

16. TENDERS FOR CLARIFIERS NO 1 AND 2 AND BYPASS CHANNEL FOR CHRISTCHURCH WASTEWATER TREATMENT PLANT EXPANSION WORKS

RR 9091

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The purpose of this report is to recommend the acceptance of a tender for the construction of the first two clarifiers and bypass channel completion for the Christchurch Wastewater Treatment Plant expansion.

1. BACKGROUND

In November 1998 the Council approved a short list of nine companies to tender for the construction of the first two clarifiers and bypass channel of the Christchurch Wastewater Treatment Plant expansion - refer attachment (a) for plan location of work. Of the nine contractors shortlisted, six tenders were received and three withdrew due to pressure of other work (Mainzeal, McConnell Smith, Lund).

2. TENDERS RECEIVED AND EVALUATION METHOD

Tenders were received as follows:

Contractor	Tender Price	
Daniel Smith Industries Ltd	\$7,724,396	} Refer section 4 below for adjustment to these prices to allow for alternatives and removal of tags and conditions.
Fulton Hogan Ltd	\$7,736,926	
Hopkins Engineering Ltd	\$7,858,920	
Brian Perry Ltd	\$8,135,588	} Not considered further due to significantly greater prices.
Naylor Love Ltd	\$8,441,934	
Downer & Co Ltd	\$9,350,600	

These tenders all include a contingency sum of \$0.350m.

The tender evaluation method specified was that the lowest conforming tender would be accepted provided that all of the associated subcontractors satisfied a pass/fail criteria for certain attributes namely relevant experience, track record, technical skills, resources, management skills and methodology. (Note that the same attributes for the main contractors were all checked out and passed as acceptable at the tender registration stage).

The specification allowed for consideration of alternatives provided they satisfied certain requirements. Alternatives offered by the tenderers have all been very carefully evaluated. The most significant of them are discussed below and the adjusted tender prices listed in Section 4 below.

3. MAIN ALTERNATIVES, TAGS AND CONDITIONS

(a) Sludge Removal Mechanism

Each clarifier has a rotating mechanical sludge removal mechanism at its base. This is a primary element and the correct selection of type and supplier is very important in terms of ensuring ease of ongoing maintenance, avoidance of mechanical breakdown and outage. The specification required supply of the sludge removal mechanism by US Filter. Other mechanisms have been offered (refer table below) but these are not considered acceptable on the basis of reliability and general track record (ie proven performance) for these large 48m diameter clarifiers.

Contractor	Sludge Removal Mechanism Supplier	Conforms with specification (Yes/No)
(a) Daniel Smith Industries Ltd	US Filter	Yes
	Smith & Loveless	No
(b) Fulton Hogan Ltd	US Filter	Yes
(c) Hopkins Engineering Ltd	US Filter	Yes
(d) Brian Perry Ltd	Dormarg	No
(e) Naylor Love Ltd	Dormarg	No
(f) Downer & Co Ltd	US Filter	Yes

(b) Dewatering the Foundation Excavations

All tenderers allowed for dewatering the foundations during construction. However, Fulton Hogan tagged their tender along the lines that they had included only six dewatering wells and that if any more wells proved necessary then the Council would have to pay the extra cost. It is considered unacceptable for the Council to accept this unknown risk.

A price has been subsequently requested and supplied by Fulton Hogan for a fixed price for this item. It is \$18,000 extra.

(c) Foundation Soil Densification

The ground beneath the clarifier foundation is subject to liquefaction during earthquake shaking and requires densification. Methods of densification offered were as follows:

	Contractor	Densification Method	Approved (Yes/No)
(a)	Daniel Smith	Vibro Probe and Stone columns	Yes
(b)	Fulton Hogan	Compaction Grouting	No
(c)	Hopkins	Vibro Probe and Stone Columns	Yes
(d)	Others	Not Relevant	Not Relevant

The vibration compaction methods offered by Daniel Smith and Hopkins for soil densification are well proven in the sandy soil conditions indicated on the borelogs for the site. This method is acceptable.

On the other hand Fulton Hogan initially offered densification by grouting which is not considered to have an adequately proven track record in sandy soil. This method is not recommended by Beca Consultants geotechnical specialist (Dr Graham Ramsey). Fulton Hogan's price for the compaction by vibration techniques is \$84,888 extra which has been added as an adjustment to their tender price – refer section 4 below.

(d) **Construction Time**

The specified construction time is 63 weeks from the date on the letter of tender acceptance. All tenderers have agreed that they can meet this timing.

4. **ADJUSTED TENDER PRICES**

Tender prices are adjusted to take account of tags and conditions in the table below.

Contractor	Tender Price \$	Tender Adjustments \$	Adjusted Tender Price \$
(a) Daniel Smith	7,724,396	(a) Soil ownership adjustment -30,000	7,694,396
(b) Fulton Hogan	7,736,926	(a) Removal of dewatering tag 18,000 (b) Pipework deletion 12,240 (c) Soil ownership adjustment -42,300 (d) Pipework deletion -70,400 (e) Soil densification by vibration 84,888 (f) Pipework alternative <u>-11,000</u> <u>-8,572</u>	7,728,354
(d) Hopkins	7,858,920	(a) Soil ownership adjustment -27,900 (b) Pipework alternative <u>-38,000</u> <u>-65,900</u>	7,793,020
(e) Others	Not Relevant	Not Relevant	Not Relevant

5. **DANIEL SMITH INDUSTRIES CREDENTIALS**

The credentials of Daniel Smith Industries were all checked out and proved excellent during the pre-registration phase so it is not necessary to traverse them in detail here. Suffice it to say that Daniel Smith Industries are very well known as a civil construction works contractor with a high reputation, considerable expertise and substantial resources. Over the past eight years they have successfully completed 44 construction projects. The post tender interviews revealed that Daniel Smith Industries has a very clear understanding of what this job requires. The most difficult area of the project is the below ground work in which Daniel Smith industries have exceptionally good expertise. Daniel Smith Industries concrete subcontractor G&T Construction (Lex Thompson) is well known to the Council, having recently successfully completed the channel and tank modification work at Christchurch Wastewater Treatment Plant to a very high standard.

6. **SUBCONTRACTORS**

Subcontractors proposed by the lowest tenderer Daniel Smith are listed on attachment (d). These are all considered satisfactory.

7. **BUDGET AND METHOD OF FINANCING**

(a) **This Tender (ie No 1 and 2 Clarifiers and Bypass Channel)**

The lowest adjusted tender price for this work (ie clarifiers 1, 2 and bypass channel is \$7,694,396m (construction only, excluding professional fees) – refer section 4 above.

This tender compares with an allowance on the ten year \$30m budget of \$5.9m as below (figures from attachment (b)).

•	bypass channel	\$0.8m	
•	clarifiers	\$5.0m	
•	part contingency	<u>\$0.6m</u>	(1.1 x 5.8) 11.4)
		<u>\$6.4m</u>	
•	less fees 8%	<u>\$0.5m</u>	
		<u>\$5.9m</u>	(budget allowance versus lowest adjusted tender of \$7.7m)

It is clear now that the 1996 budget for the clarifiers was too low. The clarifier budget allowance was one item in a \$30m broadbrush estimate which needs to be progressively updated as the design and development of the expansion works progress. Reasons for clarifier cost increases are as follows:

• weakening in the \$ exchange rate of 20% in \$1.5m value of work	\$0.3m
• inflation from 1996 to 1999 (\$5.9m x 0.02 x 3)	\$0.4m
• unforeseen weak ground requiring densification	\$0.5m
• increase in clarifier size from 40m diameter to 48m diameter to provide more performance security	<u>\$0.5m</u>
Total increases	<u>\$1.7m</u>

When added to the budget allowance of \$5.9m this totals **\$7.6m** (\$5.9m + \$1.7m) which compares with Daniel Smiths lowest adjusted tender of **\$7.7m**. A global budget update is addressed below.

(b) **Global Budget**

The 1998/99 \$30m global budget is shown as attachment (b). This is still unchanged from 1996, the date of its formulation. As the expansion project has progressed (note completed items to date are trickling filter ventilation, new screens, part bypass channel, part odour control works, part AEE and study work) various elements of work will need modifying and revaluing. Currently such elements are known to be as follows:

Item	Budget Change (\$m)
(i) Actual cost of completed work for fine screens, bypass separator, bypass channel – \$2.4m reduced to \$2.1m	-0.3

(ii) Revised estimate for pond inlet provisions – \$2.2m reduced to \$0.6m	-1.6
<p>This is possible due to a reduction in the extent of the Cuthberts Road pond bank relocation east. The relocation was originally proposed to provide a planted buffer zone between the road, residents and ponds to reduce odour. Recent odour reduction work within the plant and subsequent odour testing indicates that this reduced level of work will suffice.</p>	
(iii) Revised estimate for four clarifiers – \$9.0m increased to \$12.7m	3.7
<p>Original estimate now proven too low as a result of recent tenders, increase in the \$ exchange rate, the need for larger clarifiers, densification of weak ground and inflation.</p>	
(iv) Revised estimate for solids contact aeration – \$1.8m increased to \$3.6m	1.8
<p>Increased to allow for more nutrient removal – to be finally confirmed by outcome of AEE study and resource consent application (estuary versus ocean outfall etc).</p>	
(v) Conversion of secondary tank 8 to an additional primary tank no longer considered necessary – \$0.1m reduction	-0.1
(vi) Estimate for ponds, baffles and wetlands – \$2.1m reduced to \$1.8m.	-0.3
<p>The separate stone filters in ponds 5 and 6 envisaged in the 1996 report can be replaced by less expensive “in bank” rock filters.</p>	
<u>3.2 increase</u>	

It must be noted that three years of inflation accounts for a substantial part of the increase from the 1996 year of origin to the proposed 1999/00 new global budget. Inflation is around 2% per annum ie $\$30\text{m} \times 0.02 \times 3 = \mathbf{\$1.8\text{m}}$. So of the **\$3.2m** proposed increase, around **\$1.8m** can be accounted for as inflation, the remainder is due to design development and current budget fine tuning together with the clarifiers extra **\$1.3m** (\$1.7m - \$0.4m inflation) – refer 7(a) above).

The above proposed changes to the 1998/99 global budget are tabulated in attachment (c) and summarised year by year below.

	96/97	97/98	98/99	99/00	00/01	01/02	02/03	03/04	04/05	05/06	Total
1998/99 Budget Totals	0.4	3.2	3.9	7.5	3.9	3.6	2.7	2.0	1.4	1.4	30.0
Proposed modifications to 1999/00 Budget	0.4	3.2	3.9	7.5	4.9	5.0	4.3	1.2	1.4	1.4	33.2
Difference	-	-	-	-	1.0	1.4	1.6	-0.8	-	-	3.2
Cumulative Difference	-	-	-	-	1.0	2.4	4.0	3.2	3.2	3.2	3.2

8. POSSIBLE BUDGET SMOOTHING

If the Council wished to spread the expenditure of the \$33.2m global budget beyond the year 2005/06 for smoothing purposes then it would be technically feasible to delay the construction of the fourth clarifier. This delay could probably be up to ten years (ie until 2015/16 – Note, however, that the first three clarifiers must be constructed as programmed for effluent load requirements). Such a delay will increase the final cost of the fourth clarifier due to the necessity for another construction contract sometime in the future. For this reason it is not recommended unless absolutely necessary.

9. SUMMARY

The lowest adjusted tender is from Daniel Smith Industries for **\$7,694,396**. Daniel Smith Industries is a very good contractor with an excellent track record and proven special expertise in important areas of this project. Reconciliation of this tender with the budget allowance is discussed in detail above. The financial bottom line is that the original 1996 ten year \$30m programme requires updating to \$33.2m. If necessary this can be smoothed by delaying the 4th clarifier construction from its planned date of 2002/03 for up to ten years though this is not recommended.

It is recommended that the tender of Daniel Smith Industries for the construction of clarifiers 1 and 2 bypass channel completion be accepted.

Recommendation: That the lowest adjusted tender of Daniel Smith Industries Ltd for **\$7,694,396** be accepted.