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# **DBCT "Short Gain" Capacity Expansion Assessment**

## **Final Report**

12665-00-GE-RP-001

15-Jun-07

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### SYNOPSIS

WorleyParsons has reviewed the scope, standard and cost of the DBCT Short Gain expansion carried out by BBI (DBCT) Management Pty Limited and concluded that:

- the scope of the works is consistent with the DBCT Master Plan 2005;
- engineering standards applied to the expansion project do not involve any unnecessary works or contain design standards that exceed those necessary to comply with Section 12.1 of the Ports Services Agreement; and
- the costs of the expansion are reasonable.

#### PROJECT 12665-00-GE-RP-001 - DBCT "SHORT GAIN" CAPACITY EXPANSION ASSESSMENT

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## 1. EXECUTIVE SUMMARY

WorleyParsons has reviewed the technical aspects of the recently completed 'Short Gain' capacity expansion of the Dalrymple Bay Coal Terminal (DBCT) that was undertaken by BBI (DBCT) Management Pty Limited to increase the net operating capacity of the terminal by 4.5 Mtpa. The assessment was based on documents, data and information provided by DBCT Management.

The 'Short Gain' capacity expansion described in the DBCT Master Plan 2005 is the first part of the program to increase the terminal capacity from 54.5 to 90 Mtpa.

To achieve the required throughput capacity improvement of 4.5 Mtpa for the 'Short Gain' expansion, the following modifications to terminal and its operation were carried out:

- a) Optimising terminal control systems
- b) Upgrading shiploader SL3 long travel and boom luffing speeds; and
- c) Replacing reclaimer RL1 and conveyor R1.

A further 1.0 mtpa, which will increase terminal capacity from 59 to 60 mtpa, is to be realized from the departure path dredging undertaken by the Ports Corporation of Queensland.

WorleyParsons found that the work undertaken by BBI for the "Short Gain" expansion was consistent with the current DBCT Master Plan 2005 and that the works were carried out to acceptable standards. Throughout the audit process it was found that the works were considered reasonable in terms of proper methodology, acceptable standards, design requirements and contract execution. Although the expansion will be slightly over budget, the level of costs incurred was considered to be reasonable.



## 2. INTRODUCTION

### 2.1 Background

The Dalrymple Bay Coal Terminal (DBCT) is a common user coal export terminal located at the Port of Hay Point, approximately forty kilometres south of Mackay. The coal terminal is used for the export of coal and is linked by rail to the Bowen Basin. DBCT's coal handling service includes the inloading, stacking, reclaiming and outloading of coal.

DBCT is owned by the Queensland Government through a wholly owned entity, DBCT Holdings Pty Ltd (Holdings). In September 2001, the Queensland Government executed a long term lease for DBCT with Prime Infrastructure, now BBI (DBCT) Management Pty Limited (DBCT Management).

DBCT Management's lease of the terminal, as governed by the Ports Services Agreement (PSA), requires it to undertake capacity expansions in accordance with a Master Plan approved by Holdings. The purpose of the Master Plan is to guide the development and expansion of the terminal.

The 'Short Gain' expansion is the first part of the expansion program described in the Master Plan to increase the terminal capacity from 54.5 to 90 Mtpa (NOC). Improvement upgrades suggested in various engineering investigations and feasibility studies have been incorporated in the 'Short Gain' capacity expansion.<sup>1</sup>

The purpose of the 'Short Gain' expansion is to increase net operating terminal capacity (NOC) by 4.5 mtpa from 54.5 Mtpa to 59 Mtpa (approximately 8%).<sup>2</sup> DBCT Management commissioned the expansion in August 2006. As a result, DBCT Management will apply to the Queensland Competition Authority (QCA) to approve the associated capital expenditure and increase in its regulated revenue cap.

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<sup>1</sup> Estimates of the impact of upgrade proposals on the net terminal capacity were made during the feasibility study period using Sandwell's Bulk Handling Terminal Simulation Software. The accuracy of the capacity estimates was considered to be +/- 0.8 Mtpa. The models simulated transport and handling of the product coal from the mine stockpiles to the terminal and from the terminal to the holds of various sized ships. Actual operating data and records were used to construct the models.

<sup>2</sup> A further 1.0 mtpa, which will increase terminal capacity from 59 to 60 mtpa, is to be realized from the departure path dredging undertaken by the Ports Corporation of Queensland.



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### 2.2 Objectives and Scope

This report follows the objective and scope requirements set out in the consultancy brief provided to WorleyParsons by the Queensland Competition Authority (the Authority). The Authority will need to assess the prudence of these costs on the basis of the criteria in clause 12.5(m) of the access undertaking, namely:

- scope of the works undertaken - how it relates or aligns to the current Master Plan;
- standard of the works undertaken - to determine if the quality and nature of work specified and installed complies with general industry standards, consistent with those necessary to comply with clause 12.1 of the Ports Services Agreement (PSA); and
- the reasonableness of the cost of works undertaken - taking into consideration the scale and complexity of the works, appropriate procurement procedures and the methods used for evaluating and awarding the contracts, current construction market conditions, management during construction, HSE, operational disruption, scheduling difficulties, whole of life Capex versus Opex comparison, and certainty of risk versus price consideration.

The Queensland Competition Authority (QCA) has engaged WorleyParsons to advise it on the technical aspects of these criteria for the 'Short Gain' expansion. Items not affected by the scope of the 'Short Gain' have not been considered.

### 2.3 Data Gathering Methodology

The findings and conclusions reached are based on examination of the DBCT Master Plan 2005, the Master Plan 2005 Addendum 1 Feb 2006, in conjunction with supporting information given to the Authority by DBCT Management, including reports dealing with Optimization Terminal Controls, Upgrade to Shiploader SL3, Replacement of Reclaimer RL1 and Upgrade to Conveyor R1.

Where applicable, data provided by DBCT Management was compared with in house historical data from other coal handling projects.



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## 3. RESULTS & FINDINGS

### 3.1 Assessing the Scope of the Short Gain Expansion Works against the DBCT Master Plan

To review the scope of short gain expansion works, the consultancy brief required WorleyParsons to assess whether the work undertaken is consistent with the current DBCT Master Plan, including the Master Plan 2005 Addendum 1 Feb 2006. The estimated throughput capacity improvement for the 'Short Gain' expansion depends on the following modifications to the terminal and its operation:

- feasibility studies
- optimising terminal control systems
- upgrading shiploader SL3 long travel and boom luffing speeds; and
- replacing reclaimer RL1 and conveyor R1.

WorleyParsons has undertaken an assessment of each of the abovementioned items and has found that, the scope of the works undertaken is consistent with the Master Plan. Sections 3.1.1 – 3.1.4

#### 3.1.1 Enlivenment and Feasibility Studies

A range of engineering investigations and feasibility studies were carried out as result of advice from prospective DBCT users of plans to increase capacity and further develop Bowen Basin coal mines, therefore requiring a terminal to cater for an increased demand. These engineering investigations and feasibility studies provided an assessment of the technical issues, likely capacity increase and costs for options to increase terminal capacity. The studies are an essential to define the scope of the overall expansion project incorporated in the 2005 Master Plan.

The overall expansion project includes both the 'Short Gain' expansion and subsequent expansions to 68 mtpa and 85 mtpa (DBCT 7X Project). As a result, some studies are not relevant to the 'Short Gain' expansion, which only includes control systems optimization, shiploader upgrades, replacement of reclaimer RL1 and the conveyor R1 upgrade. Although some studies were not applied directly to the Short Gain expansion it is agreed that undertaking such studies in this early phase of a staged Masterplan is required to ensure upgrades are cost effective or consider other factors. One such example of this was to defer the speed increase to shiploader SL1 to the 7X Project.

The Master Plan 2005 (page 80 of 129) includes "upgrade of the long travel and boom luffing speeds on all machines and upgrade of the SL1 shuttle speed and shuttling angle capability. The upgrade



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work for SL3 will be completed within the Short Gain path. Upgrades to SL1 and SL2 will be carried out under the 7X Project to coincide with timing for maintenance shutdowns." This was an agreement between the operator DBCT Pty Ltd and DBCT Management.

The engineering investigations and feasibility studies are listed in Appendix 1.

### 3.1.2 Optimizing Control Systems

The Master plan refers to 21 sub-programs under the subject of optimization of control systems in Table 18 - Proposed Work Summary.

The supporting documentation provides information on engineering and implementation of a number of projects relevant to the optimization work, twenty-one (21) in all. The group of projects and project notes are listed in Appendix 2.

All identified projects were not implemented. Work on projects for which early work showed that the completed project would not provide the anticipated capacity benefit, was discontinued. Project 17 to improve the anti-collision systems in the yard was deferred to Phase 1. Table 1 below gives the status and predicted benefit (based on data from the Sandwell report) from the 12 remaining projects.

Table 1 – Control Systems Optimization Projects

Project No.	Project Description	Average Increase/Saving	Completion Status
1	Calibration of the surge bin	20/min per product	Complete. Need for additional bin level instrumentation identified for later phase works.
3	Surge Bin Utilization	Included in 1	Completed June 06
6	Cargo Assembly Regulations	Refer TCM	Completed July 05
7	Raising and Lowering Conveyor S3 and S4 Trippers	6 min/train	Completed May 05
8	Next string conveyor setup	1 min/train	Completed Jul 06



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10	Conveyor startup sequencing	3 min/train	Completed Jun 06
12	Stockpile Creation Methodology	2% in average gross rate.(up to 8% on 50% of stockpiles)	Completed Oct 06
13	Coal density factor for belt loading	2% in average gross rate. (0.25 Mtpa inloading)	Completed May 06
16	Improved Bucket Reclaimer Control Algorithm. Applied to RL1, SR1 and SR5. Not implemented on SR2 and SR3.	10% of average gross rate. (5% across yard)	Completed Oct 06
18	Auto Relocation of SL1 & SL2	10 min/ship	Completed Mar 05
20	East/West offsets of stockpile zones A and C	3 min/train	Completed Mar 05
21	Investigate QR/DBCT Interface	2.5 min/train	Completed May 05

Additional modeling as proposed by DBCT Management is recommended to confirm that the as built 'Short Gain' expansion works provide the required increase in net operating capacity. Although this modeling was not available at the time of writing the designed increases were proven during performance testing of the individual systems and as such it is expected that the modeling will prove the overall theoretical system performance.

WorleyParsons notes that the DBCT Master Plan provides for the optimization of control programs. As such, WorleyParsons confirms the scope of the works undertaken is consistent with the DBCT Master Plan.

### 3.1.3 Upgrading Shiploader SL3 Long Travel and Luff Speeds

Contract SG06 to supply, install and commission mechanical, structural and electrical plant and equipment was based on engineering and design work by Connell Hatch under contract SG05. The scope of work incorporated in the upgrade includes,

- Modifications to long travel drive power supply and control systems to increase travel speed.



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- Modifications to long travel buffers to suit higher travel speeds.
- Modifications to the boom luffing winch and electrical systems to increase the luffing speed.
- Strengthening the shiploader structure and modifications to the bogie frames to cater for higher loads from buffer impact and "rail blocked" load cases.
- Modifications to the SL3 tripper and L17 drive tower structures to provide clearance for the modified travel range.
- Replacement of the cable and hose reeler drives.
- Replacement of the long travel drive brake motors.
- Modifications to the boom luffing winch equaliser.
- Control system software and VSD parameter changes.

The above modifications are essential if long travel and luff speeds are increased and are therefore required for the 'Short Gain' expansion. WorleyParsons notes that the DBCT Master Plan provides for the upgrade of shiploader SL3. As such, WorleyParsons confirms the scope of the works undertaken is consistent with the DBCT Master Plan.

### 3.1.4 Replacing Reclaimer RL1

The replacement of RL1 is essential to the 'Short Gain' expansion. Contract SG13 was let for the design, supply, delivery to site, erection, commissioning and testing of a complete machine to meet all specification requirements. The contract was awarded to Voest-Alpine Materials Handling.

WorleyParsons notes that the DBCT Master Plan provides for the replacement of reclaimer RL1. As such, WorleyParsons confirms the scope of the works undertaken is consistent with the DBCT Master Plan.

WorleyParsons notes that new slew ring bearings for SR4 and SR5 were added to the scope of supply for the new reclaimer but are not required by the 'Short Gain' expansion. WorleyParsons understands that these new bearings were included in the scope of supply for RL1 due to the cost savings achievable. As such, whether or not including the bearings in the scope of the short gain expansion is appropriate is a matter for the Authority to determine.



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### 3.1.5 Upgrading Conveyor R1

Upgrading R1 is required to utilize the increase in reclaiming capacity provided by the new reclaimer RL1. Three contracts were let.

- a) SG15 for the supply, installation and commissioning of civil, structural, mechanical plant and equipment to upgrade conveyor R1, including installation of supplied Conveyor Drive Units and conveyor R1 transfer chute assembly;
- b) SG16 for the design, supply, fabrication and protective coating of the conveyor R1 chute transfer system to the out-loading conveyor L11A; and
- c) SG17 for the supply of conveyor R1 drive assemblies including motors, scoop control fluid couplings with a cooling system, gear reducers, low speed coupling and base frame.

WorleyParsons notes that the DBCT Master Plan provides for the upgrade of conveyor R1. As such, WorleyParsons confirms the scope of the works undertaken is consistent with the DBCT Master Plan.

### 3.2 Standard of the Works Undertaken

The consultancy brief requires WorleyParsons to assess the standard and specifications of the works undertaken with the aim of ensuring that the proposed works do not involve any unnecessary works or contain design standards that exceed those necessary to comply with Section 12.1 of the Port Services Agreement (PSA).

#### 3.2.1 Optimization

Supporting information was not provided to enable assessment of the standard of work for PLC and SCADA software. Various reports show that code was tested. The schedule of rates documents did not define the required standards for the PLC and SCADA software. Established DBCT standards, selection of appropriately qualified and experienced contractors, review and testing seems to be relied on.

DBCT was requested by DBCT Management to provide ST1 code for third party audit to assess robustness and maintainability. (refer to 17 Feb 2006 minutes of meeting). This indicates that DBCT Management acted to review the standard of software produced.

Review of the report on Preloading of Conveyors S1 and S2, the Functional Description for Inloading Job Processing Modifications and Reclaim Control Algorithm and Minutes of Progress Meeting leads WorleyParsons to conclude that the optimization work was carried out to an acceptable standard.



### 3.2.2 Upgrading Shiploader SL3 Long Travel and Luff Speeds

The SG06 contract technical specification defines the standard of work in detail and by reference to appropriate and relevant Australian standards. The modifications required were given in the MP03 report "MP03 Concept Study, Shiploader Luffing, Long Travel and Shuttle Speed Upgrade" that recommends an upgrade to a luffing speed of 11 deg/min and a maximum long travel speed of 53 m/min.

The MP03 Concept Study, Shiploader Luffing, Long Travel and Shuttle Speed Upgrade sets out the basic technical requirements to upgrade shiploaders SL3 and outlines the modifications to the electrical power, control, travel drives, mechanical components and buffers systems to accommodate the higher travel speeds. These upgrades were required to ensure that SL3 will be able to maintain the capacity that the upgrades to R1 and RL1 will offer.

The Shiploader SL3 Upgrade - Contract SG06 Technical Specification expands on the MP03 report data and gives details of the work carried out. Review of these documents leads WorleyParsons to the conclusion that the standard of the SL3 upgrade does not reflect unnecessary works or design standards that exceed those necessary to comply with 12.1 of the PSA.

### 3.2.3 Replacing Reclaimer RL1

The build standard of the replacement reclaimer was defined in the technical specification of contract SG13. The technical specification is comprehensive and references appropriate Australian standards, in particular AS4324 which is the base standard for the design reclaimers to be used in Australia. In the absence of suitable Australian standards, British and DIN standards are referenced for design of plate buckling. Reference to British and DIN standards for this application is normal and appropriate.

A comprehensive structural and mechanical design audit was undertaken by Aspec Engineering. Paterson Flood Engineers carried out an electrical design audit as planned. The electrical design audit report was provided and design reviews were carried out.

The specified average reclaim rate of 4200 tph with product bulk density of 830 kg/m<sup>3</sup>, is consistent with the required reclaim rate given in the DBCT Expansion Project Facility Design Requirements. After reviewing the optimization study this is the capacity required for the short gain expansion. No further increases will be required for the 7X Project as extra capacity gain will come from other areas within the terminal.

The technical specification, Design and Construction of Replacement Reclaimer RL1, gives details of requirements for performance, design, reliability, mechanical equipment, structural steelwork, electrical equipment requirements, operation and control, protective coatings (painting etc), design audits, data requirements, quality assurance, training, commissioning and testing.



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The detail standards incorporated in the technical specification for the Replacement Reclaimer are normal for material handling machines required to operate in the environment prevailing at DBCT.

### 3.2.4 Upgrading Conveyor R1

The R1 upgrade project was split into four areas:

- Engineering
- Supply and installation of R1 components
- Manufacture and supply of R1 drive
- Design, supply, fabrication and surface treatment of R1 head chute transfer system.

The engineering work provided an appropriate specification for supply and installation scope. Site standard components were incorporated in the R1 drive assembly. The standard of the head chute assembly was defined by a detailed specification provided to the selected contractor and was constructed from the usual material thickness and grades for this application.

As such, WorleyParsons confirms that the standard for the conveyor R1 upgrade does not reflect unnecessary works or design standards that exceed those necessary to comply with 12.1 of the PSA.

### 3.3 Reasonableness of the Cost of Works Undertaken

To review the reasonableness of the cost of works undertaken for the Short Gain expansion, the consultancy brief required that WorleyParsons have regard to the:

- level of costs;
- appropriateness of DBCT Management's tendering process; and
- current market for engineering, equipment supply and construction.

In forming a view on the reasonableness of the expansion costs, WorleyParsons may also have regard to DBCT Management's management of the short gain expansion.

WorleyParsons has undertaken an assessment with respect to the abovementioned items and has found that, given the complexity and nature of the project, the costs of the work undertaken are reasonable. Sections 3.3.1 – 3.3.4 provide explanations for this conclusion.



### 3.3.1 Levels of Costs

#### a) Engineering Investigations and Feasibility Studies

Engineering investigations and feasibility studies were awarded to specialist consultants on a schedule of rates basis. This approach is reasonable given the requirement for specialist skills and the uncertainty surrounding the total scope of work at the early stages of the project.

Table 2 gives an overview of the budget outcomes resulting from the approach adopted.

Table 2 – Engineering Investigations and Feasibility Studies

Study Item	Responsibility	% of Controlled Budget	% Variance per Item	% Budget Impact per Item
Power Upgrade	SKM	4.5	0.0	0.0
Yard Machines	Aspec Engineering	7.2	0.0	0.0
Various Studies (listed in Appendix 2)	Connell Hatch	47.1	16.2	7.6
Layout Drawings	Entity Design and Drafting	0.1	0.0	0.0
SR4 and SR5 Capacity	WBM	2.2	39.5	0.9
ST1 and ST2	MMHE	1.7	12.1	0.2
Yard Machines Electrical	Paterson Flood	1.2	0.0	0.0
Rail Reveal Pit 1 Options	Bechtel Services	1.5	0.0	0.0
Terminal Capacity Modeling	Sandwell	5.5	24.1	1.3



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DBCT Consultancy	DBCT	1.9	15.1	0.3
BBI Site Management	BBI (DBCT) Management	27.2	3.0	0.8
Total		100.0	10.4	10.4

Reference to Table 2 and Appendix 1 shows that a single consultant carried a large portion (approximately half) of the investigation and feasibility work under a single contract. The various studies referred to above are in reality a set of 11 individual studies.

As shown in Table 2 some investigations and studies ran over budget. The overall variance of 10.4 % is on the high end but not considered to be excessive for the type of work undertaken. In fact with the studies undertaken the level of accuracy at this stage would be expected to be approximately +/-10%.

DBCT Management's site management costs are at the high end of expectations but are not considered to be excessive. It is expected this is the case due to the number of consultants that were used for in excess of twenty various studies over the course of the feasibility period.

The expenditure on the investigation and feasibility work applies to all phases of the capacity expansion set out in the Master Plan and represents approximately 0.4% of the projected capacity expansion capital cost. In this context, the reported level of expenditure on engineering investigations and feasibility studies is considered to be reasonable.

## b) Optimization of Control Systems

Orders were let to selected specialist organizations to undertake the sub-projects mentioned in section 3.1.1. on a schedule of rates basis. The rates mentioned in documents are consistent with market rates prevailing at the time of award.

Engineering and implementation of an improved reclaim control algorithm to RL1, SR1 and SR5 absorbed 44.2% of the optimization budget, which equates to approximately 2,500 man-hours.

WorleyParsons recognizes that improved reclaim control algorithms potentially provide a 10% increase in average reclaim rates and are therefore essential to meeting the nominal Short Gain capacity increase. The BBI response to information requests shows that latent technical issues such as boom oscillation and instrument malfunctions had to be resolved. Resolution of these issues no doubt added to the cost.



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Given the importance of improvement to the reclaim algorithms to the Short Gain capacity improvement and the information provided in response to the information request on inloading - preloading engineering (contract SG02), the cost for the control system optimization projects is reasonable and justified.

### **c) Upgrading Shiploader SL3 Long Travel and Luff Speeds**

A schedule of rates approach was adopted for the engineering content of the ship loader upgrade. Selection of Connell Hatch to provide the engineering services was entirely appropriate as they designed the shiploader and did the MP03 study on shiploader upgrade. The cost of the engineering services at 11.4% of the SL3 upgrade budget is considered to be reasonable. This is based on historical data for Engineering, Procurement and Construction Management costs being in the vicinity of 20 to 30% with the engineering portion anywhere between 6 to 12% depending on the complexity of the tasks at hand and the overall breakdown of capital cost.

A lump sum contract was awarded to G and S Engineering to execute the specified works following evaluation of competitive tenders. Market forces therefore determined the cost of the specified work.

### **d) RL1 Replacement**

Replacement of reclaimer RL1 accounted for approximately 63% of the 'Short Gain' expansion budget. As a lump sum tender was awarded to the best evaluated tenderer, market forces determined the level of costs to design supply and install the new reclaimer.

### **e) Conveyor R1 Upgrade**

A schedule of rates approach was adopted for the design and engineering content of the conveyor R1 upgrade. Connell Hatch was selected to provide the design services based on their expertise and participation in the precursor engineering investigation. The cost of the design and engineering services at 5.9% of the upgrade budget is considered to be reasonable as per the same reasoning as of item c above.

A competitive lump sum contract was awarded for the supply and installation of the specified conveyor upgrade components. It follows that market forces determined the level of costs for this part of the work.

A lump sum contract was awarded for design, fabrication and supply of a transfer chute system at the head end of R1, based on a sole source proposal. The cost of the chute system provided was compared with a chute system performing a similar function supplied by another contractor for a recent project. The size, configuration, materials and construction details were similar to the R1 chute



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system. The adjusted prices for both chutes were in reasonable agreement, which supports a conclusion that the price level of the R1 head chute system is reasonable.

A lump sum contract was awarded for supply of R1 drives, based on a sole source supply. The supply cost compares favorably with values included in the study budget estimates and prices for drives installed elsewhere.

### **f) Project Management Costs**

When the costs for engineering, procurement and construction management (EPCM) are extracted from the data provided and compared with the total 'Short Gain' expansion cost, the ratio is 22.5%, of which the portion due to Project Management is 9.2%. This is in the high end for project management however it was agreed that this was necessary due to quite a number of varying contracts and consultants involved.

#### **3.3.2 Appropriateness of the Tendering Process**

The processes used can be classified as follows.

- Single source schedule rates proposals requested from specialized consultants.
- Competitive schedules of rates proposals requested from known contractors.
- Competitive lump sum tenders from approved contractors.
- Single source lump sum proposal from a specialist contractor.

Competitive lump sum contracts accounted for 67% of the 'Short Gain' budget. The approach and rationale for its adoption by DBCT Management for each contract has been documented. There is no evidence that, on balance, adoption of schedule of rates contracts has resulted in unfavorable budget outcomes. Furthermore it has been found in recent market conditions a reluctance from many vendors to work on lump sum contracts especially from a consultancy standpoint where there are many changes during the design phase.

Having reviewed BBI's tendering processes for the short gain expansion, it is concluded that BBI's procurement arrangements were comprehensive, involving a series of detailed commercial, technical (engineering), and legal processes consistent with standard industry practice.



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## **a) Engineering Investigations and Feasibility Studies**

Schedule of rates contracts on a single source basis were awarded to specialist consultants considered by DBCT Management's management team to be the most appropriate choice after review of proposals from the consultants involved. The consultants were selected on the basis of specialist knowledge and availability. Rates for consultants with appropriate skills do not vary greatly. The scope of work and the efficiency of the consultant have a more profound influence on cost outcome for this type of work rather than the charge rate. Unless the scope of work is and can be well defined, a lump sum contract for this work would of necessity carry a significant contingency. For these reasons, WP believes that this approach was reasonable.

The consultants selected are listed in Appendix 1. In budget terms, Connell Hatch undertook 47% of the investigation and study work. All the consultants selected are considered to be suitable for the scope of work undertaken.

## **b) Controls Systems Optimisation**

Three schedule of rates contracts on a single source basis were awarded to specialist consultants nominated by DBCT Management's management after review of proposals from the consultants involved. The projects executed by the specialist consultants are listed in Appendix 2.

Use of the schedule of rates was justified as investigation followed by scope development was required against restraints imposed by time and the need for testing control system modifications in an operating plant.

## **c) Ship Loader SL3 Upgrades**

A single source schedule of rates contract was awarded to Connell Hatch for the engineering work. This consultant is well known to DBCT Management and was well placed to undertake the engineering work since they designed the DBCT ship loaders and were involved in the feasibility studies for this part of the 'Short Gain' expansion. The schedule of rates approach was adopted to avoid the cost of contingencies that are included in lump sum proposals for this type of work.

Competitive lump sum tenders were sought from four companies, selected for their perceived capacity to adequately carry out the scope of work specified by the engineering consultant. Three offers were received and subjected to evaluation by the DBCT Management site team and a contract awarded to the tenderer (G and S Engineering) with the lowest evaluated proposal i.e. the lowest price after equalization of bids to account for exclusions, departures and adjustment for late wage rate increases, legal and management sign off.



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### **d) Reclaimer RL1 Replacement**

A single source schedule of rates contract was awarded to Connell Hatch to provide engineering services for tender scope detailing for the RL1 package. Two other engineering contracts were awarded for third party audits of the contractor's (Voest Alpine) designs. These audits are a requirement of the applicable Australian standard AS4324. The audits were awarded to Aspec Engineering and Paterson Flood Engineers on the basis of their availability and technical capacity. The mechanical and structural audit required extensive finite element analysis on the entire machine for a wide range of load cases.

Competitive tenders were sought from three experienced yard machine suppliers for the design, supply, erection and commissioning of a reclaimer to meet the requirements of the specification prepared by Connell Hatch. This is an industry standard 'design and construct' approach. Three tenders were received. The highest priced tender was non compliant technically and commercially and was eliminated as the tenderer advised that the price would be increased substantially for a compliant option. The two remaining tenders were subjected to detailed assessment by the DBCT Management site team and a contract awarded to Voest-Alpine Materials Handling after management and legal sign off. Voest-Alpine was able to offer replacement slew bearings at a substantial discount and to commit to a Practical Completion date of 28 Jan 2006. The other tenderer could not offer discounted slew ring bearings and would only commit to a 14 March 2006 Practical Completion date. These considerations placed Voest-Alpine first on both price and delivery.

Since the tender process was competitive, the cost outcome was determined by market forces and is therefore considered to be reasonable.

### **e) Conveyor R1 Upgrade**

A single source schedule of rates contract was awarded to Connell Hatch for the engineering component of the upgrade. This decision was based on the consultant's involvement in the earlier engineering investigations and their conveyor design expertise.

Three qualified construction companies were invited to provide lump sum tenders in a competitive process for the supply and installation of the R1 upgrade. The conveyor drives and head end chutes were excluded from the supply. Three tenders were received and assessed by the DBCT Management site team and a contract awarded to the lowest price tenderer (REB Engineering Pty Ltd) after management and legal sign off.

Since the tender process for the installation contract for the R1 upgrade was competitive, the cost outcome was determined by market forces and is therefore considered to be reasonable. This portion of the R1 Upgrade work accounted for 70% of the expenditure.



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A single source lump sum proposal was obtained from Tasman Warajay Pty Ltd to design and supply the R1 head end transfer chute. This approach was adopted in view of previous favorable site experience, to save time and due to the company's specialist knowledge in the design of low head room chutes. The price quoted by Tasman Warajay was compared with a similar chute system recently installed in a Bowen Basin coal mine and was found to be reasonably priced.

A single source lump sum proposal was obtained from Hansen Transmissions to supply the conveyor drives. This approach was adopted because Hansen Transmissions are the standard transmissions used on the DBCT site. The proposal was reviewed and a contract awarded to Hansen Transmissions after management and legal sign off. The price quoted by Hansen Transmissions compares favorably with a similar systems recently installed in a Bowen Basin coal mines

### **3.3.3 Current Market for Engineering, Equipment Supply and Construction**

Experienced contractors with a proven capacity to undertake construction work of the type required for the 'Short Gain' expansion generally have full order books. The results of the tender process for the SL3 Upgrade (two out of four tenderers declining due to other commitments) are similar to those experienced for other Central Queensland projects.

### **3.3.4 DBCT Management's Management of the Short Gain Expansion**

A Project Execution Plan for the DBCT Short Gain Expansion was prepared by DBCT Management. The Execution Plan includes the following topics:

- Project objective
- Project scope of works
- Background and packaging strategies assigning the scope of work to the various contractors and suppliers
- Capital expenditure budget
- Project organization including an organization structure and chart of authorities
- Project controls including procurement control, cost control, contract administration.
- Reporting
- Position charters



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- Major identified risks
- Programme including milestone dates. Commissioning and handover of the project was given as 28 Jan 2006.

Copies of tender evaluations, recommendations for awarding contracts, approval sign off to verify compliance with policy and legal review of contract documents.

The practical completion/handover dates given in the documents supplied are given below.

- Shiploader SL3 Upgrade – 6 June 2006
- Reclaimer RL1 – 4 Aug 2006
- Conveyor R1 Upgrade – 16 June 2006
- Optimisation projects – Progresssive from March 2005 to October 2006

An explanation for the delays in completion was not given in the documents provided.



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## 4. CONCLUSIONS

WorleyParsons' assessment of the documents and data provided shows that the scope of the 'Short Gain' expansion is consistent with the current Master Plan for DBCT and that the works were carried out to acceptable standards.

Although the expansion will be slightly over budget, the level of costs incurred were considered to be reasonable.



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## **Appendix 1– Engineering Investigations and Feasibility Studies**



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- 1) MP01 – Power Upgrade - Awarded to SKM
- 2) MP02 – Yard Machines - Awarded to Aspec
- 3) MP03 – Various Engineering Investigations and Feasibility Studies – Awarded to Connell Hatch.
  - Shiploaders, luffing, long travel shuttle.
  - Inloading Systems 1 and 2
  - Outloading Systems 1 and 2
  - Inloading 3 Dump Station Feeders (Belt or Vibrating)
  - Outloading System 3 – surge bin 3
  - Berth 4
  - Shiploader SL4
  - Outloading System 3 – Conveyor L15
  - Bund 5A Development
  - Stockyard Upgrade Works
  - Bund 6 Development
- 4) MP05 – Layout - Awarded to Entity Design and Drafting
- 5) MP06 – SR4 and SR5 – Awarded to WBM
- 6) MP07 – ST1 and ST2 – Awarded to MMHE
- 7) MP09 – Yard Machines Electrical – Awarded to Paterson Flood
- 8) MP10 – Rail Receival P1 – Awarded to Becthel Services
- 9) MP11 – Terminal Capacity Modeling – Awarded to Sandwell
- 10) MP12 – DBCT Consultancy



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## Appendix 2– Control Systems Optimization Projects



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### 1. Contract SG01 – Awarded to Matrikon

- Project 21 - Investigate QR/DBCT Interface. Jillalan to DBCT. Identify and interview key QR and DBCT personnel. Identify existing written and informal rules and procedures, current degree of compliance. Report findings and recommendations.

### 2. Contract SG02 – Awarded to Paterson Flood Engineers to provide engineering and software implementation.

- Project 1 - Calibration of the surge bin (DBCT Surge Bins Report Rev B Dec 04 by PFE was not available) Reported as complete.
- Project 3 - Surge Bin Utilization (DBCT Surge Bins Report Rev B Dec 04 by PFE was not available) Reported as complete June 06.
- Project 7 - Engineering for Raising and Lowering Conveyor S3 and S4 Trippers  
13 Dec 05 report by PFE on PLC controls investigation gives no changes or benefit but recommends investigation of delays in hydraulic system operation and fitting of two proximity switches to restrict the raise operation. No action taken on either S3 or S4 controls according to the report. SG spreadsheet reports costs to ODG for implementation. Completed May 05.
- Project 8 - Next string conveyor setup assigned to DBCT – is PFE report Inloading Job Processing Modifications 16 March 2006 for this project. Reported complete Jul 06)
- Project 9 - Engineering to improve yard machine extend/retract timing. Investigate possible control modifications to stacker/reclaimers (SR2, SR3, SR4, and SR5) to reduce the time taken to transfer both the elevator conveyor and tripper to and from extend and retract positions. Evaluation indicated small gain was not worth the risk. Not implemented.
- Project 10 - Modify the rules for conveyor startup sequencing Developing control logic and PLC code to implement. PFE report on Conveyor start sequences describes.
- Project 13 - Implement a coal density factor for belt loading setpoints to maximize belt capacity. Check accuracy of existing measurements. Existing Plantscape SCADA data on S1 rates was found to be accurate. No further action required. Density control tested by DBCT P/L on inloading but overloaded motors. Implemented by DBCT P/ on SR4 and SR5 to 5500 tph stacking on cone piles.



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- Project 17 - Improve anti-collision system in yard. No report, no costs apparently nothing done or may be incorporated elsewhere. Removed from PFE scope 24 March 05 and moved to Phase 1 expansion.
  - Project 18 - Auto Relocation of SL1 & SL2. Added to PFE scope. Reported as complete, no reports provided. Implementation shown as G and S under SG03. Cash flows indicate work was done but no other verification provided. Reported complete Mid 05.
  - Project 19 - Improve preloading of inloading conveyors. No reports or scope.
3. Contract SG03 - Awarded to O'Donnell Griffin as schedule of rates to install cabling, brackets and field devices
- Project 7 - Engineering for Raising and lowering conveyor S3 and S4 Trippers. Fitting of two proximity switches to restrict the raise operation.
4. Contract SG07 – Awarded to Logitech
- Project 16a – Engineering for Improved Bucket Reclaimer Control Algorithm for SR1 as recommended by WBM in report for SR4 and SR5 upgrade.
5. DBCT Projects
- Project 4 - Surge Bin Level Control over Yard Machine Reclaim Rates. Not implemented as no perceived benefit.
  - Project 5 - Surge Bin Level to calculate input from known quantity of coal in transit. Not implemented as no perceived benefit.
  - Project 11 – Conveyor Suspension Times – Existing fixed suspension times on belt restarts after stop to be controlled. Allows reduction in delays on both inloading and outloading. Benefit negligible according to Sandwell Report. Inloading complete and outloading target completion Oct 06.
  - Project 12 - Stockpile Creation Methodology. Target completion was end of October 06.
  - Project 16 - Bucketwheel reclaimer control algorithm improvements on RL1, SR1 and SR5. Target completion was Oct 06.
  - Project 20 - East/West offsets of stockpile zones A and C. Completed March 05.



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6. DBCT Management Projects

- Project 6 – Cargo Assembly Regulations – Change terminal regulations to increase cargo assembly stockpile allocation. Completed Jul 05.