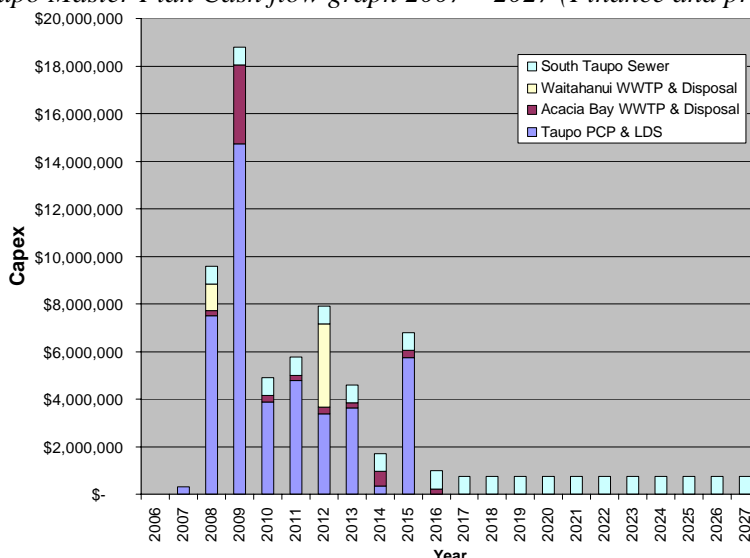


Figure 11: Taupo Master Plan Cash flow graph 2007 – 2027 (Finance and practicality driven basis)



Many of the projects identified could be pushed out to a later date. The Master Plan allowed management to identify and then select projects for deferral on a risk analysis basis. The assets deemed to be at capacity but deferred from expansion can then be monitored and carefully managed until funds and resources are available for the deferred project to go ahead.

6 CONCLUSIONS

Planning documents are an essential tool for assisting local authorities in managing growth and infrastructural assets under their jurisdiction. The Wastewater Master Plan generated for Taupo District Council was aimed to serve as a user-friendly tool for planning the expansion of Council’s wastewater within the 3 major catchment areas covered by the Plan. This live document is flexible and is designed to be modified and updated on a regular basis.

It is projected that with the ongoing growth within New Zealand and the increasingly stringent environmental standards applied to the management of wastewater infrastructure that such planning documents will become increasingly advantageous to assist in the management of expanding wastewater schemes.

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REFERENCES

- HG (October 2005). TDC – Asset Management Planning: Wastewater Asset Management Plan.
- TDC (July 2005). Development Contributions Policy.
- AWT (April 2007). View Rd Land Disposal System Preliminary Design Report – Draft.