

Current Status of the Consultancy Contract CPA/94531 with Connell Wagner Pty Ltd

BACKGROUND

Contract CPA/94531 for the Investigation and Design Consultancy for the Link Road and Trunk Water Main was awarded to Connell Wagner Pty Ltd. At the Ordinary Meeting of Council held on 14 December 2005 Council resolved as follows:

RESOLVED unanimously on the motion of Councillor PAVIER and seconded by Councillor STEVENS:

- "1 That the tender from Connell Wagner Pty Ltd in the adjusted Lump Sum amount of \$519,729.65 (including GST) be accepted.*
- 2 That Council approve a contingency amount of \$60,000 (including GST) representing approximately 10% of the tendered sum to provide for any unforeseen additional work that may become necessary during the consultancy."*

This contract was awarded to consultants Connell Wagner Pty Ltd to undertake investigation and design for two major infrastructure projects:

- 1 A two lane road that would provide an important transport link between Sparks Road at Warnervale and the existing roundabout on the Pacific Highway at Watanobbi near the Wyong Golf Club.
- 2 A 750 mm diameter water pipeline between the Mardi Water Treatment Plant and an existing 750 mm diameter pipeline at Nikko Road, Warnervale, with a 375 mm diameter connection to an existing 375 mm diameter pipeline at the Pacific Highway and Britannia Drive roundabout.

The contract effectively commenced in January 2006. Variations to the contract were directed over the period from August 2006 until June 2008 as a result of additional works and significant changes to the project scope. Additional urgent investigation and design works were also assigned to Connell Wagner associated with the Porters Creek temporary weir (drought contingency) project. Actual expenditure to date on this contract is \$2,018,375.32 (excl GST).

Consultancy works were put on hold in March 2008 pending resolution of Section 94 funding issues for the construction of the Link Road.

The final estimated costs shown in this report include all works completed to date, with an allowance for finalisation of suspended works that will allow Council to be provided with a completed design package for the road and water pipeline in the event that future funding is provided.

The additional expenditure on this consultancy contract as a result of all directed variations was reported to the Extraordinary Meeting of Council held on 30 July 2008.

At the Extraordinary Meeting of Council held on 30 July 2008 Council resolved as follows:

RESOLVED unanimously on the motion of Councillor WELHAM and seconded by Councillor ROSE:

- “1 That the report be received and the information noted.*
- 2 That Council continue to pursue current initiatives to strengthen its project management capabilities.*
- 3 That staff obtain a short list of independent suitably experienced consultants for Council’s consideration with a view to appointing a consultant to undertake a review of Council’s project management processes to further assist with the strengthening of its capability in achieving its objectives in this vital aspect of its operations.*
- 4 That prior to conducting the review identified in 3 above, staff report to Council a draft consultant’s brief identifying all key aspects of the proposed review including the various policies, procedures and overall costs as associated with the review.*
- 5 That all major contract variation outcomes be reported as information reports to Council at the completion of the various tenders.*
- 6 That reports to Council on major projects highlight the potential risks and consequences in order to facilitate consideration of the nature of those risks and the adequacy of actions in place to mitigate them by both executive management and Councillors.*
- 7 That the quarterly reports on the Management Plan include a summary report on significant contract/project variations for the quarter.”*

This report now provides details on all major contract variations at the effective end of this contract as required by Item No. 5 of the Resolution above.

PROGRESS TO DATE

Works Under Original Contract

The original scope of work for the design consultancy was based on preliminary concept designs for both the Link Road and water pipeline.

The preliminary concept design for the Link Road was standard for this type of roadway. It was based on shallow road cuttings with a major embankment adjacent to, and encroaching into, the eastern edge of the Porters Creek Wetland (PCW) due to the narrow 20 metre wide road corridor at this location. The embankment incorporated basic culverts for hydraulic purposes.

At the time this concept was expected to be the least cost construction option for the road.

Increased Scope of Work to Original Contract

As the investigation and design developed, extensive environmental, geotechnical and engineering challenges, largely associated with crossing the edge of the PCW, resulted in significant changes to the original scope of work for the consultancy. The PCW is designated as a SEPP14 Wetland and any proposed development impacting it must be assessed as Designated Development under the provisions of the Environmental Planning and Assessment Act (EP & A Act). This would have resulted in an Environmental Impact Statement being required to be completed and submitted with a Development Application for assessment under Part 4 of the EP & A Act.

The changes to the consultancy scope of work are discussed below.

a Reinforced Earth Wall Option

In response to these challenges Connell Wagner was directed to amend the initial concept and confine the road footprint to stay fully within the 20 metre road reserve, so that there was no encroachment into the SEPP 14 Wetland and removing the need for the project to be considered as Designated Development. The concept developed to satisfy this criterion was for vertical reinforced earth walls to be provided, up to one kilometre long on both sides of the road, to keep the road footprint outside the PCW on the western side and the Great Northern Railway on the eastern side of the road.

As the investigations and designs were developed for this concept, geotechnical investigations undertaken by the consultant indicated very poor ground conditions adjacent to Porters Creek Wetland and within the road reserve. As a result, engineering solutions necessary to minimise potential settlement between the reinforced earth walls and the major culvert structures (required through the walls) were required. These were found to be very costly. It became apparent that, although not initially under consideration as a possible least cost solution, the option of a bridge would need to be investigated.

b Super “T” Girder Bridge Option

The bridge option mitigated issues of environmental impact and poor foundation conditions. Connell Wagner was instructed to undertake further investigations and design for a bridge, to enable final comparison of the benefits and disadvantages (on both cost and non-cost criteria) of a bridge option versus the reinforced earth embankment option. This situation required considerable additional investigation and design effort by the consultant, with resultant cost implications on the consultancy contract.

Connell Wagner undertook preliminary investigation and design of a more conventional Super “T” girder bridge. This type of bridge super-structure consists of precast, pre-stressed concrete girders with the cross section shape of a “T” that are positioned onto the sub-structure with a crane and with a concrete deck that is cast in-situ. It was the expected least cost option but a number of uncertainties around the attachment of the two proposed water pipelines to the bridge were difficult to resolve. The bridge/water pipeline interaction became a pivotal factor in the final choice of the type of bridge structure due to the need for ready accessibility to the pipelines for maintenance purposes.

c Incrementally Launched, Post-tensioned, Continuous Section Girder Bridge

An alternative type of bridge structure, known as an incrementally launched, post-tensioned, continuous section girder bridge, offered the best solution for the attached pipelines. This type of bridge super-structure is constructed from segments that are pre-cast in a casting bed at one end of the bridge. The segments are then post-tensioned together and launched using a launching truss into position within the span. The bridge “grows” from one end and the technique can be used for bridge lengths of several hundred metres. A notable example of this type of bridge is the “Sea Cliff” bridge just south of Stanwell Park on the Grand Pacific Drive (60 km south of Sydney). This type of structure also offered a major environmental advantage in that the bridge could be constructed within the narrow 20 metre road corridor and launched horizontally into position, with no encroachment into the PCW.

This design was pursued on the basis of its constructability and reduced impact on the wetland during construction. This variation involved the consultant in considerable additional effort, enlistment of extra expert specialists knowledgeable in the design of such structures, and considerable extra time to complete the design.

Connell Wagner’s engagement for the design of the Link Road and water pipeline was substantially increased in complexity and duration to address all of the issues that arose during the project. The total of all directed variations in relation to the Link Road and water pipeline is \$1,605,782.99 (excluding GST).

Details of these variations are provided in Annexure 1.

Additional Drought Contingency Projects

During the course of this contract the consultant was directed to undertake a number of additional drought contingency projects that were urgently required. Connell Wagner had already undertaken significant survey and geotechnical investigations in relation to its original engagement for the Link Road and water pipeline. This work was in the same locality as the proposed drought contingency projects, and this action was judged to be the most expedient and cost-effective manner in which to have these emergency works investigated and designed in the shortest possible time. It was also the least possible cost because any other consultant would have to have duplicated the survey and geotechnical work already completed by Connell Wagner. Connell Wagner was engaged for this work under the provisions of the Local Government Act 1993 that a contract made in a case of emergency is exempt from tendering and approval by Council. The cost of these six separate work packages was \$208,440.00 (excl GST).

Details of these variations are provided in Annexure 2.

Contract Summary

Table 1 summarises the main areas of expenditure on this contract to date. Actual expenditure to date is \$2,018,375.32 (excluding GST)

Table 1 Summary of Main Areas of Expenditure

Original Approved Funds with Contingency (excl. GST)	Directed Variations to Scope for Road and Pipeline (excl. GST)	Directed Variations to Emergency Drought Contingency Projects (excl. GST)	Total Directed Variations to the Contract (excl. GST)	Total Contract Sum (excl. GST)
\$527,026.95	\$1,605,782.99 *	\$208,440.00	\$1,814,222.99	\$2,286,704.49

Note: * Includes allowance for completion of works.

Summary tables of variations and explanation of significant variations to the contract are provided in Annexures 1, 2 and 3.

Discussion Relevant to Contract Cost Increases

The current estimated construction cost for the combined road and pipeline is \$37.4 million (excl GST). The current final estimated investigation and design consultancy cost for Connell Wagner attributable to the road and pipeline project only is \$2,078,181.82 (excl GST). This represents 5.6% of the estimated construction cost of that work. This is well within the industry range of up to 8% for the typical cost of pre-construction work for a project of this size and complexity.

Urgent Approval to Payment of Consultant's Claim

At the time when work on this project was put on hold (in March 2008) due to the uncertainties over the availability of Section 94 funding, the Consultant had submitted progressive claims for payment totalling \$332,929.00 (excl GST) in accordance with the provisions of the contract and under the Security of Payments Act. Payment was then delayed pending a report to Council seeking approval for the variations already directed by staff under the previous procedures used for reporting such variations to Council. (This procedure has now been changed to provide monthly reports to Council on all contract variations).

In view of the relationship established with Council and in good faith, the Consultant did not pursue payment under the Security of Payment Act while Council procedures were being amended. Following a further request for payment from the consultant, the General Manager exercised his delegation to act to ensure Council met its legal obligations and approved this payment.

CONCLUSION

During the course of this contract a significant number of scope changes were required to address emerging issues with locating a major arterial road and water pipeline adjacent to the Porters Creek Wetland. Approximately 40 variations were directed to progress the project, increasing the cost for the original works to \$2,078,264.49 (excl GST).

Also during the course of this work the consultant was directed to undertake a number of urgent drought contingency projects at a further cost of \$208,440.00 (excl GST).

All of these variations were undertaken by the consultant to a high standard and are considered to be a reasonable price for the works.

The additional expenditure on this consultancy contract as a result of all directed variations was reported to the Extraordinary Meeting of Council held on 30 July 2008.

It is recommended that Council approve additional funding to increase the contract sum from \$527,026.95 (incl. contingency and excl GST) to \$2,286,704.49 (excl GST). This figure includes a small allowance for the consultant to finalise design information and provide Council with a completed package that can be used should funding for this project be provided in the future.

<i>Annexure 1</i>	<i>Variations Directed by Superintendent</i>	
<i>Annexure 2</i>	<i>Variations Directed by Superintendent – Drought Contingency Projects</i>	
<i>Annexure 3</i>	<i>Explanation for Significant Variations</i>	

Annexure 1

Variations Directed by Superintendent

Variation No.	Description of Variations	Amount (excl. GST)
VO1	Railcorp protection officer	\$3,545.45
VO2-1	Service locations & survey stage 1	\$19,200.00
VO2-2	Service locations & survey stage 2	\$34,513.35
VO3	DA conditions approval - habitat restoration plan	\$25,364.00
VO4	Railcorp power pole relocation investigation & design	\$59,000.00
VO5	Survey & utilities - investigation for changed scope	\$48,440.00
V10	Water main directional drilling investigation	\$24,800.00
V11	DA conditions - approval soil & water management plan	\$46,000.00
V13	Scope change - Link Road preliminary design	\$86,920.00
V14	Scope change - water main preliminary design	\$32,080.00
V15	Scope change - geotechnical investigation	\$81,782.00
V17	Service change - Wyong River bridge design concepts	\$30,000.00
V18	Scope change - project management & reporting to July 2007	\$34,720.00
V19	Additional geotechnical investigations	\$89,760.00
V20	Detailed design Link Road bridge	\$133,900.00
V21	Revised planning approvals & REF preparations	\$44,640.00
V22	Separate design & documentation - Link Road North	\$126,140.00
V23	Traffic projections review & alternate pavement design	\$19,260.00
V24	Changed Scope - water main final design	\$38,180.00
V25	Changed Scope - project management to December 2007	\$84,000.00

Annexure 1 - (contd)

Variations Directed by Superintendent

Variation No.	Description of Variations (contd)	Amount (excl. GST)
V26	Changed scope - Sparks Road and additional Traffic Signal design	\$73,840.00
V27	Detailed design of piled raft foundation	\$34,500.00
V28	Bridge pile redesign	\$20,500.00
V29	Additional survey	\$21,360.00
V30	Valve house structural design	\$8,460.00
V31	REF's for Railcorp & RTA	\$20,430.00
V32	Changed scope - road and water main contract documentation	\$22,843.64
V33	Additional cost estimation work	\$27,200.00
V34	3D visualisation of Link Road	\$10,150.00
V35	Detailed design of water main crossing Wyong River bridge	\$80,000.00
V36	Additional design costs - Porters Creek Wetland bridge	\$136,320.00
V37	Tender evaluation Committee	\$12,400.00
V38	Additional REF preparations	\$30,080.00
V39	Environmental studies - Wyong River Bridge – Estimate only	\$27,272.73
V40	Project management fees January to June 2008 – Estimate only	\$18,181.82
Total* (excl. GST)		\$1,605,782.99

Note: * Total value includes variations for road and pipeline project only. Variations 06, 07, 08, 09, 12 and 16 are for separate drought contingency projects and are provided in Attachment 2.

Annexure 2

Variations Directed by Superintendent – Drought Contingency Projects

Variation No.	Description of Variations	Amount (excl. GST)
DROUGHT CONTINGENCY WORKS		
VO6	Porters Creek Weir - survey of weir site & creek	\$29,430.00
VO7	Porters Creek Weir - survey rising main route	\$33,230.00
VO8	Porters Creek Weir - REF for the weir site & creek	\$77,360.00
VO9	Porters Creek Weir - pump & rising main design	\$48,300.00
VO12	Design of stormwater harvesting pipe	\$16,960.00
VO16	Scope change - gas and oil pipe for Lower Wyong transfer	\$3,160.00
Total (excl. GST)		\$208,440.00

Annexure 3

Explanation for Significant Variations

Variation 13 (V13): - Scope change - Link Road design - \$86,920.00 excl GST

The initial concept for the Link Road was for local road design and construction on a given alignment with shallow road cuttings and routine embankment construction through wetland areas, with culverts to be provided for hydraulic purposes. The intersection with Sparks Road was to be a roundabout, however post tender negotiations allowed for this to be signalised. The Link Road alignment was subsequently to be fully retained within the existing 20 metre wide road reserve adjacent to Porters Creek (SEPP 14) Wetland (PCW). This initially required major retaining wall structures on the western side of the road through PCW.

Aligning the road within the existing road reserve also meant that the road would be very close to the great Northern Railway and this, in turn, required a retaining wall on the eastern side of the road approximately 1 kilometre in length. The net result was that this section of the project became a major structure through the wetland and adjacent to the railway line.

Since Connell Wagner's engagement the design of the Link Road has substantially increased in complexity and this variation was due to time spent by Connell Wagner on this work additional to the original scope of the consultancy.

Other scope increases or changed design requirements included (generally from south to north):

- Inclusion of adjustments to the existing Pacific Highway at the Watanobbi roundabout.
- Modifications to the Link Road formation to relocate proposed cycleway to an off-road facility.
- Alignment adjustments and redesign/relocation of a proposed future access intersection (roundabout) north of Porters Creek Wetland.
- Redesign of the Lakes Anglican Grammar School (LAGS) senior school roundabout to provide a single lane circulating facility in the Stage 1 construction of the Link Road.
- Alignment and realignment of the Link Road between the LAGS junior school access and Sparks Road, adjustment and readjustment of shoulder/kerb widths over this length.
- Development of a major signalised intersection at the Link Road connection to Sparks Road, with multiple auxiliary lanes for turning movements to/from Sparks Road.
- Provision for the development of Sparks Road to be compatible with future six lane configuration as proposed by the RTA.

Variation 19 (V19): - Additional Geotechnical Investigations - \$89,760.00 excl GST

Poor ground conditions, environmental conditions and restrictions that required the bridge to be built through PCW, in lieu of an on grade road, also determined that specialised Geotechnical investigation work and techniques had to be used in this area. For example, an area of the Wetland towards the southern end of the Bridge was inaccessible to standard geotechnical drilling rigs and equipment.

Specialised design requirements for the bridge piers and abutments also required specific Geotechnical investigation work to be undertaken.

The additional work covered under this variation was for extra geotechnical services that were required to inform the design through the wetland area.

Annexure 3 - (contd)

Explanation for Significant Variations

Variation 20 (V20): - Detailed Design Link Road Bridge - \$133,900.00 excl GST

During the development of the Link Road design it was concluded that the construction of an on grade road (via either embankment or reinforced earth retained construction) where it passes through the existing PCW was a high risk proposition in terms of environmental impact, cost, design implications, constructability and long term serviceability issues.

This determination was based on the following key issues:

- costs and constructability issues associated with constructing a road through the poor ground conditions located within the wetlands
- significant environmental implications and requirements of PCW that need to be met.

Connell Wagner indicated that a bridge structure across the wetland offered the least risk, least environmental impact and best value for money option to Council and would maintain the desired environmental performance of the wetland far beyond what the construction of a road embankment would do. The bridge option was therefore accepted.

This initial bridge option was predominantly a concrete structure approximately 450m long, comprising a road deck 9m wide with a further footway and cycle way requirement, providing an overall bridge width in the order of 13.5m. Two 750 diameter water pipelines would be supported on the bridge structure.

The original scope of Connell Wagner's service was for local road design and construction on a given alignment with shallow road cuttings and routine embankment construction through wetland areas. The change from this local road to a bridge structure was a major variation to the original contract scope.

Due to time implications (a pre-commitment that Council had made to complete the northern section of the Link Rd adjacent to LAGS by first school term 2008) this variation also included time for Connell Wagner to expedite the design and documentation relating to the northern section to allow construction of this section first and the procurement strategy for the project was changed.

Variation 22 (V22) - Separate Design & Documentation - Link Road North - \$126,140.00 excl GST

The complexity of the Link Road section of the project increased substantially since the Connell Wagner Fee Proposal of May 2005. Specifically, the previous concept of a rural local road with shallow cuttings and low embankments (with culverts) through wetland areas, was replaced with a more heavily engineered concept involving bridges and retaining walls.

The impact of the bridge and the need for reinforced soil walls over a long length of the Link Road approaches has substantially contributed to additional time and effort in modifying and detailing the road geometry and associated design features.

Annexure 3 - (contd)

Explanation for Significant Variations (contd)

A summary of the additional complexities or increased design tasks on the Link Road is as follows:

- Detailing of adjustments to the existing Watanobbi roundabout.
- Modification of bridge approach crossfalls to match one-way crossfall on bridge.
- Detailing reinforced soil wall profiles, standard reference points and bridge abutment returns.
- Adjustment of bridge horizontal and vertical alignments to provide constant radius curves in both planes. This was only possible with the resolution of the Water Main configuration on the bridge, with one either side removing the previous constraint to a constant radius horizontal curve.
- Design of the proposed Noise Wall on the eastern side of the Link Road south of the new Albert Warner Drive intersection.
- Separate detailing and alignment strings for off-road shared pathway remote from road formation.

Connell Wagner also undertook a number of additional tasks at the request of Council that required increased work and also rework during the final design. These items are summarised below:-

- Splitting of the road project into two distinct sections for separate construction contracts to enable early completion of the section of road from just south of the LAGS Senior School access to Sparks Road.
- Review of the traffic projections to assess the need for dual carriageways south of the LAGS School. This review resulted in down-time for the design process until the assessment was completed.
- The traffic review resulted in a change in scope for the road design between the LAGS Junior School and the LAGS Senior School entries. This resulted in rework of the well advanced final design for the northern section of the road.
- The decision to split the project into two construction contracts was subsequently reversed to provide the greater benefit to the community of the whole road rather than part of it. This review resulted in reorganisation of the drawings and recompilation of the drawings and documents into a combined contract.

This variation was submitted for additional design costs associated with Changed Scope of the Link Road Final Design.

Variation 36 (V36) - Additional Design Costs - Porters Creek Wetland Bridge - \$136,320.00 excl GST

Connell Wagner commenced the detailed design of a Super "T" girder bridge across the Porters Creek Wetland in lieu of the originally proposed conventional road embankment with culverts that was superseded by a reinforced earth retaining wall structure with culverts.

Annexure 3 - (contd)

Explanation for Significant Variations (contd)

The consultant provided an initial estimate for this work which was approved as Variation No 20. Subsequent to this, the scope of the work changed to the design of an incrementally launched post-tensioned continuous section type girder bridge. This involved the consultant in considerable extra effort, enlistment of extra expert specialists knowledgeable in the design of such structures, and considerable extra time to complete the design.

The consultant had substantially completed the original Super "T" design when the decision was made to change the design to the incrementally launched post-tensioned girder bridge. The conversion to an incrementally launched structure was pursued on the basis of improved maintenance accessibility to the attached pipelines, its constructability and reduced impact on the wetland during construction.

The cost involved with this variation is for the extra work involved with the design of the bridge as an incrementally launched post-tensioned girder type bridge.