



12 August 2008  
Project No. 42068200

Tauranga City Council  
91 Willow Street  
Private Bag 12022  
Tauranga

Attention: Barry Somers  
Project Manager

Dear Barry,

**Subject: Southern Pipeline –  
Preliminary Cost Estimate for a “2031 Scheme”**

## 1. Introduction

As requested we have prepared a preliminary cost estimate for a Southern Pipeline scheme with a reduced capacity to meet the projected wastewater flows to 2031 only (hereafter referred to as the “2031 Scheme”). The estimate has been developed from, and for comparison with, the Southern Pipeline Project estimate with the foreshore walkway option including an ONTRACK bridge upgrade (costing revision C, dated 21/02/2008).

## 2. Pipeline Requirements

The flow capacity for the 2031 Scheme would reduce by approximately 12% and 11% for both the Maleme Street and Memorial Park pump stations respectively, using the current flow projections for the 2031 Scheme. It should be noted that the Southern Pipeline Project as costed on 21/02/2008, has been sized based on earlier flow projections for 2051 (819 l/s) which are slightly lower than the current 2051 flow estimate (890 l/s). Design flows for the Southern Pipeline Project and the 2031 Scheme are compared in Table 1 together with the expected changes to pipeline diameters.

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**Table 1: Comparison of Expected Pipeline Sizings.**

<b>Pipeline Section</b>	<b>Southern Pipeline at 21/2/08</b>	<b>2031 Scheme</b>
Design Flow – From Maleme Street to Memorial Park	477 l/s	420 l/s*
Design Flow – From Memorial Park to Te Maunga WWTP	819 l/s	725 l/s*
Pipe Type - Maleme Street to 18 <sup>th</sup> Avenue Pipeline	DN710mm, PN10/PN8	DN630mm, PN10/PN8
Pipe Type - 18 <sup>th</sup> Avenue to Memorial Park Pipeline	DN800mm, PN6.3	DN800mm, PN6.3 (No change)
Pipe Type - Memorial Park to Siphon Pipeline	DN800mm, PN8	DN800mm, PN8 (No change)
Pipe Type - Siphon to Te Maunga Pipeline	Dual DN710mm, PN6.3	Dual DN630mm, PN6.3

\* Flows for the 2031 Scheme are based on current flow projections using the 2006 census data and current network model.

Pipe diameters for both schemes have been selected to provide optimal sizing whilst maintaining practical pumping heads. Pipe selections have been based on the use of PE100 pipe with a design roughness coefficient, k, of 0.7mm.

As shown in Table 1, it is unlikely that the pipe diameter can be reduced for the 18<sup>th</sup> Avenue to Memorial Park gravity sewer under the 2031 Scheme as this would require a steeper gradient and somewhat deeper excavations than currently anticipated for the Southern Pipeline Project. In addition, it is unlikely that the pressure main from Memorial Park to the siphon can be reduced in size as this would result in a pumping head of over 70m which is higher than most sewage pumps can reasonably achieve for the flow rates required for this project.

Consideration has been given to the potential to divert some of the 2031 design (peak) flows from the Memorial Park Pump Station to the Chapel Street Wastewater Treatment Plant (WWTP). The Chapel Street WWTP has a peak discharge pipeline capacity for treated effluent of 750 l/s which is only slightly greater than the projected peak WWTP inflows at 2031 (695 l/s). Whilst shedding of wastewater flows to the Chapel Street WWTP from the Memorial Park Pump Station may be possible for part of some wet weather events, this cannot be relied upon for all storm events due to the discharge

constraints from the Chapel Street WWTP. Therefore the potential for peak flow shedding to the Chapel Street WWTP has not been considered further.

### 3. Pump Station Requirements

Minor changes to the proposed Maleme Street and Memorial Park Pump Station designs would occur under the 2031 Scheme owing to the reduced flowrate. The changes are predicted to be relatively minor in nature and of limited cost savings. Indicative changes are summarised in Table 2. Flow rates are as shown in Table 1.

**Table 2: Comparison of Pump Station Requirements**

Parameter	Southern Pipeline	2031 Scheme
<b>Maleme Street Pump Station</b>		
Maximum Steady State Pump Head (Pipeline roughness coefficient, $k = 0.7\text{mm}$ )	47 m	53 m
Total Pump Power (approximate)	310 kW	310 kW (No change)
<b>Memorial Park Pump Station</b>		
Maximum Steady State Pump Head (Pipeline roughness coefficient, $k = 0.7\text{mm}$ )	59 m <sup>(1)</sup>	50 m <sup>(1)</sup>
Total Pump Power (approximate)	670 kW <sup>(2)</sup>	510 kW <sup>(2)</sup>

(1) Steady state pump heads do not include for minor losses and are subject to detailed design.

(2) Pump power is based on 70% efficiency.

A detailed assessment of the likely mechanical and electrical component changes has not been carried out at this stage. However, by inspection of the flow rates in Table 1 and the inferred pump power requirements in Table 2, the cost savings under the 2031 Scheme are expected to be limited. Refer to Section 4 for additional details.

Civil work costs are primarily influenced by the required off-line storage for pipeline flushing (routine operation) and emergency storage (if the pump station/pipeline fails). Although there would be some reduction in the required storage for sizing to 2031 flows, it would become practically very difficult to stage the building of the storage tank initially for 2031 flows only, due to the required construction methodologies and poor ground conditions. Accordingly, it has been assumed that the 2031 Scheme would still be constructed with storage capacity as per the Southern Pipeline Project (namely to 2051).

#### 4. Cost Estimate

The cost estimate for the 2031 Scheme has been developed from, and for comparison with, the Southern Pipeline Project estimate with the foreshore walkway option including an ONTRACK bridge upgrade (costing revision C, dated 21/02/2008). A number of broad assumptions have had to be made in developing this 2031 Scheme estimate, as described in this letter. The estimate set out in this letter should therefore be taken to be preliminary and used for comparison with the Southern Pipeline Project cost estimate. Summaries of the 85<sup>th</sup>ile costs for the 2031 Scheme and Southern Pipeline Project are presented in Annexes A and B respectively. All costs are presented in January 2009 \$NZ.

Key changes from the Southern Pipeline Project costing to the 2031 Scheme costing are summarised below with respect to the cost headings given in Annex B.

1. Maleme Street Pump Station: Changes to this pump station are expected to be very limited and likely only to apply to some pipework, fittings, and the air vessels. Based on the flow capacity reduction of around 12%, a pro-rata savings of 12% has been globally applied to all **mechanical** components compared with the Southern Pipeline Project. This assessed savings should be taken to be broadly indicative only and subject to detailed design.
2. Maleme Street to Memorial Park Pipeline: Cost savings have been allowed for the size reduction in the pressure main (Maleme Street to 18<sup>th</sup> Avenue). Savings have been calculated based on reduced supply costs, reduced trench widths, reduced installation costs and other miscellaneous changes.
3. Memorial Park Pump Station: Changes to this pump station are expected to be limited and likely only to apply to pumps, power supply, switchboards, some pipework, fittings, and the air vessels. Based on the flow capacity reduction of around 11%, a pro-rata savings of 11% has been globally applied to all **mechanical** components compared with the Southern Pipeline Project. For **electrical** components, a pro-rata savings of 24% has been globally applied based on the reduced pump power requirements. These assessed savings should be taken to be broadly indicative only and subject to detailed design.
4. Memorial Park to ONTRACK Bridge – via the Foreshore Walkway: No change in pipe size is applicable and hence no changes to the costs for this section have been made.
5. Foreshore Walkway – Excluding Pipeline: No change in pipe size is applicable and hence no changes to the costs for this section have been made.
6. ONTRACK Bridge to Matapihi: No change in pipe size is applicable and hence no changes to the costs for this section have been made.

7. Matapihi to Te Maunga WWTP: Cost savings have been identified by a size reduction in the twin siphon pipeline to the Te Maunga WWTP. Savings have been calculated based on reduced supply costs, reduced trench widths, reduced installation costs and other miscellaneous changes (eg. the siphon inlet chamber).
8. Additional works required as part of the Southern Pipeline: No change to the scheduled items is expected and hence no changes to the costs for this section have been made.
9. TCC project costs, option development, investigations and AEE: Costs for these items have not been changed at this stage. However, it is noted that should a second pipeline be installed for the 2031 to 2051 period, there will be additional consenting and other non-construction costs.

Allowances for preliminary and general costs, contractor margins, contingencies, and design and supervision are calculated on a percentage basis. The percentages applied for these costs have remained unchanged between the two options.

TCC require that all Southern Pipeline costs are simulated through a Monte Carlo process to develop the statistical 85%ile value for the cost estimate. The 85%ile for the 2031 scheme has been pro-rated from the base estimate using the same ratio developed in the Monte Carlo process for the Southern Pipeline Project (being approximately an increase of 3%). A separate Monte Carlo simulation has not been carried out at this stage. The expected error margin in this assumption is very small compared with the total project cost.

In summary, the 85%ile cost estimate for the 2031 Scheme has been calculated as approximately \$114.0M. This can be compared against the \$116.9M (approximately) estimated for the Southern Pipeline Project, being a savings of around \$2.9M in January 2009 \$NZ. No whole of life cashflow or net present value estimate has been prepared at this stage.

## 5. Limitations

URS New Zealand Limited (URS) has prepared this letter for the use of Tauranga City Council in accordance with the usual care and thoroughness of the consulting profession. It is based on generally accepted practices and standards at the time it was prepared. No other warranty, expressed or implied, is made as to the professional advice included in this letter.

The methodology adopted and sources of information used by URS are outlined in this letter. URS has made no independent verification of this information beyond the agreed



Barry Somers  
Tauranga City Council  
12 August 2008  
Page 6

scope of works and URS assumes no responsibility for any inaccuracies or omissions in third party information or data. No indications were found during our investigations that information as provided to URS was false.

This letter was prepared in August 2008 and is based on the information reviewed at the time of preparation. URS disclaims responsibility for any changes that may have occurred after this time.

This letter should be read in full. No responsibility is accepted for use of any part of this letter in any other context or for any other purpose or by third parties. This letter does not purport to give legal advice. Legal advice can only be given by qualified legal practitioners.

## 6. Closure

Should you have questions regarding the above please contact either of the undersigned on phone (09) 355 1300.

Yours sincerely,  
**URS NEW ZEALAND LIMITED**

Matthew Reed  
Associate Engineer

Martin Evans  
Project Manager



Barry Somers  
Tauranga City Council  
12 August 2008  
Page 7

**Annex A**  
**Southern Pipeline Project 85%ile Cost Estimate Summary**

<b>Client:</b>	Tauranga City Council		
<b>Project:</b>	Southern Pipeline - Foreshore Walkway Option including ONTRACK Bridge Upgrade		
<b>Description:</b>	<b>Prepared By:</b>	BS	21/02/2008
Summary Sheet - Jan 2009 NZD 85%ile Cost Estimate	<b>Reviewed By:</b>	ME	Revision: C
<b>85%ile</b>			
<b>Maleme Street Pump Station</b>			
L MALEME ST STORAGE TANK			\$ 5,772,518
MALEME ST PUMP STATION - STAGE 1			\$ 659,374
MALEME ST PUMP STATION - STAGE 2			\$ 5,475,497
			<b>\$ 11,907,390</b>
<b>Maleme Street to Memorial Park</b>			
A MALEME ST TO CHADWICK RD			\$ 4,629,896
B CHADWICK RD TO 18th AVE			\$ 8,707,016
C 18th AVE TO MEMORIAL PARK			\$ 7,226,696
			<b>\$ 20,563,608</b>
<b>Memorial Park Pump Station</b>			
M MEMORIAL PARK STORAGE TANK			\$ 5,211,556
MEMORIAL PARK PUMP STATION			\$ 6,810,521
			<b>\$ 12,022,077</b>
<b>Memorial Park to ONTRACK Bridge - via the Foreshore Walkway</b>			
D MEMORIAL PARK TO 5th AVE			\$ 2,351,894
E 5th AVE TO ELIZABETH ST CULVERT - PIPELINE ONLY			\$ 4,388,249
R CONCOURSE RECLAMATION			\$ 1,701,156
			<b>\$ 8,441,300</b>
<b>Foreshore Walkway - Excluding Pipeline</b>			
F FORESHORE WALKWAY			\$ 13,072,840
G NEW BEACH			\$ 240,841
			<b>\$ 13,313,682</b>
<b>ONTRACK Bridge to Matapihi</b>			
H(i) HARBOUR CROSSING EMBANKMENT AND PIPELINE			\$ 4,895,984
H(ii) BRIDGE WALKWAY AND PIPELINE			\$ 7,335,506
I ONTRACK BRIDGE UPGRADE CONTRIBUTION			\$ 6,266,074
J RAIL BRIDGE EMBANKMENT TO MATAPIHI ROAD			\$ 1,300,100
			<b>\$ 19,797,664</b>
<b>Matapihi to Te Maunga WWTP</b>			
K MATAPIHI ROAD TO TE MAUNGA			\$ 18,980,896
N MATAPIHI RECLAMATION			\$ 800,572
			<b>\$ 19,781,468</b>
<b>Additional works required as part of the Southern Pipeline</b>			
O ANCHORAGE SIPHON			\$ 1,044,912
P POIKE AND ILA PLACE NETWORK UPGRADE - TO BE CONFIRMED			\$ -
			<b>\$ 1,044,912</b>
<b>TCC project costs, option development, investigations and AEE</b>			
Q NON CONSTRUCTION COSTS - Not covered by the IPENZ guidelines			\$ 9,992,075
			<b>\$ 9,992,075</b>
<b>Total Cost - Southern Pipeline Foreshore Walkway Option</b>			<b>\$ 116,864,176</b>
<b>Comments</b>			
1 Base unit costs developed by Rider Levitt Bucknall in August 2007 NZD.			
2 Inflation from August 2007 to January 2009 agreed with TCC financial team at 5.3%.			
3 TCC require that all Southern Pipeline costs are simulated through a Monte Carlo process to develop the statistical 85%ile value for the cost estimate.			
4 Non construction costs include investigations, option development and AEE costs. Design and supervision fees are now included for each item of the project.			
5 Item I is a lump sum contribution to ONTRACK and consists of the difference between the cost of a submarine pipeline option and the expected cost to affix the pipeline to the bridge, upgrade the walkway and cross the concourse area.			





Barry Somers  
Tauranga City Council  
12 August 2008  
Page 8

**Annex B**  
**2031 Scheme 85%ile Cost Estimate Summary**

<b>Client:</b>	Tauranga City Council		
<b>Project:</b>	Southern Pipeline - Foreshore Walkway Option including ONTRACK Bridge Upgrade - Capacity to 2031		
<b>Description:</b>	<b>Prepared By:</b>	VS	7/08/2008
Summary Sheet - Assessed Jan 2009 NZD 85%ile Cost	<b>Reviewed By:</b>	MR	12/08/2008
			<b>Revision:</b> B
			<b>85%ile</b>
<b>Maleme Street Pump Station</b>			
L MALEME ST STORAGE TANK			\$ 5,772,518
MALEME ST PUMP STATION - STAGE 1			\$ 597,714
MALEME ST PUMP STATION - STAGE 2			\$ 5,366,862
			<b>\$ 11,737,093</b>
<b>Maleme Street to Memorial Park</b>			
A MALEME ST TO CHADWICK RD			\$ 4,323,208
B CHADWICK RD TO 18th AVE			\$ 8,159,251
C 18th AVE TO MEMORIAL PARK			\$ 7,226,696
			<b>\$ 19,709,154</b>
<b>Memorial Park Pump Station</b>			
M MEMORIAL PARK STORAGE TANK			\$ 5,211,556
MEMORIAL PARK PUMP STATION			\$ 6,100,302
			<b>\$ 11,311,857</b>
<b>Memorial Park to ONTRACK Bridge - via the Foreshore Walkway</b>			
D MEMORIAL PARK TO 5th AVE			\$ 2,351,894
E 5th AVE TO ELIZABETH ST CULVERT - PIPELINE ONLY			\$ 4,388,249
R CONCOURSE RECLAMATION			\$ 1,701,156
			<b>\$ 8,441,300</b>
<b>Foreshore Walkway - Excluding Pipeline</b>			
F FORESHORE WALKWAY			\$ 13,072,840
G NEW BEACH			\$ 240,841
			<b>\$ 13,313,682</b>
<b>ONTRACK Bridge to Matapihi</b>			
H(I) HARBOUR CROSSING EMBANKMENT AND PIPELINE			\$ 4,895,984
H(II) BRIDGE WALKWAY AND PIPELINE			\$ 7,335,506
I ONTRACK BRIDGE UPGRADE CONTRIBUTION			\$ 6,266,074
J RAIL BRIDGE EMBANKMENT TO MATAPIHI ROAD			\$ 1,300,100
			<b>\$ 19,797,664</b>
<b>Matapihi to Te Maunga WWTP</b>			
K MATAPIHI ROAD TO TE MAUNGA			\$ 17,880,033
N MATAPIHI RECLAMATION			\$ 800,572
			<b>\$ 18,680,606</b>
<b>Additional works required as part of the Southern Pipeline</b>			
O ANCHORAGE SIPHON			\$ 1,044,912
P POIKE AND ILA PLACE NETWORK UPGRADE - TO BE CONFIRMED			\$ -
			<b>\$ 1,044,912</b>
<b>TCC project costs, option development, investigations and AEE</b>			
Q NON CONSTRUCTION COSTS - Not covered by the IPENZ guidelines			\$ 9,992,075
			<b>\$ 9,992,075</b>
<b>Total Cost - Southern Pipeline Foreshore Walkway Option</b>			<b>\$114,028,344</b>
<b>Comments</b>			
1 Base unit costs developed by Rider Levitt Bucknall in August 2007 NZD for the AEE scheme. Relevant costs have been adjusted by URS for the 2031 scheme.			
2 Inflation from August 2007 to January 2009 agreed with TCC financial team at 5.3%.			
3 TCC require that all Southern Pipeline costs are simulated through a Monte Carlo process to develop the statistical 85%ile value for the cost estimate. The 85%ile for the 2031 scheme has been pro-rated from the base estimate using the same ratio developed in the AEE scheme Monte Carlo process (approximately 1.03). A separate simulation has not been carried out at this stage.			
4 Non construction costs include investigations, option development and AEE costs. Design and supervision fees are now included for each item of the project.			
5 Item I is a lump sum contribution to ONTRACK and consists of the difference between the cost of a submarine pipeline option and the expected cost to affix the pipeline to the bridge, upgrade the walkway and cross the concourse area.			