

TO: Richard Kirby – Engineering Services Manager, Tasman District Council

CC: Waimea Water, Project Governance Board members
Andy Nelson, Project Director

FROM: Alex Adams Stakeholder and Risk Manager - Waimea Water

DATE: 17 July 2018
Version 2. Updating terminology and Additional Detail added.

SUBJECT: **Information on Project Out-turn Cost Estimates following Price Exchange and Agreed Outcome for Construction Contract.**

Purpose

This memorandum has been prepared in response to your request for an early analysis of the pricing position following the Price Exchange between the ECI contractor (Fulton Hogan – Taylor Contracting joint venture – (FHTJV)) and the Independent Estimator (BondCM) and subsequent work that has now taken place toward a largely agreed position.

Background

The Price Exchange took place on 29 June 2018 under probity conditions.

The direct cost items that make up the Construction Contract were agreed between the ECI contractor (Fulton Hogan – Taylor Contracting joint venture – (FHTJV)) and the Independent Estimator (BondCM) on 06 July. During the week 09 to 13 July the non-direct cost matters, that can only be addressed after the direct cost pricing is agreed, have been receiving attention. Currently the FHTJV boards are confirming their company's willingness to enter into the Construction Contract. They have yet to confirm that the agreed prices for the direct cost items and the proposed sharing of liabilities for items, such as risk allowances and inflation, are formally accepted.

The Price Exchange values for construction, along with costs identified for wider aspects indicate that the total project cost will be significantly above the funding budgets used by TDC and WIL.

Currently the Waimea Water Project Director is preparing the detailed breakdown of the Total Project Out-turn Estimate for the Project Governance Board. The information below is largely sourced from that work in progress. There are some matters that remain to be finalised, mainly connected with the FHTJV confirmed position. However, the Dam Construction price is by far the largest item and therefore the overall Project out-turn position can now be relied upon for key decision making.

Price Variance

The remaining uncertainties are not very material and the information below provides a reasonable assessment of the final position. (Available by the end of July.)

	TDC Budget/ April 2015 Estimate	Estimated Final Project Cost	Variance	Commentary
Procurement, ECI Phase, Design, Project Office	5,400,000	6,091,542	(691,542)	Design costs significantly over budget (\$1.3M budgeted, currently sits at \$2.9M). Significant savings have been achieved in all other areas but not enough to offset the design overspend.
Land Access and Purchase	2,000,000	3,140,452	(1,140,452)	Additional costs due to additional roading provisions agreed with landowners during access and purchase negotiations
Governance & Company		952,875	(952,875)	No allowance was made in the 2015 Estimate, that was adopted as the TDC budget. Likely to have been assumed to be treated as OPEX. 1. WW Directors fees and expenses during construction - budgeted \$471,000 2. CCO formation costs - budgeted at \$100,000 3. Costs associated with debt funding - budgeted at \$200,000 (Note the comment in the Potential Price Reduction section below, it is likely that the budgeted expenses in 2. and 3. are very conservative).
Dam Construction	49,800,000	68,114,189	(18,314,189)	See below table for information on this major item.
Site Access, Clearing, Roothing	2,000,000	4,183,728	(2,183,728)	Site Access Road Upgrade Design, completed following geotech surveys, identified that significant slope stabilisation measures are required. Site Access Road Upgrade required to facilitate two-way traffic in order to avoid conflicts with foresters. Vegetation Clearance Costs increased following a survey and an acceptable site clearance methodology.
Escalation/Inflation (Approximate as at July 2018)	3,200,000	2,500,000	These Allowances apply to different periods and are not comparisons	The inflation allowance in the 2015 estimate, that was adopted as the TDC budget, assumed construction completion 2018/19. Construction industry inflation has run well above CPI and the \$3.2M will, at a minimum, have been reflected in present pricing. A further allocation for inflation construction completion has been made at \$2.5M. (See further detail below)
Total Contingency Allowance in the 2015 Estimate and TDC budget	13,500,000	(See the 2 Items Below)	These Items are not strictly comparable because the 2015 estimate, that was adopted as the TDC budget, provided the contingency for a range of matters that will have been absorbed into the 2017 ECI pricing elsewhere in this table.	The 2015 estimate, that was adopted as the TDC budget, included a single figure to make an allowance for pricing uncertainty and items that had not at that stage been identified.
Risk Allowance (Approximate as at 16 July 2018)		7,000,000		The estimates for the various category of risks are yet to be completed because responses from the FHTJV are needed to complete the detailed assessments. The preliminary estimate, \$7million, will however be in the right order.
Contingency Allowance (Approximate as at 16 July 2018)		3,000,000		The Contingency allowance is yet to be confirmed because responses from the FHTJV are needed to complete the detailed assessments. The preliminary estimate, \$3million, will however be in the right order.

	TDC Budget/ April 2015 Estimate	Estimated Final Project Cost	Variance	Commentary
Construction Related Professional Services		4,708,780	(4,708,708)	No allowance was shown explicitly in the 2015 estimate, that was adopted as the TDC budget, for: 1. T+T Onsite QA 2. Engineer to the Contract This item was likely to have been considered as an overhead and/or to have, at least for some line items, considered as overheads and/or OPEX.
Meeting Consent Conditions and Compliance		1,122,472	(1,122,472)	No allowance was made in 2015 estimate, that was adopted as the TDC budget for the direct expenses incurred in meeting Resource Consent conditions and monitoring environmental matters. (Note this is the WW responsibility area - FHTJV have priced their obligations in Dam Construction)
Sunk Costs - To recognise expenses incurred by TDC prior to formation of WW		1,320,109	Not strictly a variance	This sum represents some costs incurred by TDC between 2015 and the formation of Waimea Water Joint Venture in 2017. (Therefore, not strictly a variance).
Totals	75,900,000	102,134,147		
Difference TDC budget to Estimated Final Project Cost		(26,234,147)		

NOTE: The assessments that appear to be down to the nearest dollar should not be taken literally. This is the result of the Work In Progress on these figures being continually reconciled as a quality check.

Dam Construction

The table below largely comprises figures that were agreed following the ECI process. That is, the Price Exchange and the subsequent analysis that was carried out between the FHTJV and the Independent estimator, BondCM. There is now very close agreement between them on the large number of items that make up the categories below.

The ECI process included substantial value engineering, combining expertise from the designers, Tonkin + Taylor (T+T) and the two practical construction companies making up the FHTJV, along with specialists brought in for certain matters. There was a particular focus on the temporary diversion works that required close coordination between the original dam design and the proposals for the contractor's design and build of that componentry. The buildability and the detailed construction methodology was also worked up. After these engineering aspects were agreed, FHTJV Quantity Surveyors and senior engineers undertook the costing to develop the proposed construction contract price in time for the Price Exchange.

This substantial work (that clearly had a very high level of commitment) produced a rigorously priced construction contract that also results in contractors accepting a high degree of responsibility to construct within the specified price.

	Estimated April 2015 - TDC Budget	ECI Agreed Final Project Cost	Variance	Commentary
Environmental	595,000	1,254,048	(659,048)	The Resource Consent had not been granted in April 2015, when the estimate, that was adopted as the TDC budget, was done. Thus, the requirements imposed by the conditions were then unknown. The Conditions now require that extensive monitoring and environmental controls are in place. The monitoring equipment supply and site infrastructure provisions are now significant.
Diversion Works (Construction Contractor Design and Build).	6,686,395	8,959,095	(2,272,700)	The diversion works were only an outline design in 2015 when the estimate, that was adopted as the TDC budget, was prepared. The actual works do not appear to be significantly more expensive, but the design costs, that include flood effect data, appear to have been under-allowed.
Earthworks	8,438,906	10,977,987	(2,539,081)	Increases due to substantial additional processing and cut called for in the revised, final 2017 Design Stage 4 specification. (Circa 90,000 tonnes of additional cut and processing.)
Slope Protection	294,814	2,688,758	(2,393,944)	A large volume of additional permanent slope stabilisation works are required. The 2015 Beca/BondCM estimate made no allowance for temporary slope protection while work is being carried out on the downside of the right-hand slope. The area of permanent slope protection increased from 900m ² in 2015 to 2,800m ² in 2017/18 Design Stage 4. Temporary slope protection is extra on top of that again.
Concrete Works	15,040,201	16,747,075	(1,706,874)	The increase is a little more than inflation. The 2015 Beca/BondCM estimate allowed very little for the cost of delivering concrete (or cement) to site and therefore the placed on-site rate was low. There are slightly increased volumes, largely due to the provision of over-break where it is not possible to cut exactly to profile due to rock size etc. When the lower rate and higher volumes are considered jointly, there is this significant cumulative effect.
Mechanical and Electrical (Essentially a PC sum at 16/07/18)	2,637,069	5,600,000	(2,962,931)	The 2015 Beca/BondCM estimate, that was adopted as the TDC budget, did not specifically include for electrical, comms or instrumentation. The design for Mechanical and Electrical did not exist at that time and it was (quite reasonably) assumed that the requirements would be fairly simple. The Resource Consents were obtained later, and the Consent Conditions included considerable requirements for monitoring (requiring increased equipment such as sensors), increased instrumentation and logic, increased communications and also system redundancy. The main penstock and pipe work only had an outline design, and this was not improved upon until late in the 2017/18 Stage 4 design process. The pipe work and pipe fixing design is heavier and more complex than could have reasonably been anticipated in 2015. Two additional smaller pipes and their associated valves were added in the Stage 4 design to provide for control of the low volume residual flows. The two large variable cone valves were priced at \$203,000 in 2015. These now cost \$648,000 and the additional two smaller variable cone valves \$110,000 i.e. a total of \$758,000 or \$555,000 more than the 2015 estimate.
Testing & Commissioning	38,700	233,257	(194,557)	This substantial increase is heavily influenced by the M&E design now becoming much more complex. It is also likely the original estimate did not allow for the time delays that are likely to occur while the dam fills. The M+E equipment cannot be commissioned until all the different dam level scenarios have occurred naturally.

	Estimated April 2015 - TDC Budget	ECI Agreed Final Project Cost	Variance	Commentary
Preliminary & General	Redacted	Redacted	Redacted	In the last few years, Contractors P&G pricing has increased sharply. To a degree this reflects that more liabilities, including H+S, have been incurred. This remote work site results in some inefficiencies compared to other sites. (It is worth noting that the independent estimator, BondCM, actually estimated a figure that was some 3% higher.)
Contractor's Margin	Redacted	Redacted	Redacted	This margin is the agreed figure under their ECI proposal. However, being a percentage, it reflects the higher base cost.
WW Allowance for Scope Creep during Construction		50,000		This is a Waimea Water Allowance in addition to the main Contingency sum.
Contractor's Risk Allowance	Not priced	1,500,000		Current (as at 16/07/18) estimate of the risk allowance that will be made by the contractor. This will depend on risk sharing arrangements finally agreed.
Estimated Items Priced, now within other Items of ECI	2,186,346			Some items originally estimated have been included in other items in the ECI pricing.
Totals	49,800,000	68,114,189		
Difference TDC budget to Estimated Final Project Cost		(18,445,189)	Note: This figure does not exactly reconcile due to overlapping inclusions between individual line items	

Inflation Allowance

The inflation allowance in the 2015 estimate was adopted in the TDC budget. It assumed that construction would start promptly, and the dam construction would be complete in 2018/19. Further, it was applied to the items that were estimated, essentially the construction aspects, and no specific inflation allowance was made for items outside the estimate.

In hind sight, it is apparent that construction industry inflation has run well above the CPI, underlying inflation. Accordingly, the 2015 estimated figure of \$3.2M will, at a minimum, have already been reflected in the pricing undertaken in 2018.

To provide a completed project price for the longer duration project, it is necessary to make another allocation for inflation that occurs from now until construction completion. To do this more accurately, the project cash flow will need to be used. Currently FHTJV is completing the project cash flow. However, the \$2.5M allowance indicated is a reasonable approximation of what is expected (assuming that there is little delay in construction start and the rapid increase in construction pricing slows to more like underlying inflation going forward).

A fundamental decision remains related to which party, the FHTJV or Waimea Water, carries the allocation for forecast inflation. The FHTJV may be prepared to provide a fixed price, in effect pricing for the inflation and carrying the risk/opportunity of it going over/under their estimate. Alternatively, Waimea Water (and therefore its shareholders) can during the project pay the contractor for inflation, probably utilising a quarterly formula method based on the Capital Goods Construction Index published by Statistics New Zealand. At today's date the

Project Director is awaiting the cash flow and an offer from FHTJV before putting the matter before the Project Governance Group.

It should be noted that the inflationary effect alone on project delays is in the order of \$80,000 per month.

Developments that have Increased Construction costs

In addition to general inflationary increased costs, some other aspects that have come into play over the past five or six years have influenced construction costs.

NZSOLD Guidelines

The New Zealand Society of Large Dams (NZSOLD) publishes guidelines for the operation and construction of Dams in New Zealand. The guidelines were substantially updated in May 2015. This was after the Beca/BondCM price estimate was prepared. The revised guidelines were fairly apparently influenced by the Christchurch earthquakes. Other standards were also revised, and design of structures and construction methodology has become substantially more conservative. It has been estimated by, BondCM, that the effect on more conservative design alone added some \$2M to the construction cost. (My own view is that this is likely to underestimate the cumulative effect of; more conservative design, conservative interpretation by the contractors and the increased QA inspections and records specified in the 2015 edition of the NZSOLD Guidelines. I think that it is more likely to be double the direct estimate.)

Health and Safety Regulation and Practices

The sharply increased Health and Safety standards applying to construction result in increased direct expenses for contractors. In addition, on this particular dam design there are some areas that have been upgraded to allow for the current interpretation of what is required. Examples are:

- The Culvert that carries the pipes under the dam was, in the 2015 the Beca/BondCM price estimate, assumed to be ventilated by temporary fans. This assumed that, on the infrequent occasions staff are required to enter it after the dam begins operation, will have temporary fans placed. Currently, it has been priced with fixed fans built in during construction.
- The right-hand embankment at lower levels becomes covered by the dam as construction rises. However, the contractor identified a potential risk of rock fall and has priced in substantial bank stabilisation works.

Cumulative Effects

In several instances the 2015 the Beca/BondCM unit cost price estimate was proven to be somewhat low (even after allowing for inflation) and then it was found that higher volumes were also required. In these instances, the cumulative effect of unit price increase and volume variance becomes very significant.

Potential Price Reductions

Price Savings

Since the Price Exchange occurred, work has been done to identify potential price reductions.

It is necessary to recognise that extensive and interactive work with TDC involvement has been undertaken from early stages of the design work to identify cost effective design solutions.

More recently, the thorough ECI process has identified further efficiencies and cost savings. Accordingly, the potential price reductions that have been identified are quite modest.

In total the potential price savings identified amount to some \$4.8M. In practice not all of these will be achieved. Allowing for, perhaps an optimistic, 70% achievement rate, this leaves some \$3.4M. The costs to lock in price reductions, largely T+T design and FHTJV expert involvement over the next 4 months, are estimated to be \$275,000. This results in an estimated net price reduction in the order of, say, \$3M. Clearly this does not materially change the position.

Opportunities

It should be noted that there are some opportunities for the final project cost to come in less than budgeted. These opportunities include:

- The potential to sell trees from the clearance works
- The possibility that inflation is less than forecast (if WW accepts the quarterly formula payment method, rather than fixing it in the contract price (not decided as at 16/07/18)).
- The possibility that uncertainties allowed for do not eventuate, ie the risk allowance proves to be conservative - higher than is actually required at project completion).
- The possibility that the Contingency allowance proves to be conservative - higher than is actually required at project completion

Without the final inputs awaited from the FHTJV for the above aspects, it is difficult to provide an estimate based on logic but in my opinion these aspects combined would be very unlikely to exceed, say, \$4M.

Price Reduction Conclusion

Combining the Price Savings and Opportunities assessment above indicates that a maximum of \$7M can be identified. While significant, this sum does not materially change the position.

I trust that this commentary provides the information you require. In the meantime, if you need any further information please just ask, I'm happy to expand on any aspects.

Alex Adams
17/07/18