Halcrow Pacific Pty Ltd

October 2010

Queensland Competition Authority

SEQ Interim Price Monitoring

Assessment of Capital Expenditure on Various Sewage Treatment Plants

Review Report

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List of Acronyms

DN	Nominal Diameter
EP	Equivalent Persons
ET	Equivalent Tenements
NPC	Net Present Cost
QCA	Queensland Competition Authority
STP	Sewage Treatment Plant
WPCC	Water Pollution Control Centre
WWTP	Wastewater Treatment Plant

Executive Summary

Introduction

Halcrow has been commissioned by the Queensland Competition Authority (QCA, or the Authority) to assist with its Interim Price Monitoring review of the monopoly distribution and retail water and wastewater activities of Queensland Urban Utilities, Allconnex Water and Unitywater. In particular, Halcrow has been engaged to undertake an assessment of the prudence and efficiency of proposed capital expenditure on five (5) sewage treatment plant projects to be constructed by Queensland Urban Utilities (four (4) projects) and Allconnex Water (one (1) project).

SKM has been engaged as the primary consultant for the review of capital expenditure as part of the Authority's price monitoring investigations, however, a conflict of interest has been identified in respect to these particular projects and review by an alternative consultant was required.

Scope of Review

The scope of the review has involved, for each of the treatment plant projects:

- assessment of the application of the respective entity's policies and procedures for capital planning;
- an assessment as to whether the proposed expenditure is prudent;
- assessment as to whether the proposed expenditure is efficient;
- assessment of the proposed timing and deliverability of the proposed expenditure; and
- assessment of the implications (if any) for operating expenditure to be incurred by the respective entity.

Review Findings

The findings of the review in respect to each of the five projects can be summarised as follows:

- ***Goodna Sewage Treatment Plant Upgrade:***

  Halcrow considers that the proposed upgrade (Option 3) to Goodna STP has been demonstrated to be prudent, based on the key driver of growth. QUU has demonstrated a well documented and justified development of options

and has engaged independent consultants to support and review proposals at key points in option development. Halcrow supports the progression of the Modified Regional Approach, which has been developed by adopting a broader regional approach to planning following the formation of QUU.

A detailed assessment of efficiency has not been possible at the current stage of design, however, the equivalent unit rate cost of approximately $4,400 per EP is considered to be generally consistent with the estimated and actual costs of other similar works. It is noted that the Modified Regional Approach planning has led to a reduction of approximately 7.5 percent in the cost of the works proposed to be undertaken during the 2010-2013 price monitoring period.

- ***Lockyer Valley East Sewerage Scheme:***

  Halcrow considers that the Lockyer Valley East Sewerage Scheme project is prudent on the basis of growth and licence compliance requirements, and that QUU is following a robust planning approach in undertaking investigation, feasibility studies and option analysis. A definitive statement in respect to the efficiency of the project cannot be made at this early stage, however, the equivalent unit rate cost of approximately $3,700 per EP is considered to be generally consistent with the estimated and actual costs of other similar works and provides a suitable basis for forecasting capital expenditure.

- ***Somerset Fernvale Sewage Treatment Plant:***

  Prudence of the Fernvale Sewage Treatment Plant Upgrade project has been demonstrated on the basis of population growth. The adopted solution has been identified through a robust planning approach; on this basis, the proposed expenditure is considered to be efficient.

- ***Bromelton (Scenic Rim) Regional Sewage Treatment Plant:***

  Limited information has been provided regarding the proposed sewerage infrastructure upgrades in the Bromelton region. Whilst the forecast population growth indicates that the project is prudent, no concept or detailed design proposal has been provided for review, and it is therefore not possible to comment on the efficiency of the forecast expenditure associated with this item of capital works.

- ***Stapylton Wastewater Treatment Plant (Stage 1):***

  Halcrow considers the Stapylton WWTP Stage 1 project to be prudent on the basis of predicted growth (both population and industrial development) in the catchment. It is noted, however, that timing of construction is still subject to final review of a broader serving strategy which is also targeted at a long term no-release (of effluent) strategy. The robust planning process, which is yet to

confirm the final arrangement and timing of the works, and the use of a properly managed Alliance delivery mechanism should ensure that the cost of the proposed works, which equates to a unit rate cost of approximately $4,190 per EP, is efficient.

1 Introduction

1.1 Background

Halcrow has been commissioned by the Queensland Competition Authority (QCA, or the Authority) to assist with its Interim Price Monitoring review of the monopoly distribution and retail water and wastewater activities of Queensland Urban Utilities, Allconnex Water and Unitywater. In particular, Halcrow has been engaged to undertake an assessment of the prudence and efficiency of proposed capital expenditure on five (5) sewage treatment plant projects to be constructed by Queensland Urban Utilities (four (4) projects) and Allconnex Water (one (1) project).

SKM has been engaged as the primary consultant for the review of capital expenditure as part of the Authority's price monitoring investigations, however, a conflict of interest has been identified in respect to these particular projects and review by an alternative consultant was required.

1.2 Scope of Review

The following sewage treatment plant upgrade and expansion projects were identified for assessment as part of this review:

- Queensland Urban Utilities (QUU) projects:
  - Goodna Sewage Treatment Plant Upgrade;
  - Lockyer Valley East Sewage Scheme;
  - Somerset Fernvale Sewerage Treatment Plant; and
  - Bromelton (Scenic Rim) Regional Sewage Treatment Plant;
- Allconnex Water project:
  - Stapylton Wastewater Treatment Plant (Stage 1).

The scope of this review has comprised the following activities which have been undertaken for each of the projects:

- Assess the application of the entities' policies and procedures for capital expenditure in relation to the sewage treatment plant upgrade project.
- Assess whether the expenditure is prudent – the assessment is to consider if it is required as a result of a legal obligation, new growth (as approved by the Authority), renewal of existing infrastructure, or it achieves an increase in the reliability or the quality of supply that is explicitly endorsed or desired by

customers, external agencies or participating councils. The consultant should identify where standards of service vary from industry benchmarks.

- Assess whether the expenditure is cost effective:
  - the scope of the works (which reflects the general characteristics of the capital item) is the best means of achieving the desired outcomes after having regard to the options available, including the substitution possibilities between capex and opex and non network alternatives such as demand management;
  - the standard of the works conforms with technical, design and construction requirements in legislation, industry and other standards, codes and manuals. Compatibility with existing and adjacent infrastructure is relevant as is consideration of modern engineering equivalents and technologies. Compliance with Strategic Asset Management Plans and Total Management Plans are likely to be highly relevant; and
  - the cost of the defined scope and standard of works is consistent with conditions prevailing in the markets for engineering, equipment supply and construction. The consultant must substantiate its view with reference to relevant interstate and international benchmarks and information sources. For example, the source of comparable unit costs and indexes must be given and the efficiency of costs justified. The consultant should identify the reasons for any costs higher than normal commercial levels.
- Assess the deliverability and timing of the capital expenditure (for the specific projects).
- Liaise with the Authority's consultants appointed for the review, particularly the consultants responsible for the review of demand, to ensure that consistent advice is provided to the Authority.
- Take into account any previous reviews of relevant assets provided by the entities, such as Priority Infrastructure Plans (as they relate to each of the specific projects).
- Identify the value of any expenditure considered not to be prudent or efficient.

1.3 Scope of Report

This report sets out our findings in respect to the prudence and efficiency of the proposed capital expenditure on the identified sewage treatment plant upgrade and expansion projects. Review and assessment of each project is reported in the following manner:

- relevant reference documents are identified;
- a description of the project is presented;
- key drivers are identified and assessed; links to the entity's Asset Management Plan (or other overarching planning framework) are identified;
- the solution development (project planning process) is reviewed and assessed;
- cost estimates are identified and assessed;
- project timing and delivery mechanisms are discussed and assessed;
- any implications that the proposed capital expenditure will have in respect to operating expenditure are identified; and
- a summary of the assessment findings is presented.

1.4 *Limitations of this Report*

This report has been prepared for the QCA by Halcrow, for the sole purpose of providing an assessment as to the prudence and efficiency of forecast capital expenditure to be incurred by Queensland Urban Utilities and Allconnex Water (as appropriate) on specific identified sewage treatment plant upgrade and expansion project. This report cannot be relied upon by any other party or for any other purpose.

Our assessment has been undertaken on the basis of information provided by Queensland Urban Utilities, Allconnex Water the QCA and, and to a limited extent, discussions with representatives of these parties.

Importantly, we have not undertaken any independent verification of the reliability, accuracy or completeness of the information provided. Therefore, it should not be construed that we have carried out any form of audit or other verification of the adequacy, completeness, or reasonableness of the specific information provided by either Queensland Urban Utilities or Allconnex Water.

2 Goodna Sewage Treatment Plant Upgrade (Queensland Urban Utilities)

2.1 Project Overview

2.1.1 Key Reference Documents

The key reference documents used for this review are:

- Queensland Urban Utilities, *Post Market Memo – Goodna STP Stage 4A Upgrade Facility Approval, Contract Number: 09-10-138-01-04*, Internal memo to Major Projects Executive, 26 August 2010.
- Queensland Urban Utilities, *Regional Sewerage Scheme for Goodna and Wacol Catchments – Ipswich Goodna STP Upgrade – Feasibility Report Addendum*, 26 August 2010.
- Beca, *Ipswich Water Population Review*, prepared for Brisbane City Council, 5 July 2010.
- Ipswich Water, *Goodna Sewerage Treatment Plant Upgrade – Feasibility Study*, prepared by SKM, 25 June 2009.

2.1.2 Project Description

The Goodna Sewerage Treatment Plant (STP) requires upgrading to meet forecast growth in the catchment. Current STP design capacity is 65,000 equivalent persons (EP) while forecast load by 2012 is assessed to be 77,000EP.

It is proposed to upgrade the STP in accordance with Stage 4a of Option 3 (the Modified Regional Approach), as recommended in the *Feasibility Report Addendum*[1] for the Regional Sewerage Scheme for Goodna and Wacol Catchments. The planned upgrade should increase plant capacity by 25,000EP, resulting in a total capacity of 90,000EP.

The proposed Stage 4a upgrade to the existing STP consists of new works including a five stage Bardenpho process and submerged membrane filtration. The proposed design comprises new inlet works, oxidation ditch bioreactor with submerged membrane filtration, odour treatment, chemical dosing and electrical upgrades.

[1] Queensland Urban Utilities, *Regional Sewerage Scheme for Goodna and Wacol Catchments – Ipswich Goodna STP Upgrade - Feasibility Report Addendum*, 26 August 2010.

It is noted that, as discussed in **Section 2.3**, the project proposal has recently been modified and varies from that which was adopted as the basis for QUU's Interim Monitoring Return. The previous proposal included upgrading of the Goodna STP in three stages, as follows:

- Stage 4a – Upgrade for growth - 25,000EP (Total 90,000EP);
- Stage 4b – Upgrade for growth - 23,000EP and allow diversion from Carole Park STP - 22,000 EP (Total 135,000EP); and
- Stage 4c – Upgrade for growth - 45,000EP (Total of 180,000EP).

The Modified Regional Approach, which has now been adopted, comprises:

- Phase 1 – construction Goodna STP Stage 4a in conjunction with optimised use of other existing infrastructure; construction of Goodna STP Stages 4b and 4c will not proceed; and
- Phase 2 – other infrastructure works to be implemented from 2014 onwards.

2.2 Key Drivers and Link to Asset Management Plan

There are two key drivers for the proposed upgrade of the Goodna STP. The primary driver is forecast growth in the catchment while the secondary driver is compliance with treated effluent quality standards.

According to the *Population Review Report* prepared by Beca,[2] growth in the region is expected to significantly increase the load on the Goodna STP from the 2008 level of 54,000EP to the expected load of 208,000EP by 2031. This growth is forecast to occur in stages with 123,000EP by 2016 and 186,000EP by 2026. Raw data for the growth predictions identified in the *Population Review Report* was sourced from the Catchment Population Appraisal Addendum (January 2010), which in turn references the *South East Queensland Regional Plan 2009-2031*.

Ipswich Water was a member of the South East Queensland Healthy Waterways Partnership under the South East Queensland Healthy Waterways Strategy (SEQHWS). The SEQHWS Point Source Pollution Management Plan has specific elements targeting:

- *By 2026, 100% of nutrient loads from wastewater treatment plants ADWFs are to be removed from the receiving waters by recycling or other mean;*
- *Until this is achieved, wastewater treatment plants are to operate at 3mgN/L and 1mgP/L (50 percentile). The SEQHWS notes that 3mgN/L is not EPA policy; and*

[2] Beca, *Ipswich Water Population Review*, prepared for Brisbane City Council, 5 July 2010.

- *At least 25% of nutrient loads from wastewater treatment plants (based on 2006 ADWF) are to be removed by 2012 by recycling or other means.*

While at present the majority of effluent from the Goodna STP is sent to the Western Corridor Recycled Water Project there is a limit on the volume that can be transferred. Consequently, the increasing load on the Goodna STP will result in surplus effluent which must be managed using alternative arrangements, as this surplus effluent can not be discharged to the current point of discharge, ie. the Brisbane River.

The Goodna STP upgrade project is mentioned in the following documents:

- *Total Management Plan and Strategic Asset Management Plan 2008-2011; Sub-Plan 10 - Infrastructure Planning; Key Result Area - Asset Management*, February 2009. There are a number of references to the proposed upgrade of the STP generally consistent with the key reference documents identified previously. This Sub-Plan also listed numerous planning reports and feasibility studies related to the Goodna STP.
- *Total Management Plan and Strategic Asset Management Plan 2008-2011; Sub-Plan 12 - Demand Management; Key Result Area - Asset Management*, February 2009. This Sub-Plan contains a single descriptive reference of the current recycling arrangements at the STP.
- *Total Management Plan and Strategic Asset Management Plan 2008-2011; Sub-Plan 15 - Environmental Management; Key Result Area - Environmental Performance*, February 2009. This Sub-Plan identifies the environmental licence for Goodna, mentions a recycled water management plan for Goodna, and references the transfer of treatment water from Goodna STP to the Western Corridor Recycled Water Scheme.
- *Total Management Plan and Strategic Asset Management Plan 2008-2011; Sub-Plan 17 - Biosolids Management; Key Result Area - Environmental Performance*, February 2009. This Sub Plan provides details of biosolids production at the Goodna STP.
- *Total Management Plan and Strategic Asset Management Plan 2008-2011; Sub-Plan 18 - Source Control (including Trade Waste); Key Result Area - Environmental Performance*, February 2009. This Sub-Plan outlines the trade waste source characteristics of the Goodna STP catchment.
- *Total Management Plan and Strategic Asset Management Plan 2008-2011; Sub Plan 1 - Business Management; Key Result Area - Business Management*, February 2009. This Sub-Plan provides basic details on the Goodna STP system.

Overall the key drivers for this project are clear and, to the extent possible with the information supplied for this review, appear to be reasonably well justified.

The Goodna STP project has relatively clear linkages back to the *Strategic Asset Management Plan/Total Management Plan 2008-2011* developed by Ipswich Water. References to the Goodna STP are made in a number of documents within this Plan, however, only the key reference documents listed previously have actually been sighted and reviewed.

2.3 Solution Development

The historical development of the Goodna STP review can be traced in the list of reports relevant to the project (refer **Table 2.1**). This list of reports has been compiled from the key reference documents listed above and the *Total Management Plan and Strategic Asset Management Plan 2008-2011; Sub-Plan 10 - Infrastructure Planning* document, which provides details of sewerage planning reports for the region.

Table 2.1 Relevant Planning Reports – Goodna STP

Title	Date of Report	Author/ Consultant
Augmentation of Eastern Wastewater Catchment Trunk Sewerage*	1-Oct-93	GHD
Eastern Wastewater Centre	1-Dec-93	SKM
Eastern Wastewater Centre Stage 3 Augmentation, Design Planning Report	August 1994	SKM
Options for Rehabilitation of Goodna Creek Trunk Sewer	1-Jul-95	ICC
Eastern Wastewater Centre Stage 3 Augmentation, Design Drawings	May 1996	SKM
Headworks Policy Development, Capital Cost Estimates for BNR Augmentation of Bundamba and Goodna Sewage Treatment Plants	1-Jul-97	C&D
South West Goodna Sewerage Scheme	1-Jan-98	ICC
Site Based Management Plans - Goodna WWC	1-Jun-98	GHD
Goodna Wastewater Centre - Stage 3 Augmentation Operational Enhancement	1-Jun-99	SKM
Goodna Wastewater Centre Planning Report	20-Mar-00	Kinhill
South West Goodna Sewerage System*	2-Apr-00	ICC
Goodna Sewerage Catchments G32 and G33 Planning Report	1-Jun-00	SKM
Treatment and Reuse Options for the Carole Park and Goodna Wastewater Centres	1-Nov-00	IW-SPS
Goodna Sewerage Catchment G12 Planning Report	1-Dec-01	SKM
Integration of Goodna Carole Park Wastewater Centres	1-Jun-02	Maunsell
Development Strategy for Goodna Wastewater Centre	1-Mar-03	Ken Hartley

Title	Date of Report	Author/ Consultant
Transfer of Carole Park Flows to the Goodna WWC - Detailed Planning Reports	1-Apr-03	CMBK
Transfer of Carole Park Flows to the Goodna WWC - Report on Preliminary Designs of Schemes A1 $ A4	1-Jun-03	CMBK
Report of Goodna Wastewater Centre	1-Jan-07	CH2MHILL
Goodna & Carole Park Sewerage Master Plan	1-Apr-07	GHD
Goodna Wastewater Treatment Centre Feasibility and Planning Study	1-Feb-08	CH2MHILL
Ipswich Regional Recycled Water Strategy	May 2008	Ipswich Council
Report for Biosolids Management Strategy (Draft)	July 2008	GHD
Goodna STP Influent Design Envelope Report	April 2009	GHD
Goodna Sewerage Treatment Plant Upgrade Feasibility Study	June 2009	SKM
Ipswich City Infrastructure Project – Report for Goodna STP Upgrade, Draft Options Assessment	September 2009	GHD
Ipswich City Infrastructure Project – Report for Goodna STP Upgrade, Final Concept Design	September 2009	GHD
Ipswich City Infrastructure Project – Report for Goodna STP Upgrade, Asset Condition Assessment Report	September 2009	GHD
Report for Existing Goodna Sewage Treatment Plant (STP) – Hazard and Operability Study (HAZOP)	September 2009	GHD
Ipswich City Infrastructure Project – Report for Goodna STP Upgrade, 30% of Concept Design – Draft	October 2009	GHD
Ipswich City Infrastructure Project Business Case – Approval of Financial Arrangements and Borrowing Approvals for the Ipswich City Critical Portfolio Works Project – Volumes 1-15	29-Jan-10	Ipswich Council
Goodna STP Stage 4A Upgrading – Review of Key Decisions	April 2010	SKM
Queensland Urban Utilities Major Project Review	9 April 2010	BECA
Ipswich City Infrastructure Project Goodna STP Stage 4A Upgrading – Goodna Interim Upgrade Report	June 2010	SKM
Regional Sewerage Scheme for Goodna and Wacol Catchments – Feasibility Report Addendum	2 August 2010	QUU
Post Market Memo – Goodna STP Stage 4A Upgrade Facility Approval, Contract Number: 09-10-138-01-04, Internal memo to Major Projects Executive	26 August 2010	QUU

Note: * Indicates superseded report. Shaded reports have been sighted and reviewed by Halcrow.

The list of reports completed outlines a comprehensive project development process from initial planning and feasibility studies, options assessments and concept designs.

It is noted that, subsequent to the formation of QUU on 1 July 2010, integrated planning across the area serviced by QUU (which includes both Brisbane and Ipswich) has led to the identification of integrated regional approaches and solutions for providing sewerage services. This is reflected in the servicing options presented in the *Feasibility Report Addendum*[3] which underpins the solution now proposed, ie. the Modified Regional Approach.

2.4 Cost Estimate

In its Interim Monitoring Return, QUU has proposed expenditure amounting to a total of approximately $136.8 million ($nominal) for the Goodna STP Upgrade over the period 2010-2013. The proposed expenditure profile over the proposed regulatory period and beyond is shown in **Table 2.2**.

Table 2.2 Proposed Expenditure Profile ($'000 nominal)[4]

Project	2010-11	2011-12	2012-13	2013-14	2014-15	Subsequent	Total
Goodna STP Upgrade - Stage 4a	55,893	74,144					130,037
Goodna STP Upgrade - Stage 4b			6,812	30,101			36,913
Goodna STP Upgrade - Stage 4c					1,647	38,354	40,000
Goodna STP Upgrade - Total	55,893	74,144	6,812	30,101	1,647	38,354	206,951

QUU has confirmed that the costs provided in the submission (**Table 2.2**) are now superseded by the costs associated with Option 3 (Modified Regional Approach), as outlined in the *Feasibility Report Addendum*. The total project cost is estimated at $126.6 million while the expected contract commitment is estimated

[3] Queensland Urban Utilities, *Regional Sewerage Scheme for Goodna and Wacol Catchments – Ipswich Goodna STP Upgrade - Feasibility Report Addendum*, 26 August 2010.

[4] Queensland Urban Utilities has applied an escalation index of 2.5 percent per annum from the date of cost estimate to determine expenditure in subsequent years.

at $121.1 million. The expected cash flow is shown spread evenly across three years (2010-11, 2011-12 and 2012-13).

The estimated cost of almost $126.6 million ($2010-11), or $129.8 million ($nominal), is referred to as the 'Expected Total Cost of Project' and includes the Guaranteed Maximum Price (agreed with Thiess) but excludes any prior year's financial expenditure. The expected contract commitment[5] constitutes an actual contract value of $106,505,340 plus a contingency allowance of $10,300,000 and other allowances of $4,300,000. These revised costs should be incorporated into the proposed expenditure submission; the revised expenditure profile would be as shown in **Table 2.3**.

Table 2.3 Revised Proposed Expenditure Profile ($'000 nominal)[6]

Project	2010-11	2011-12	2012-13	2013-14	2014-15	Subsequent	Total
Goodna STP Upgrade - Stage 4a	42,200	43,255	44,336				129,791

A detailed breakdown of the cost for the Modified Regional Approach has not been provided; consequently, the efficiency of the cost estimates cannot be assessed. It has, however, been determined that the estimated cost amounts to approximately $4,400 per EP, which is considered to be generally consistent with the estimated and actual costs of other similar works.

2.5 Timing and Deliverability

The key reference documents for this project do not present any detailed schedules for construction other than a high level procurement schedule given in Section 7 of the *Post Market Memo – Goodna STP Stage 4A Upgrade Facility Approval.*[7]

[5] Queensland Urban Utilities, *Post Market Memo – Goodna STP Stage 4A Upgrade Facility Approval, Contract Number: 09-10-138-01-04*, Internal memo to Major Projects Executive, 26 August 2010.

[6] Project cost of $126.6 million in assumed to be expressed in $2010-11. Escalation index of 2.5 percent per annum (as adopted by Queensland Urban Utilities) has been applied from the date of cost estimate to determine expenditure in subsequent years.

[7] Queensland Urban Utilities, *Post Market Memo – Goodna STP Stage 4A Upgrade Facility Approval, Contract Number: 09-10-138-01-04*, Internal memo to Major Projects Executive, 26 August 2010.

Milestone dates given are considered achievable, and correlate with the proposed expenditure profile. It is noted that the planned date for commencement on site is 13 October 2010; in the absence of any advice to the contrary, it is assumed that construction has started without any significant delay.

2.6 Implications for Operating Expenditure

Basic operating costs are provided for both preferred options, with the Goodna STP Stage 4a option having an expected annual cost of approximately $4.2 million.

The operating costs for the Modified Regional Approach option have been presented as a differential operating cost net present value of approximately $23.6 million (to ultimate development) compared to the full Goodna STP upgrade proposal (to ultimate development) operating cost of approximately $36 million. It is therefore unclear what the annual operating cost will be.

2.7 Summary of Assessment Findings

The Goodna STP upgrade project has been reviewed with consideration of the key drivers, links to asset management plans, the process of developing the solution identified, the proposed cost estimates, the timing and deliverability and the implications for operating expenditure. A summary of findings against each of these factors is provided below:

- *Key drivers* – growth with a secondary driver of compliance with treated effluent quality licences. Drivers appear to be adequately supported, with detailed assessment of the growth projections having been completed and made available.
- *Links to asset management plans* – the Goodna STP upgrade project is referenced in the *Total Management Plan and Strategic Asset Management Plan 2008-2011* and other supporting documents.
- *Solution development* – a list of relevant documents was collated which shows a comprehensive process of feasibility studies, options assessments and concept designs, and two feasibility studies have been sighted and assessed as part of this review. It is noted that, following the formation of QUU, a broader regional approach to planning has been pursued. The recent *Feasibility Report Addendum*[8] and subsequent *Post Market Memo – Goodna STP Stage 4A Upgrade*

[8] Queensland Urban Utilities, *Regional Sewerage Scheme for Goodna and Wacol Catchments – Ipswich Goodna STP Upgrade - Feasibility Report Addendum*, 26 August 2010.

Facility Approval[9] confirms the chosen solution and the way forward as the Modified Regional Approach (Option 3).

- *Cost estimates* – the proposed expenditure included in the Interim Monitoring Return is now superseded by the costs associated with Option 3, ie. the Modified Regional Approach. These costs, which are estimated at almost $126.6 million, should be incorporated into the proposed expenditure submission with a uniform rate of expenditure over the next three years (ie. 2010-11, 2011-12 and 2012-13). A detailed breakdown of costs has not been provided and as such an assessment of efficiency has not been possible.
- *Timing and deliverability* – Milestone dates given are considered achievable, and consistent with the proposed cash flow.
- *Operating expenditure* – The operating costs for the Modified Regional Approach option have been presented as a differential operating cost net present value of approximately $23.6 million (to ultimate development) compared to the full Goodna STP upgrade proposal (to ultimate development) operating cost of approximately $36 million.

In summary, Halcrow considers that the proposed upgrade (Option 3) to Goodna STP has been demonstrated to be prudent, based on the key driver of growth. QUU has demonstrated a well documented and justified development of options and has engaged independent consultants to support and review proposals at key points in option development. Halcrow supports the progression of the Modified Regional Approach, which has been developed by adopting a broader regional approach to planning following the formation of QUU.

The estimated costs for the proposed upgrade works have not been provided in sufficient detail to enable a detailed assessment of efficiency, however, the equivalent unit rate cost of approximately $4,400 per EP is considered to be generally consistent with the estimated and actual costs of other similar works. It is noted that the Modified Regional Approach planning has led to a reduction of approximately 7.5 percent in the (nominal) cost of the works proposed to be undertaken during the 2010-2013 price monitoring period.

[9] Queensland Urban Utilities, *Post Market Memo – Goodna STP Stage 4A Upgrade Facility Approval, Contract Number: 09-10-138-01-04*, Internal memo to Major Projects Executive, 26 August 2010.

3 Lockyer Valley East Sewerage Scheme (Queensland Urban Utilities)

3.1 Project Overview

3.1.1 Key Reference Documents

The following documents were reviewed in relation to this project.

- *Lockyer East Sewage Treatment Master Planning Study – Value Management Report* (Rev 0), SKM, January 2010.
- *Queensland Urban Utilities Major Project Review* (Rev Final-3), Beca, April 2010.
- *Interim Total Management Plan for Water Supply & Sewerage for Ex-Gatton Shire Area - Asset Management Plan*, Lockyer Valley Regional Council, June 2006.
- *Interim Total Management Plan for Water Supply & Sewerage for Ex-Gatton Shire Area – Strategic Asset Management Plan for Wastewater Services*, Lockyer Valley Regional Council, June 2009.
- *Interim Total Management Plan for Water Supply & Sewerage for Ex-Gatton Shire Area – Infrastructure Planning*, Lockyer Valley Regional Council, not dated.
- *Interim Total Management Plan for Water Supply & Sewerage for Ex-Gatton Shire Area – Environmental Management Plan*, Lockyer Valley Regional Council, date unknown.
- *Interim Total Management Plan for Water Supply & Sewerage for Ex-Gatton Shire Area – Effluent Reuse and Sludge Management Plan*, Lockyer Valley Regional Council, June 2006.
- *Interim Total Management Plan for Water Supply & Sewerage for Ex-Gatton Shire Area – Service Standards Plan*, Lockyer Valley Regional Council, date unknown.

It is understood that some of these documents have been prepared by Lockyer Valley Regional Council and provided by Queensland Urban Utilities in good faith, and that the asset management strategies and associated financing strategies represent the views of the Council and do not necessarily represent the views of Queensland Urban Utilities.

3.1.2 Project Description

A number of options were investigated for the Lockyer Valley East Sewerage Scheme. Option 1, Stage 1 was the preferred option and involves a single upgraded treatment plant at Gatton with raw sewage pumped to it from Plainland, Laidley and Forest Hill.

Essentially, the preferred option consolidates the number of sewage treatment plants in the local region and re-diverts flows to one site at Gatton STP. Stage 1 considers flows/loads up to the year 2016. It does not include flows from the University of Queensland campus as the University has advised that it is unlikely to join the scheme for least five years (ie. no earlier than 2016).

Option 1, Stage 1 of the Lockyer Valley East Sewerage Scheme involves the following works:

- Minor hydraulic modifications to the existing Gatton STP;
- New 5,000EP STP at Gatton;
- New raw sewage pump station at Plainland;
- Upgraded raw sewage pump station at Laidley;
- Upgraded raw sewage pump station at Forest Hill; and
- 25.7km of pipeline (1km of DN90, 6km of DN160, 7.8km of DN250 and 10.9km of DN315).

Stage 2 of the project would see inclusion of flows from the University of Queensland and an additional 4000EP of treatment capacity provided at the Gatton STP.

3.2 Key Drivers and Link to Asset Management Plan

The key drivers for this capital project are population growth and licence compliance.

Combined sewage volume projections from 2008 to 2016 for Laidley, Forest Hill, Gatton and Plainland areas indicate an increase in flow of 512 kL/d, or 2844 EP, representing a 28.3 percent increase. **Table 3.1** shows the sewage volume projections taken from the *Value Management Report*.[10] Population and sewage volume data used as the basis for this report was obtained from an earlier study undertaken by SKM in 2009, a copy of which has not been sighted.

Gatton STP is the largest plant and is believed to be operating close to full capacity. The suitability of upgrading some treatment plants was limited due to the treatment technology employed and space available. The Lockyer Valley Regional Council (LVRC) Infrastructure Planning report notes that "*growth has resulted in an increased demand on… waste water infrastructure.*"

[10] *Lockyer East Sewage Treatment Master Planning Study – Value Management Report* (Rev 0), SKM, January 2010.

Table 3.1 Combined Sewage Volume Projections for Option 1, Stage 1

Area	2008		2016	
	kL/d ADWF	EP	kL/d ADWF	EP
Laidley	550	3056	671	3728
Forest Hill	94	522	110	611
Gatton	1132	6289	1380	7667
Plainland	33	183	160	889
Combined	1809	10050	2321	12894

Note: Assumes 180 L/d ADWF per EP.

Another contributing factor that led to the decision to upgrade the Gatton STP is are that Laidley and Forest Hill treatment plants have not been meeting licence requirements, as noted in the LVRC Strategic Asset Management Plan (2009). It is also noted that effluent disposal arrangements are ad hoc and considered to be unsatisfactory.

The Plainland area is serviced by a number of private on-site sewage treatment plants and effluent arrangements, and Council would like to transfer these systems over to a centralised sewage scheme.

Linkages between the Lockyer Valley East Sewerage Scheme and the available Council plans, policies and strategic documents are general or broad in nature. Whilst no specific mention of the need to upgrade sewage treatment plants is mentioned, there is general direction/provision to do so through high level objectives and goals noted in the LVRC Infrastructure Planning report, such as:

- *To provide water and wastewater services to the community in the most efficient and effective way, at the same time adhering to relevant health and environmental standards.*
- *Investigate the feasibility of providing water and wastewater services to localities not currently supplied.*
- *Protection of the natural environment.*

The Infrastructure Planning report mentions the proposed preparation of 10 year infrastructure plans "*to ensure that adequate planning is undertaken for future augmentation, renewal and extension of it water supply and wastewater services.*" Whilst they have not been available for review, Halcrow would expect these infrastructure plans to provide support and justification for the sewage treatment plant upgrade; this expectation needs to be verified.

Key justification for the project is largely based on *Value Management Report*[11] and associated studies.

3.3 Solution Development

A review of the available information indicates that a sound and reasonable approach has been undertaken during the master planning phase of this project. The process of solution development has included stakeholder consultation, general research and investigation, investigation of populations and sewage volumes, option generation and option evaluation.

In particular, the options were subject to a range of different types of analyses and assessment in the following categories:

- Technical;
- Social and cultural;
- Environmental and regulatory;
- Financial; and
- OHS and operations.

Following a stakeholder workshop involving the weighted scoring of each option against the above key categories, the preferred option was chosen. The preferred option is a single upgraded STP at Gatton with raw sewage pumped to it from Plainland, Laidley, Forest Hill and UQ.

The *Populations and Sewage Volumes* report[12] and the *Options Analysis* report,[13] both prepared by SKM, would contain further relevant details to this project review, however, these documents have not been sighted by Halcrow.

Whilst considerable effort has been put into the master planning phase of the project, there is significant further work to complete such as approvals, EPA licence modification, effluent management and irrigation sustainability, detailed risk assessment, preliminary design and detailed design. QUU have advised that, subsequent to the Master Planning Study, SKM has been commissioned to undertake a further feasibility study of the shortlisted options in greater detail.

[11] *Lockyer East Sewage Treatment Master Planning Study – Value Management Report* (Rev 0), SKM, January 2010.

[12] Sinclair Knight Merz, *Lockyer East Sewerage Treatment Master Planning Study, Populations & Sewage Volumes*, draft report prepared for Lockyer Valley Regional Council, November 2009.

[13] Sinclair Knight Merz, *Lockyer East Sewerage Treatment Master Planning Study, Options Analysis Report*, draft report prepared for Lockyer Valley Regional Council, November 2009.

Outcomes from these ongoing investigations have the potential to impact heavily on the scheme configuration and cost of the project.

3.4 Cost Estimate

In its Interim Monitoring Return, QUU has proposed expenditure amounting to a total of approximately $18.2 million ($nominal), or $17.8 million ($2010-11), for the Lockyer Valley East Sewage Scheme over the period 2010-2013. The proposed expenditure profile is shown in **Table 3.2**. It is assumed that this represents the cost allowance for the complete scope of the Option 1, Stage 1 as the total expenditure is comparable to that expected for this project.

Table 3.2 Proposed Expenditure Profile ($'000 nominal)[14]

Project	2010-11	2011-12	2012-13	2013-14	2014-15	Subsequent	Total
Lockyer Valley East Sewage Scheme	3,000	15,170					18,170

The only document available to Halcrow with cost estimates for this project is the *Value Management Report*.[15] The preliminary cost estimate for Option 1, Stage 1 is $18.5 million, assumed to be expressed in $2009-10, and with an accuracy of ±15-25 percent. Assuming an escalation rate of 2.5% is applied to convert from $2009-10 to $2010-11, then the preliminary cost estimate for Option 1, Stage 1 is taken as $18.96 million. In $2010-11 terms, there is a discrepancy of $1.16 million between the proposed capital expenditure ($17.8 million) and the estimated costs ($18.96 million). The reason for the discrepancy is unknown and not explained by the supporting documentation provided. Further information about the basis of the forecast expenditure is required to verify the discrepancy.

It is noted, however, that QUU have advised[16] that following a budget review the expenditure profile is now $502,000 in 2010-11 and $17,298,000 in 2011-12. This correlates to proposed expenditure of $17.8 million ($2010-11) included in QUU's

[14] Queensland Urban Utilities has applied an escalation index of 2.5 percent per annum from the date of cost estimate to determine expenditure in subsequent years.

[15] *Lockyer East Sewage Treatment Master Planning Study – Value Management Report* (Rev 0), SKM, January 2010.

[16] Queensland Urban Utilities response to Draft Review Report.

Interim Monitoring Return, however, the deferred timing of the expenditure will result in a marginal increase in nominal terms, as shown in **Table 3.3**.

Table 3.3 Revised Proposed Expenditure Profile ($'000 nominal)

Project	2010-11	2011-12	2012-13	2013-14	2014-15	Subsequent	Total
Lockyer Valley East Sewage Scheme	502	17,730					18,232

The Gatton STP augmentation component accounts for about $5.5 million, or approximately 30 percent of the total project cost estimate of $18.5 million. This amount is reported as a line item only, and appears to be based on a unit rate allowance of $1,110 per EP (Note: total cost amounts to approximately $3,700 per EP). Whilst the estimate has been prepared for pre-feasibility purposes only, further details or a breakdown of this single cost component would be required to enable a robust assessment of the cost estimate.

It is noted that the master planning cost estimate is subject to change depending on the outcome of further investigations and design.

3.5 Timing and Deliverability

The forecast capital expenditure for the Lockyer Valley East Sewerage Scheme suggests that work will commence during 2010-11, with the majority of work completed in 2011-12.

With respect to the current status of the project, QUU have advised that a further feasibility study has commenced and is due to be completed in December 2010. Documentation for approvals is to be lodged with the relevant agencies in December 2010/January 2011.

A project program or general indication of key dates for the delivery of this capital project has not been provided for review. In the absence of such information, however, it is reasonable to expect that the project can be completed within the timeframe indicated by the expenditure profile included in the Interim Price Monitoring Return, although any delay to progress would compromise this achievement. Completion of the detailed design and tendering process would probably need to be completed by around the end of 2010-11 to allow adequate time for construction and commissioning of the works.

Given the performance of existing STPs and the timing of projected growth in the catchment, the project will need to be completed before the end of 2014-15.

3.6 Implications for Operating Expenditure

In undertaking the options assessment, SKM assessed each of the options against OH&S and operational criteria, however, from the information provided in the *Value Management Report*,[17] it is not apparent what the assessment involved. Notwithstanding the above, Option 1 (the preferred option) scored better than other potential options for this criteria.

The *Value Management Report* notes that the annual operating cost for Option 1, Stage 1 is $0.5 million ($2009/10 assumed); other options considered attracted higher operating costs. Details of existing operating costs were not provided so assessment of relative increase/decrease in operating costs could not be undertaken.

The supporting information indicates that, compared to other options, the preferred option results in lower operating costs through consolidation of sewage treatment plant facilities despite the additional pumping costs required for sewage transfer.

3.7 Summary of Assessment Findings

With respect to the Lockyer Valley East Sewerage Scheme project, the following conclusions are made.

- *Key drivers:* The project is considered prudent on the basis of growth and licence compliance requirements. There is growth in the catchment and some facilities are currently running at/close to full capacity. Existing facilities are performing poorly and there are constraints on the ability to upgrade them.
- *Links to asset management plans:* The project appears to have broad, general linkages to QUU's/Lockyer Valley Regional Council's asset management plans/policies/documents, particularly in respect to providing "*water and wastewater services to the community in the most efficient and effective way.*" Key justification is, however, largely based on the *Value Management Report* and associated studies.

[17] *Lockyer East Sewage Treatment Master Planning Study – Value Management Report* (Rev 0), SKM, January 2010.

- *Solution development:* The master planning phase has adopted a robust approach to solution development through a process of consultation, investigation, option development and option evaluation. Whilst considerable effort has been put into the master planning phase of the project, the outcomes from these ongoing investigations, approvals and design development have the potential to impact heavily on the scheme configuration and cost of the project.
- *Cost estimates:* The preliminary cost estimate for Option 1, Stage 1 is in the order of $18.5 million (assumed $2009-10). This compares to the proposed expenditure of $17.8 million ($2010-11) included in QUU's Interim Monitoring Return, and recently confirmed by QUU. The Gatton STP augmentation component of the project accounts for about $5.5 million, or approximately 30 percent of the total project cost. This amount is reported as a line item only, and whilst the accuracy of the cost appears to be suitable for pre-feasibility purposes, further details or a breakdown of this single cost component would be required to enable a robust assessment of the cost estimate. It is recommended that $17.8 million ($2010-11), or $18.23 million ($nominal), be adopted as an efficient cost at this stage of project development.
- *Timing and deliverability:* A project program or general indication of key dates has not been seen for the delivery of this capital project. In the absence of such information, it is, however, reasonable to expect that the project can be completed within the timeframe indicated by the proposed expenditure profile, although any delay to progress would compromise this achievement. Given the performance of existing STPs and the timing of projected growth in the catchment, the project will need to be completed before the end of 2014-15.
- *Implications for Operating Expenditure:* The preferred option results in lower operating costs compared to alternative options despite the additional pumping costs required for sewage transfer. The estimated annual operating cost is $0.5 million.

In summary, Halcrow considers that the Lockyer Valley East Sewerage Scheme project is prudent on the basis of growth and licence compliance requirements, and it appears that QUU is following a robust planning approach in undertaking investigation, feasibility studies and option analysis. A definitive statement in respect to the efficiency of the project cannot be made at this early stage, however, the equivalent unit rate cost of approximately $3,700 per EP is considered to be generally consistent with the estimated and actual costs of other similar works and provides a suitable basis for forecasting capital expenditure.

4 Somerset Fernvale Sewage Treatment Plant Upgrade (Queensland Urban Utilities)

4.1 Project Overview

4.1.1 Key Reference Documents

The following documents were reviewed in relation to this project:

- *Lowood and Fernvale Regional STP Strategy Report*, prepared by CH2M Hill Australia Pty Limited, June 2007.
- *Stage 2 Report for Lowood and Fernvale Sewage Treatment Plant Upgrade*, prepared by Water Strategies Pty Limited, October 2008.
- *Somerset Regional Council Total Management Plan for Water and Sewerage Services*, prepared by Somerset Regional Council, February 2009.
- *Lowood/Fernvale Sewage Treatment & Effluent Irrigation Project*, prepared by Sinclair Knight Merz Pty Limited, 8 July 2010.
- *Fernvale Sewerage Planning Report for 4,000 EP Capacity*, prepared by Sinclair Knight Merz Pty Limited, 6 September 2010.
- *SEQ Interim Price Monitoring: Assessment of projected demand*, prepared by Frontier Economics, September 2010.

4.1.2 Project Description

Population growth observed and predicted in the Fernvale community has resulted in the need for augmentation of the existing sewage treatment plant. Various augmentation options have been reviewed, in reports listed in **Section 4.1.1**, with options including upgrade of Fernvale STP as a single STP or as a larger combined STP with the Lowood community. The latest report, *Fernvale Sewerage Planning Report*,[18] presents the following:

- a concept design for a 4000EP STP to service Fernvale only;
- STP preferred site selection from three (3) identified options;
- augmentation to the existing pump station and rising main required to service the 4,000EP load; and
- identification of additional sewerage system infrastructure required to service the 4,000EP load.

[18] *Fernvale Sewerage Planning Report for 4,000 EP Capacity*, prepared by Sinclair Knight Merz Pty Limited, 6 September 2010.

4.2 Key Drivers and Link to Asset Management Plan

The key driver for this project is the historical and projected population increase in the Fernvale and Lowood communities. QUU have advised that a secondary driver is that "*both Fernvale and Lowood treatment Plants are not meeting their Development Approval conditions due to assets of inappropriate condition and performance. Fernvale Treatment Plant regularly fails to comply with key environmental licence conditions (Biochemical Oxygen Demand, Suspended Solids, Disinfection). The Plant also regularly exceeds licence limits for effluent release quantity. Lowood Treatment Plant struggles to meet key environmental licence conditions (Biochemical Oxygen Demand, Suspended Solids). The Plant also regularly exceeds licence limits for effluent release quantity.*"[19]

Forecast system volumes detailed in the *Fernvale Sewerage Planning Report*[20] show approximately 4000EP population projected by the end of 2020. However, the Frontier Economics *Assessment of Project Demand*[21] report, prepared as part of the Interim Price Monitoring process, predicts significantly lower levels of population increase of approximately 4.4 percent per annum compound rate for the period 2010-2013. Historical growth of 10 percent per annum has been observed for 2008-2010.

Other reports listed in **Section 4.1.1**, discuss future developments in the region, and the high number of recent sub-division approvals granted by Council. Taking this into consideration, the projected population of approximately 4,000EP by the end of 2020 would appear to be reasonable.

The costs associated with proposed upgrades of the treatment plant detailed in the *Fernvale Sewerage Planning Report*, [22] correlate with costs included in the QUU Capital Expenditure spreadsheet provided by QCA. However, costs detailed in Somerset Regional Council's Total Management Plan do not correlate.

[19] Anecdotal advice (response to draft report); evidence was not sighted.

[20] *Fernvale Sewerage Planning Report for 4,000 EP Capacity*, prepared by Sinclair Knight Merz Pty Limited, 6 September 2010.

[21] Frontier Economics, *SEQ Interim Price Monitoring; Assessment of Projected Demand; A Draft Report prepared for Queensland Competition Authority*, September 2010.

[22] *Fernvale Sewerage Planning Report for 4,000 EP Capacity*, prepared by Sinclair Knight Merz Pty Limited, 6 September 2010.

4.3 Solution Development

4.3.1 *Lowood and Fernvale Regional STP Strategy Report*

In January 2007, CH2M Hill completed development of the Lowood and Fernvale Regional STP Strategy[23] which outlined options to upgrade the Lowood and Fernvale STPs in order to meet the requirements of catchment growth, more stringent final effluent quality requirements and meeting the demands of local customers for reclaimed water.

Four options were identified and assessed as described below:

- **Option 1:** new site at Fernvale Quarry to treat the combined Fernvale and Lowood sewage and then to decommission Fernvale and Lowood STPs;
- **Option 2:** new site in Wivenhoe Pocket to treat the combined Fernvale and Lowood sewage and then to decommission Fernvale and Lowood STPs;
- **Option 3:** develop on existing Fernvale and Lowood STP sites to treat Fernvale and Lowood townships sewage, with an alternative site nominated (Option 3a); and
- **Option 4:** develop Fernvale STP site to treat the combined load and pump raw sewage from Lowood.

From the study, it was recommended that a combined treatment facility (Option 4) be adopted as the preferred strategy, if possible being sited on the existing Fernvale STP. The estimated cost for this option was $15.4 million.

4.3.2 *Stage 2 Report for Lowood and Fernvale Sewage Treatment Plant Upgrade*

In October 2008, a subsequent report was produced by Water Strategies,[24] preparing a concept design for a new regional treatment plant at Fernvale. The report emphasises the key driver for STP upgrade as being population growth, principally due to a number of new property development proposals, and a significant number of subdivision approvals. As a result, the concept design was based on 8,000EP, as advised by Somerset Regional Council.

An oxidation ditch process was proposed based on simplicity, flexibility, robustness, performance and proven process characteristics. Associated upgrades to the transfer system were also identified. The total estimated cost of the scheme was $26.8 million (June 2008), being implemented over approximately 21 months.

[23] *Lowood and Fernvale Regional STP Strategy Report*, prepared by CH2M Hill Australia Pty Limited, June 2007.

[24] *Stage 2 Report for Lowood and Fernvale Sewage Treatment Plant Upgrade*, prepared by Water Strategies Pty Limited, October 2008.

Estimates of annual operating costs were given, and noted to be less than the existing plant.

4.3.3 *Lowood/Fernvale Sewage Treatment & Effluent Irrigation Project Report*

In July 2010, a Master Planning Report was produced by SKM,[25] to undertake the preliminary engineering design for the combined Lowood-Fernvale STP identified in previous reports. Population projections were re-estimated, and the preferred option of an 8,000EP treatment plant confirmed as being priority.

In addition to the sewage treatment plant design, an assessment of available and useable irrigation land within the STP site was undertaken, identifying potential irrigation areas, in order to reduce discharge to the Brisbane River. A biosolids management strategy is outlined, comprising aerobic digestion and sludge dewatering by belt filter presses, with the contaminant grade likely to be suitable for beneficial use.

Preliminary cost estimates total $32.3 million, including costs associated with the sewage treatment plant, sewage reticulation and recycled water irrigation scheme, providing sewage treatment capacity to 2024.

4.3.4 *Fernvale Sewerage Planning Report for 4,000 EP Capacity*

The latest report sighted on this project[26] targets a lower capacity STP of 4,000EP, to initially service Fernvale only. This option was identified for investigation by QUU. The report outlines:

- a concept design for a 4000EP STP to service Fernvale only;
- STP preferred site selection from 3 identified options;
- augmentation to the existing pump station and rising main required to service the 4,000EP load; and
- identification of additional sewerage system infrastructure required to service the 4,000EP load.

Capital cost estimates total $17.5 million for the selected option (Site 2A), including costs associated with the sewage treatment plant, the sewage pumping station, the rising main and gravity main.

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[25] *Lowood/Fernvale Sewage Treatment & Effluent Irrigation Project*, prepared by Sinclair Knight Merz Pty Limited, 8 July 2010.

[26] *Fernvale Sewerage Planning Report for 4,000 EP Capacity*, prepared by Sinclair Knight Merz Pty Limited, 6 September 2010.

Details of proposals for servicing Lowood, in light of this option, have not been provided and consequently not assessed as part of this review.

4.4 *Cost Estimate*

In its Interim Monitoring Return, QUU has proposed expenditure amounting to a total of approximately $17.5 million ($nominal) for the Somerset Fernvale STP Upgrade over the period 2010-2013. The proposed expenditure profile is shown in **Table 4.1**.

Table 4.1 Proposed Expenditure Profile ($'000 nominal)[27]

Project	2010-11	2011-12	2012-13	2013-14	2014-15	Subsequent	Total
Somerset Ferndale STP	5,000	7,175	5,253	538			17,967

It should be noted that the costs outlined in **Table 4.1** above correspond to the cost estimates detailed in the *Fernvale Sewerage Planning Report*[28] (Site 2A) and exclude the purchase costs associated with any land required to enable the construction of the new STP. These costs do, however, vary significantly from the costs reported in Council's Total Management Plan.

A detailed cost breakdown of items associated with the proposed new STP (Site 2A) is given in the *Fernvale Sewerage Planning*, Appendix H.16. The cost estimate appears reasonable; it includes a contingency allowance of 25 percent (which is considered reasonable at this stage of project development) and an engineering design and project management allowance of 15 percent (which is again considered reasonable, albeit at the upper bound of normal allowances).

[27] Queensland Urban Utilities has applied an escalation index of 2.5 percent per annum from the date of cost estimate to determine expenditure in subsequent years.

[28] *Fernvale Sewerage Planning Report for 4,000 EP Capacity*, prepared by Sinclair Knight Merz Pty Limited, 6 September 2010.

Table 4.2 Responsive Renewal Program ($'000 nominal)[29]

Project	2010-11	2011-12	2012-13	2013-14	2014-15	Subsequent	Total
Somerset WWTP Responsive Renewal Program		60		60	220		340

It is also noted that in its Interim Monitoring Return, QUU list responsive renewal costs that appear to be associated with the existing STP at Fernvale (refer **Table 4.2**). QUU have advised (but not provided evidence) that:

"*Responsive renewal costs are urgently required for Fernvale Wastewater Treatment Plant. The plant has had a full, licence compliance and asset assessment completed. The plant has been assessed at a condition and performance level of fair.*

Interim works are required to:

- *Upgrade chlorination facilities for discharge effluent;*
- *Upgrade all electrical switchboards to current codes;*
- *Upgrade walkways and ladders on site to meet current safety standards.*

These works are urgently required to meet current asset, safety legislation and meet environmental due diligence requirements."

In consideration of QUU comments above, and in spite of the fact that the proposed upgrade of Fernvale STP comprises construction of a new plant on an alternative site, Halcrow considers the proposed responsive renewals to the existing plant to be prudent in that they are required to meet statutory requirements over the remaining life of the plant.

4.5 Timing and Deliverability

As noted above, QUU has proposed a program starting in 2010/11, and reaching completion in 2013/14. Based on the information available, the proposed timing appears fair, and should be deliverable over the period, providing land acquisition of the chosen site presents no unexpected delays.

[29] Queensland Urban Utilities has applied an escalation index of 2.5 percent per annum from the date of cost estimate to determine expenditure in subsequent years.

4.6 Implications for Operating Expenditure

Basic operating costs are provided at all stages of solution development for an 8,000EP with anticipated costs of approximately $700,000 per annum for the complete scheme, including costs associated with sewage pumping stations and recycled water irrigation.

The current proposal of a 4,000EP STP does not include any details of estimated operating costs.

4.7 Summary of Assessment Findings

With respect to the Fernvale Sewage Treatment Plant Upgrade project, the following conclusions are made:

- *Key drivers:* The project is prudent on the basis of historic and predicted growth in the Fernvale community. A key factor indicating significant future population growth is the significant level of new development and subdivision of existing properties in the catchment area.
- *Link to Asset Management Plan:* The project is referenced in Somerset Regional Council's Total Management Plan, but costs vary significantly from those detailed in the *Fernvale Sewerage Planning Report.*
- *Solution development:* The planning phase has adopted a robust approach to solution development through a process of consultation, investigation, option development and option evaluation. QUU have advised that a '*request was issued from Queensland Urban Utilities to examine both a 4,000EP (Fernvale only) and 8,000 (Fernvale/Lowood) options. The 4,000EP option would only be viable given satisfactory performance of the current Lowood STP and would be an opportunity to defer capital expenditure. The 4,000EP works would require Stage 2 works at a later date to transfer Lowood and increase plant capacity to 8,000EP.*
- *Cost estimates:* The preliminary capital cost estimate for the suggested site (Site 2A) is $17.5 million, assumed to be expressed in $2010/11. Further information about the distribution of cost shown in the QUU Capex spreadsheet is required before comment can be made on the breakdown of annual Capex associated with this project.
- *Timing and deliverability:* QUU has proposed a program starting in 2010/11, and reaching completion in 2013/14. Based on the information available, the proposed timing appears reasonable, and should be deliverable over the period providing land acquisition of the chosen site presents no unexpected delays.

- *Implications for Operating Expenditure:* As identified in **Section 4.6**, operating costs associated with the final design of a 4,000EP STP are not given; consequently, no comment can be made.

In summary, prudence of the Fernvale Sewage Treatment Plant Upgrade project has been demonstrated on the basis of population growth. The adopted solution has been identified through a robust planning approach; on this basis, the proposed expenditure is considered to be efficient.

5 Bromelton (Scenic Rim) Regional Sewage Treatment Plant (Queensland Urban Utilities)

5.1 Project Overview

5.1.1 Key Reference Documents

The following documents were reviewed in relation to this project:

- Beaudesert Shire Council, *Beaudesert Whole of Shire Planning, Water Cycle Management; Local Area Study – Bromelton*, prepared by Cardno (Qld) Pty Ltd, November 2007.
- *Bromelton STP Site Selection Study; Bromelton STP; Scenic Rim Regional Council*, prepared by Aurecon Australia Pty Ltd, 12 March 2010.
- *Phase 2 – Preliminary Infrastructure Assessment Report – Water Cycle Management Infrastructure; Priority Infrastructure Plan; Scenic Rim Regional Council*, prepared by Aurecon Australia Pty Ltd, 31 March 2010.
- *SEQ Interim Price Monitoring; Assessment of Projected Demand; A Draft Report prepared for Queensland Competition Authority*, prepared by Frontier Economics, September 2010.

5.1.2 Project Description

The Bromelton locality has been identified as an area for significant Commercial/Industrial growth. Bromelton is currently not connected to a sewerage system. The nearby STP at Beaudesert is nearing full capacity; consequently, it is proposed to subdivide the Bromelton area into three sewage catchments (North, Central and South), with each catchment having its own pumping station(s) and STP.

Initial planning is based on long term Master Planning; consequently, the work has had limited review and is subject to potential change as further planning is completed. Cost estimates have been provided, but to date no concept design or other supporting documentation has been provided for review.

5.2 Key Drivers and Link to Asset Management Plan

The key driver for this project is the predicted Commercial/Industrial growth in the Bromelton locality, resulting in a significant population increase by 2026. Predicted levels of growth are identified in the South East Queensland Regional Plan. The Whole of Shire Planning Project (WOSP) has identified that further detailed information regarding infrastructure requirements for specific growth areas is required.

Bromelton is currently not connected to a sewerage system; the nearby STP at Beaudesert is nearing full capacity, and has suffered compliance issues for the effluent discharge licence.

The Scenic Rim Regional Council Strategic Asset Management Plan identifies that the Beaudesert STP requires imminent upgrade due to growth, and capital works budget is allocated to this work. However, it is not clear from the documentation provided whether this work is associated with the existing plant, or the new STPs proposed at Bromelton.

5.3 Solution Development

In November 2007, Cardno (qld) Pty Ltd produced a *Water Cycle Management Plan*[30] for the whole of the Beaudesert Shire. This report gives a very high level overview of planning requirements for sewage management in the Bromelton area. It is proposed to subdivide the Bromelton area into three sewage catchments (North, Central and South), with each catchment having its own pumping station(s) and STP. Cost estimates have been provided, but to date no concept design for the STPs has been sighted.

On the basis of the information provided for review, it is not possible to comment on STP design or associated costing. A concept design report, or similar documentation, is required to enable review of the project proposal.

[30] Beaudesert Shire Council, *Beaudesert Whole of Shire Planning, Water Cycle Management; Local Area Study – Bromelton*, prepared by Cardno (Qld) Pty Ltd, November 2007.

5.4 Cost Estimate

In its Interim Monitoring Return, QUU has proposed expenditure amounting to a total of approximately $17 million ($nominal) for the Bromelton Regional STP over the period 2010-2013, with an additional $4.7 million for land. The proposed expenditure profile is shown in **Table 5.1**.

Table 5.1 Proposed Expenditure Profile ($'000 nominal)[31]

Project	2010-11	2011-12	2012-13	2013-14	2014-15	Subsequent	Total
Bromelton STP		3,660	13,023				16,683
Bromelton STP - Land		1,032	3,673				4,706
Bromelton STP - Total		4,692	16,697				21,389

It is noted that there is an extreme variation between the costs detailed in the *Water Cycle Management Plan*[32] to those listed in **Table 5.1**. Costs associated with the three STPs discussed in this report are reported as in **Table 5.2**.

Table 5.2 Estimated STP costs from Cardno Report

Project	2006-11	2011-16	2016-21	Total
Bromelton Central	$29.27m	$39.78m	$33.77m	$102.81m
Bromelton North	$0	$0	$0	$0
Bromelton South	$0	$0	$0	$0

5.5 Timing and Deliverability

Treatment plant construction is planned to be staged, and completed by 2021. No details of the proposed staging have been provided for review; consequently, no assessment has been made of its appropriateness.

[31] Queensland Urban Utilities has applied an escalation index of 2.5 percent per annum from the date of cost estimate to determine expenditure in subsequent years.

[32] Beaudesert Shire Council, *Beaudesert Whole of Shire Planning, Water Cycle Management; Local Area Study – Bromelton*, prepared by Cardno (Qld) Pty Ltd, November 2007.

It is noted that initial expenditure on construction is forecast to be incurred in 2011-12; on the basis of the proposed cash flow, it appears that work is planned to commence in the 2012 calendar year. Given the apparent absence of any concept or detailed design proposals for the facility at this point in time, Halcrow considers that any further delay will potentially compromise the ability to deliver the project in the proposed timeframe.

5.6 Implications for Operating Expenditure

No estimates of operating costs are given, and Halcrow is unable to comment on potential implications. Nonetheless, the construction of a new treatment plant will attract ongoing operating and maintenance costs. The quantum of those costs and any offsets against existing operating expenditure will need to be separately assessed.

5.7 Summary of Assessment Findings

Limited information has been provided regarding the proposed sewerage infrastructure upgrades in the Bromelton region. Whilst the forecast population growth indicates that the project is prudent, no concept or detailed design proposal has been provided for review (however, Halcrow understands that this is currently in progress, as documented below), and it is therefore not possible to comment on the efficiency of the forecast expenditure associated with this item of capital works.

QUU has advised (but not provided evidence) that:

"*At this stage, there are a number of issues being resolved regarding land use planning aspects for this area.*

Scenic Rim Regional Council are currently finalising a land use structure and master plan for the area. Potential wastewater treatment plant sites have also been identified. QUU is participating in this process. The current Beaudesert Wastewater Treatment Plant is at capacity for the existing Beaudesert area and currently proposed developments.

A new plant will be required for the new industrial area of Bromelton which is intended to require a capacity of 15,000 persons. It is intended this plant will be required by 2014. Detailed feasibility and design of this plant is currently commencing. The resultant budget projections will form part of the 2011/12 budget deliberations."

6 Stapylton Wastewater Treatment Plant Stage 1 (Allconnex Water)

6.1 Project Overview

6.1.1 Key Reference Documents

Key reference documents consulted in undertaking this review have included:

- Gold Coast City Council, *Northern Wastewater Strategy; A Wastewater Strategy for the Northern Region of the City of Gold Coast; Volume 1 – Report*, prepared by Gold Coast City Council, 19 April 1996.
- Gold Coast Water, *Stage 3 – Northern Wastewater Strategy*, prepared by EarthTech, 2006.
- Gold Coast Water, *Strategic Wastewater Category 1; Planning Report*, prepared by Cardno, 20 November 2006.
- Gold Coast Water, *Priority Infrastructure Plan; Stapylton Wastewater Financial Catchment Planning*, prepared by Gold Cost City Council, December 2006.
- Gold Coast Water, *Stapylton WWTP Planning Report; Project Report*, prepared by Gold Coast City Council, June 2008.
- Gold Coast Water, *Stapylton Area Wastewater Infrastructure Strategy; Phase 1: Investigation Report*, prepared by Sinclair Knight Merz, June 2009.
- Logan Water Alliance, *Logan East and Stapylton Wastewater Strategy Review*, September 2010.

6.1.2 Project Description

This project[33] involves the construction of a new wastewater treatment plant to service growth in the area south of Beenleigh and north of Ormeau. The ultimate capacity of the plant is planned to be 37,600ET, with Stage 1 to provide an initial capacity of 13,800ET.

It is expected that up to 50 percent of wastewater received at the plant will originate from industrial developments; consequently the plant will incorporate the latest treatment technologies including biological nutrient removal (BNR) and disinfection processes. The plant will treat to Recycled Water Class B standard;

[33] Following review of the supporting information provided by Allconnex Water, it appears that the proposal outlined in the *Strategic Wastewater Category 1; Planning Report* (refer **Section 6.3.3**) forms the basis upon which the Stapylton WWTP project has been included in the Interim Price Monitoring Return.

further treatment will be required to meet Class A+ Recycled Water Standard to meet the proposed long term no-release strategy for the region.

6.2 Key Drivers and Link to Asset Management Plan

The need for the Stapylton WWTP is driven principally by predicted growth in the catchment, which has a significant industrial element. The planning process outlined in **Section 6.3** has involved reassessment of demand at various stages, particularly as the proposed timing for construction of the new facility is dependent upon both the rate of growth and the available treatment capacity at the Beenleigh WWTP (which currently services the Stapylton catchment).

As noted in **Section 6.3.3**, the proposed plant is included as an item of proposed trunk infrastructure in the current *Priority Infrastructure Plan* for the former Gold Coast City Council area. Allconnex Water has confirmed that population growth figures on which the *Priority Infrastructure Plan* was based have been verified by the Planning Information and Forecasting Unit (PIFU) in the Office of Economic and Statistical Research, Department of Local Government, Planning Sport and Recreation (Queensland State Government).

The Frontier Economics *Assessment of Project Demand*[34] report, prepared as part of the Interim Price Monitoring process, is not definitive in respect to wastewater demand. It does, however, suggest that Allconnex Water has proposed annual growth less than that predicted by the Planning Information and Forecasting Unit (PIFU).

The proposed construction of the Stapylton WWTP is identified in the Gold Coast Water *Strategic Asset Management Plan* (SAMP).;[35] Growth targets presented in the SAMP appear to correlate with those adopted in the relevant planning documents.

On the basis of the planning documentation reviewed, Halcrow considers that construction of the Stapylton WWTP is justified on the basis that it is required to service predicted growth in the catchment.

[34] Frontier Economics, *SEQ Interim Price Monitoring; Assessment of Projected Demand; A Draft Report prepared for Queensland Competition Authority*, September 2010.

[35] Gold Coast Water, *Strategic Asset Management Plan; Potable Water, Recycled Water and Wastewater*, prepared by Gold Coast City Council, March 2009.

6.3 Solution Development

6.3.1 Overview

Planning for the proposed Stapylton WWTP has developed over a number of years. An overview of the development of the proposed solution is outlined in the following sections.

6.3.2 Northern Wastewater Strategy

In April 1996, Gold Coast City Council completed development of the *Northern Wastewater Strategy*[36] which outlined plans for the management of wastewater in the northern region of the City of Gold Coast, including extensive recycling/reuse. The indentified works included the construction of a water reclamation facility (sewage treatment plant) in the Yatala/Stapylton area to service the Yatala Enterprise Precinct, the Ormeau District and excess growth in the Beenleigh District. A plant having an ultimate capacity of around 170,000EP at a cost of $60 million ($1996) was proposed; Stage 1 comprising 50,000EP capacity at a cost of $17 million ($1996) was planned for completion by December 2001.

6.3.3 Strategic Wastewater Category 1; Planning Report

The *Strategic Wastewater Category 1; Planning Report*[37] was prepared in November 2006. The key objectives of the study underpinning this report were:

- to provide a program for the augmentation of category 1 wastewater infrastructure to service projected population and development growth until 2056; and
- to provide estimated costs and the timing of capital expenditure associated with the augmentation program over the planning period.

In respect to the proposed Stapylton WWTP, *Strategic Wastewater Category 1; Planning Report* recommended that:

- Stage 1 of the plant is to have a capacity of 13,800ET and be commissioned in 2010 at an estimated cost of $31.188 million ($2006);[38]
- Stage 2 of the plant is to provide an additional 13,800ET capacity and be commissioned in 2030;
- the final stage (Stage 3) of the plant is to provide an additional 10,000ET capacity (ie. ultimate capacity of 37,600ET) and be commissioned in 2040;

[36] Gold Coast City Council, *Northern Wastewater Strategy; A Wastewater Strategy for the Northern Region of the City of Gold Coast; Volume 1 – Report*, prepared by Gold Cost City Council, 19 April 1996.

[37] Gold Coast Water, *Strategic Wastewater Category 1; Planning Report*, prepared by Cardno, 20 November 2006.

[38] Dollar values assumed to coincide with date of report.

- flows from the Stapylton-Yatala would be diverted to the plant in 2011 (ie. when commissioned); additional flows would be diverted to the plant in 2030 (ie. when the Beenleigh WWTP are reaching capacity and Stage 2 of the plant is constructed).

The report noted that almost 50 percent of wastewater received at the Stapylton WWTP is expected to originate from industrial developments, and that in order to accommodate the high industrial loads, the plant will need to incorporate the latest treatment technologies. Consequently, the plant is proposed to comprise:

- Inlet Works;
- BNR Activated Sludge Plant;
- Secondary Clarifiers;
- Chlorine Contact Tank;
- Recycled Water Storage Lagoons;
- Sludge Treatment; and
- Odour Treatment Facilities.

Treatment will be to Recycled Water Class B standard; further treatment will be required to meet Class A+ Recycled Water Standard to meet the proposed long term no-release strategy.

It is noted that the *Strategic Wastewater Category 1; Planning Report* outlines the planning for the wastewater treatment and release (Category 1) infrastructure identified in the *Priority Infrastructure Plan* for the former Gold Coast City Council area. Planning for trunk reticulation/collection infrastructure is documented in the *Priority Infrastructure Plan; Stapylton Wastewater Financial Catchment Planning* report.[39]

6.3.4 Stapylton WWTP Planning Report

The primary purpose of the *Stapylton WWTP Planning Report*[40] was to assess the viability of the (then) currently identified site for the proposed treatment plant, prepare a preliminary design and corresponding cost estimate for budgeting purposes and identify and describe subsequent activities and investigations required to further progress the project.

[39] Gold Coast Water, *Priority Infrastructure Plan; Stapylton Wastewater Financial Catchment Planning*, prepared by Gold Cost City Council, December 2006.

[40] Gold Coast Water, *Stapylton WWTP Planning Report; Project Report*, prepared by Gold Cost City Council, June 2008.

Preliminary process design was undertaken to confirm sizing and arrangement of the proposed plant based on treatment to Class B Recycled Water Standard. Predicted wastewater inflows were assessed, leading to the following staging profile:

- Stage 1 – 9 megalitres per day capacity to be commissioned in 2011;
- Stage 2 – 18 megalitres per day capacity (total) to be commissioned in 2024; and
- Stage 3 – 27 megalitres per day capacity (total) to be commissioned in 2035.

On the basis of the preliminary design, the cost of constructing Stage 1 of the Stapylton WWTP was estimated at $43.04 million ($March 2008), which increased to $55.95 million when a 30 percent contingency allowance was included.

Consideration was also given to appropriate delivery strategies, which varied from traditional design followed by construction to Alliance arrangements for both the capital works and subsequent operation and maintenance of the facility. It was expected most likely that an Alliance delivery method would be adopted.

6.3.5 Stapylton Area Wastewater Infrastructure Strategy

The *Stapylton Area Wastewater Infrastructure Strategy*[41] Phase 1 investigation was undertaken to identify a short term strategy for the management of wastewater in the Beenleigh and Stapylton catchments in the period prior to commissioning of the Stapylton WWTP scheduled for 2012. The investigation assessed the capacity of the system to accommodate flows under various growth scenarios, however, did not assess the required capacity (or other attributes) of the proposed Stapylton WWTP.

6.3.6 Logan East and Stapylton Wastewater Strategy Review

The *Logan East and Stapylton Wastewater Strategy Review*[42] completed in September 2010 outlines a review that examines to potential to defer timing of construction of the proposed Stapylton WWTP. This potential arises by maximising the use of spare capacity at the Loganholme Water Pollution Control Centre (WPCC). Recent revision of population growth forecasts in the Loganholme and Beenleigh wastewater catchments indicates that growth may occur at a slower rate than previously predicted; as a result the forecast load on

[41] Gold Coast Water, *Stapylton Area Wastewater Infrastructure Strategy; Phase 1: Investigation Report*, prepared by Sinclair Knight Merz, June 2009.

[42] Logan Water Alliance, *Logan East and Stapylton Wastewater Strategy Review (Draft)*, September 2010.

both Beenleigh WWTP and Loganholme WPCC will be reduced, thereby potentially removing the immediate need to construct the Stapylton WWTP.

This review revealed that construction of the Stapylton WWTP could be deferred until 2023 (with a possible further deferral to 2032 if wastewater loading is reduced to 165 litres per EP per day). Whilst the capital cost of the deferral option is only marginally (approximately 2 percent) lower than that of the previous (construct now) option, the net present cost (NPC) is some 15 percent lower. The reduction in NPC is principally associated with the deferral of the treatment plant; the NPC of all other cost elements remains essentially constant.

Allconnex Water has advised that the *Logan East and Stapylton Wastewater Strategy Review* is a draft report only and is currently under internal review. Issues to be considered as part of this review include:

- changes in short term contributing population due to increased early growth in the Stapylton catchment and the resultant changes to collection/transfer network infrastructure requirements;
- a review of the cost estimates for infrastructure, operations and maintenance;
- alternative financial assessment criteria and processes to be used in NPC calculations;
- conduct of a Multi Criteria Analysis; and
- peer review of the requirements for upgrade of the Beenleigh WWTP.

It is understood that, as a consequence, the decision to proceed with construction of the Stapylton WWTP to meet the original program remains under review, pending further analysis of options for the transfer of existing load from the Beenleigh WWTP to the Loganholme WPCC.

6.3.7 Summary

The proposed Stapylton WWTP has been the subject of an extensive and robust planning process over a number of years. The principle element of the process was the original (1996) development of the *Northern Wastewater Strategy*; subsequent planning has involved review and refinement of the details of the proposal to construct the treatment plant as part of a broader serving strategy which is also targeted at a long term no-release (of effluent) strategy.

The sizing and proposed timing for construction of the plant has remained consistent, particularly in recent planning documents. It is noted, however, that the draft *Logan East and Stapylton Wastewater Strategy Review* completed in September 2010 (ie. subsequent to preparation of the Interim Price Monitoring Return) considers deferment of construction from completion in 2011 until 2023

by using available capacity at the existing Beenleigh WWTP and Loganholme WPCC, the later which had not been previously identified.[43] At this stage, however, any decision to defer construction of the Stapylton WWTP remains under review.

It is noted that, whilst deferral of construction of the Stapylton WWTP has been considered, on the basis of work completed to date the total capital cost of the associated servicing arrangement is similar; the NPC is, however, reduced by some 15 percent. Halcrow has not made any assessment of the broader implications of this change for the overall program of works identified in Allconnex Water's Interim Price Monitoring Return.

6.4 *Cost Estimate*

In its Interim Price Monitoring Return, Allconnex Water has proposed expenditure amounting to a total of approximately $53.3 million ($nominal) for the Stapylton WWTP Stage 1 over the period 2010-2013. The proposed expenditure profile is shown in **Table 6.1**.

Table 6.1 Proposed Expenditure Profile ($'000 nominal)[44]

Project	2010-11	2011-12	2012-13	Total
Stapylton WWTP Stage 1	31,500	21,499	347	53,346

Note: Carry over expenditure of $243,000 (nominal) forecast for 2013-14.

As previously outlined, it appears that the planning (including costing) presented in the *Strategic Wastewater Category 1; Planning Report* provides the basis for the submission. This report identifies a Stage 1 cost of $31.188 million ($2006). The subsequent *Stapylton WWTP Planning Report* identifies the Stage 1 cost as $55.95 million ($March 2008) (ie. $43.04 million plus a 30 percent contingency allowance). In both cases, the development of the cost estimates appears to appropriate to the stage of project development, as follows:

[43] It is anticipated that this opportunity arises from adopting a broader "regional" approach to infrastructure planning following the amalgamation of Gold Coast Water and Logan Water (and the Redland City Council water business) to form Allconnex Water.

[44] Allconnex Water has applied an escalation index of 5 percent per annum from the date of cost estimate to determine expenditure in subsequent years.

- the estimate presented in the *Strategic Wastewater Category 1; Planning Report* has been derived using unit rates compiled by an independent consultant; and
- the estimate presented in the *Stapylton WWTP Planning Report* has been determined by estimating the costs of the principal construction activities and/or components of infrastructure. Application of a 30 percent contingency allowance at this stage of the planning process is consistent with water industry practice.

Additional information provided by Allconnex Water outlines the basis for the expenditure profile included in its Interim Price Monitoring Return, as follows:

- The proposed expenditure (as included in the Interim Price Monitoring Return) has been determined on the basis of:
  - the estimate presented in the *Stapylton WWTP Planning Report*, ie. $43.03 million, which has been inflated by a 30 percent contingency allowance to give an estimated cost of $56 million;
  - the actual outturn cost of the Pimpama WWTP Stage 1, which has been delivered under a competitive Alliance arrangement of for an actual outturn cost of approximately $67 million, which has been prorated on the basis of plant capacity to give an estimated cost of $45 million;
  - a cost estimate of $50 million was adopted for budget purposes. It appears that this estimate has been escalated to give an estimated cost of $52.29 million ($2011); and
- The cash flow has been based on a construction and commissioning program of 21 months followed by a two (2) year proving period post commissioning.

On the basis of the information presented, both the estimated cost of the proposed cash flow are considered appropriate for expenditure forecasting purposes. The use of a properly managed Alliance delivery mechanism (refer **Section 0**) should ensure that the cost of the proposed works is efficient.

Allconnex Water has subsequently advised[45] that the estimated cost of the Stapylton WWTP Stage 1 works, which is included as part of the Target Outturn Cost (TOC) determined under the Alliance arrangement, is $54.2 million ($2010-11), or $58.1 million ($nominal). The associated expenditure profile is shown in **Table 6.2**.

[45] Email message to Halcrow dated 18 October 2010.

Table 6.2 Revised Proposed Expenditure Profile ($'000 nominal)

Project	2010-11	2011-12	2012-13	Total
Stapylton WWTP Stage 1	34,146	23,305	376	57,827

Note: Carry over expenditure of $264,000 ($nominal) forecast for 2013-14; total estimated project cost is $58.091 million ($nominal).

The increase in cost has been identified through the greater detail involved in the TOC development process, which also involves independent verification of the costs. The revised cost estimate amounts to approximately $4,190 per EP (previously $3,900 per EP), which is generally consistent with the estimated and actual costs of other similar works.

6.5 *Timing and Deliverability*

The expenditure profile outlined in **Table 6.1** shows construction of the Stapylton WWTP over a three year period with completion in 2012-13. Given the relatively small expenditure in 2012-13, this timing is generally consistent with that outlined in the various planning documents.

The planned timing of construction correlates to expected demand growth as outlined in the *Strategic Wastewater Category 1; Planning Report*[46] and the *Stapylton WWTP Planning Report*.[47]

On the basis of Halcrow's review of the planning documentation, the proposed timing of construction of the Stapylton WWTP appears to be appropriate. It is noted, however, that a final decision in respect to timing remains under review pending a further assessment of options involving use of the Loganholme WPCC.

Allconnex Water has confirmed that Gold Coast City Council entered into an Alliance agreement for *Design, Construct, Commission and Prove the Coombabah Wastewater Treatment Plant – Stage 5 and Stapylton Wastewater Treatment Plant and Recycled Water Treatment Plant – Stage 1 and Associated Infrastructure*,[48] and that this agreement has been novated to Allconnex Water. Under the Alliance arrangement,

[46] Gold Coast Water, *Strategic Wastewater Category 1; Planning Report*, prepared by Cardno, 20 November 2006.

[47] Gold Coast Water, *Stapylton WWTP Planning Report; Project Report*, prepared by Gold Cost City Council, June 2008.

[48] Approval for Gold Coast Water to call Requests for Proposals for the establishment of the Alliance was given at the Gold Coast City Council meeting of 18 September 2009; no evidence of the actual establishment of the Alliance has been sited by Halcrow.

a preferred option for the Stapylton WWTP Stage 1 project has been selected and a Target Outturn Cost (TOC) of $75.33 million developed (which includes allowance for effluent release infrastructure comprising storage lagoons, a pumping station and other associated infrastructure).[49] It is understood that the TOC estimate will be used as an input to the revised *Logan East and Stapylton Wastewater Strategy Review* to confirm/revalidate or otherwise the proposed timing for construction of the Stapylton WWTP Stage 1 project.

Halcrow notes that an Alliance arrangement is an effective means of delivering large scale infrastructure development, which is regularly used in the water industry. Although the selection of this delivery mechanism has not been assessed in detail, it is considered appropriate in this instance, particularly in view of the proposed bundling with other projects including:

- Stapylton WWTP Influent Pumping Station - $4.41 million;
- Stapylton WWTP Trunk Sewer - $14.69 million;
- Stapylton WWTP Recycled Water Release Pipeline - $7.32 million; and
- Coombabah WWTP Stage 5 Upgrade - $60.95 million.

Halcrow supports the process currently being implemented by Allconnex Water to confirm/revalidate the proposed timing for construction of the Stapylton WWTP Stage 1 project.

6.6 Implications for Operating Expenditure

The proposed Stapylton WWTP will be a completely new installation. Accordingly, it will attract operating and maintenance costs that are not currently incurred by Allconnex Water following its commissioning.

It is also noted that flows from the Stapylton catchment are currently diverted to the Beenleigh WWTP. It is expected that there will be some reduction in operating expenditure associated with existing pumping stations used to divert the flows to the adjacent catchment, however, this has not been assessed as part of this review.

[49] In view of the apparent significant increase in the forecast cost of the Stapylton WWTP Stage 1 from the $53.3 million nominal proposed in Allconnex Water's Interim Monitoring Return to the $75.33 million ($2010-11) TOC estimate, Halcrow sought clarification as to the scope of work included under the TOC estimate. In an email message to Halcrow dated 18 October 2010 and subsequent telephone discussions, Allconnex Water confirmed that the cost of the actual Stapylton WWTP Stage 1 amounts to $54.2 million ($2010-11); the balance of the $75.33 million ($2010-11) TOC estimate relates to effluent release infrastructure comprising storage lagoons, a pumping station and other associated infrastructure.

6.7 Summary of Assessment Findings

Based on the assessment outlined above, the following conclusions are made in respect to the proposed Stapylton WWTP Stage 1:

- *Key drivers:* Construction of the Stapylton WWTP is justified on the basis that it is required to service predicted growth in the catchment.
- *Link to Asset Management Plan:* The project is identified as future works in the Gold Coast Water *Strategic Asset Management Plan* (SAMP) (dated March 2009). Furthermore, it is clearly identified in the current *Priority Infrastructure Plan* for the former Gold Coast City Council area.
- *Solution development:* The proposed Stapylton WWTP has been the subject of an extensive and robust planning process over a number of years. The principle element of the process was the original (1996) development of the *Northern Wastewater Strategy*; subsequent planning has involved review and refinement of the details of the proposal to construct the treatment plant as part of a broader serving strategy which is also targeted at a long term no-release (of effluent) strategy.
- *Cost estimates:* The proposed expenditure included in the Interim Monitoring Return (53.3 million ($nominal)) has now been superseded by costs estimated under an Alliance arrangement. The use of a properly managed Alliance delivery mechanism should ensure that the revised cost estimate of $58.1 million ($nominal) is efficient. The actual cost and cash flow will, however, be dependent upon the outcomes of further investigations currently being undertaken.
- *Timing and deliverability:* The proposed timing of construction of the Stapylton WWTP appears to be appropriate, although is currently under review. The use of an Alliance delivery mechanism is considered appropriate, particularly in view of the intended bundling with other projects.
- *Implications for Operating Expenditure:* As a new installation, the treatment plant will attract operating and maintenance costs that have not previously been incurred. It is expected that there will also be some reduction in operating expenditure associated with existing pumping stations currently used to divert flows to the adjacent catchment.

In summary, Halcrow considers the Stapylton WWTP Stage 1 project to be prudent on the basis of predicted growth (both population and industrial development) in the catchment. It is noted, however, that timing of construction is still subject to final review of a broader serving strategy which is also targeted at a long term no-release (of effluent) strategy.

The robust planning process, which is yet to confirm the final arrangement and timing of the works, and the use of a properly managed Alliance delivery mechanism should ensure that the cost of the proposed works, which equates to a unit rate cost of approximately $4,190 per EP, is efficient.

7 Conclusions

7.1 Overview

Halcrow's approach to the conduct of this review of the prudence and efficiency of capital expenditure related to the five (5) sewage treatment plant projects has been based predominantly around the data/information provided by Queensland Urban Utilities and Allconnex Water respectively. Whilst it was proposed that interviews/discussions with relevant officers of both entities would be conducted as a key element of the review, this did not eventuate. It is Halcrow's view that the proposed discussions would have enhanced the review process.

The outcomes of Halcrow's assessment of the prudence and efficiency of the proposed expenditure are summarised in the following sections.

7.2 Assessment Findings

7.2.1 *Goodna Sewage Treatment Plant Upgrade (Queensland Urban Utilities)*

With respect to the Goodna Sewage Treatment Plant Upgrade project, the following conclusions are made:

- *Key drivers* – growth with a secondary driver of compliance with treated effluent quality licences. Drivers appear to be adequately supported, with detailed assessment of the growth projections having been completed and made available.
- *Links to asset management plans* – the Goodna STP upgrade project is referenced in the *Total Management Plan and Strategic Asset Management Plan 2008-2011* and other supporting documents.
- *Solution development* –relevant planning documents demonstrate a comprehensive process of feasibility studies, options assessments and concept designs. It is noted that, following the formation of QUU, a broader regional approach to planning has been pursued. The most recent study confirms the Modified Regional Approach (Option 3) as the most appropriate option.
- *Cost estimates* – the proposed expenditure included in the Interim Monitoring Return is now superseded by the costs associated with Option 3, ie. the Modified Regional Approach. These costs, which are estimated at almost $126.6 million, should be incorporated into the proposed expenditure submission with a uniform rate of expenditure over the next three years (ie. 2010-11, 2011-12 and 2012-13).

- *Timing and deliverability* – Milestone dates given are considered achievable, and consistent with the proposed cash flow.
- *Operating expenditure* – The operating costs for the Modified Regional Approach option have been presented as a differential operating cost net present value of approximately $23.6 million (to ultimate development) compared to the full Goodna STP upgrade proposal (to ultimate development) operating cost of approximately $36 million.

In summary, Halcrow considers that the proposed upgrade (Option 3) to Goodna STP has been demonstrated to be prudent, based on the key driver of growth. QUU has demonstrated a well documented and justified development of options and has engaged independent consultants to support and review proposals at key points in option development. Halcrow supports the progression of the Modified Regional Approach.

In summary, Halcrow considers that the proposed upgrade (Option 3) to Goodna STP has been demonstrated to be prudent, based on the key driver of growth. QUU has demonstrated a well documented and justified development of options and has engaged independent consultants to support and review proposals at key points in option development. Halcrow supports the progression of the Modified Regional Approach, which has been developed by adopting a broader regional approach to planning following the formation of QUU.

A detailed assessment of efficiency has not been possible at the current stage of design, however, the equivalent unit rate cost of approximately $4,400 per EP is considered to be generally consistent with the estimated and actual costs of other similar works. It is noted that the Modified Regional Approach planning has led to a reduction of approximately 7.5 percent in the (nominal) cost of the works proposed to be undertaken during the 2010-2013 price monitoring period.

7.2.2 Lockyer Valley East Sewerage Scheme (Queensland Urban Utilities)

With respect to the Lockyer Valley East Sewerage Scheme project, the following conclusions are made:

- *Key drivers:* The project is considered prudent on the basis of growth and licence compliance requirements. Existing facilities are performing poorly and there are constraints on the ability to upgrade them.
- *Links to asset management plans:* The project appears to have broad, general linkages to QUU's/Lockyer Valley Regional Council's asset management plans/policies/documents.

- *Solution development:* The master planning phase has adopted a robust approach to solution development through a process of consultation, investigation, option development and option evaluation. Whilst considerable effort has been put into the master planning phase, the outcomes from the ongoing investigations, approvals and design development have the potential to impact heavily on the scheme configuration and cost of the project.
- *Cost estimates:* The preliminary cost estimate for the proposed works is $18.5 million. This compares to the proposed expenditure of $17.8 million ($2010-11) included in QUU's Interim Monitoring Return, and recently confirmed by QUU. The Gatton STP augmentation component of the project accounts for about $5.5 million, or approximately 30 percent of the total project cost. This amount is reported as a line item only, and whilst the accuracy of the cost appears to be suitable for pre-feasibility purposes, further details or a breakdown of this single cost component would be required to enable a robust assessment of the cost estimate. It is recommended that $17.8 million ($2010-11), or $18.23 million ($nominal), be adopted as an efficient cost at this stage of project development.
- *Timing and deliverability:* A project program or general indication of key dates has not been seen for the delivery of this capital project. It is, however, reasonable to expect that the project can be completed within the timeframe indicated by the proposed expenditure profile. Given the performance of existing STPs and the timing of projected growth in the catchment, the project will need to be completed before the end of 2014/15.
- *Implications for Operating Expenditure:* The preferred option results in lower operating costs compared to alternative options despite the additional pumping costs required for sewage transfer.

In summary, Halcrow considers that the Lockyer Valley East Sewerage Scheme project is prudent on the basis of growth and licence compliance requirements, and it appears that QUU is following a robust planning approach in undertaking investigation, feasibility studies and option analysis. A definitive statement in respect to the efficiency of the project cannot be made at this early stage, however, the equivalent unit rate cost of approximately $3,700 per EP is considered to be generally consistent with the estimated and actual costs of other similar works and provides a suitable basis for forecasting capital expenditure.

7.2.3 *Somerset Fernvale Sewage Treatment Plant Upgrade (Queensland Urban Utilities)*

With respect to the Fernvale Sewage Treatment Plant Upgrade project, the following conclusions are made:

- *Key drivers:* The project is prudent on the basis of historic and predicted growth in the Fernvale community; there is a significant level of new development and subdivision of existing properties in the catchment area.
- *Link to Asset Management Plan:* The project is referenced in Somerset Regional Council's Total Management Plan, but costs vary significantly from those detailed in the *Fernvale Sewerage Planning Report*.
- *Solution development:* The planning phase has adopted a robust approach to solution development through a process of consultation, investigation, option development and option evaluation.
- *Cost estimates:* The preliminary capital cost estimate for the suggested site (Site 2A) is $17.5 million, assumed to be expressed in $2010/11; further information is required before comment can be made on the breakdown of annual Capex associated with this project.
- *Timing and deliverability:* QUU has proposed a program starting in 2010/11, and reaching completion in 2013/14. Based on the information available, the proposed timing appears reasonable and should be deliverable over the period, providing land acquisition of the chosen site presents no unexpected delays.
- *Implications for Operating Expenditure:* Operating costs associated with the final design of a 4,000EP STP are not given; consequently, no comment can be made.

In summary, prudence of the Fernvale Sewage Treatment Plant Upgrade project has been demonstrated on the basis of population growth. The adopted solution has been identified through a robust planning approach; on this basis, the proposed expenditure is considered to be efficient.

7.2.4 *Bromelton (Scenic Rim) Regional Sewage Treatment Plant (Queensland Urban Utilities)*

Limited information has been provided regarding the proposed sewerage infrastructure upgrades in the Bromelton region. Whilst the forecast population growth indicates that the project is prudent, no concept or detailed design proposal has been provided for review, and it is therefore not possible to comment on the efficiency of the forecast expenditure associated with this item of capital works.

7.2.5 *Stapylton Wastewater Treatment Plant Stage 1 (Allconnex Water)*

Based on the assessment undertaken, the following conclusions are made in respect to the proposed Stapylton WWTP Stage 1:

- *Key drivers:* Construction of the Stapylton WWTP is justified on the basis that it is required to service predicted growth in the catchment.
- *Link to Asset Management Plan:* The project is identified as future works in the Gold Coast Water *Strategic Asset Management Plan* (SAMP) (dated March 2009) and is clearly identified in the current *Priority Infrastructure Plan* for the former Gold Coast City Council area.
- *Solution development:* The proposed Stapylton WWTP has been the subject of an extensive and robust planning process over a number of years. The most recent planning has involved review and refinement of the details of the proposal to construct the treatment plant as part of a broader serving strategy which is also targeted at a long term no-release (of effluent) strategy.
- *Cost estimates:* The use of a properly managed Alliance delivery mechanism should ensure that the revised cost estimate of $58.1 million is efficient. The actual cost and cash flow will, however, be dependent upon the outcomes of further investigations currently being undertaken.
- *Timing and deliverability:* The proposed timing of construction of the Stapylton WWTP appears to be appropriate, although is currently under review. The use of an Alliance delivery mechanism is considered appropriate.
- *Implications for Operating Expenditure:* As a new installation, the treatment plant will attract operating and maintenance costs that have not previously been incurred.

In summary, Halcrow considers the Stapylton WWTP Stage 1 project to be prudent on the basis of predicted growth in the catchment. It is noted, however, that timing of construction is still subject to final review of a broader serving strategy which is also targeted at a long term no-release (of effluent) strategy. The robust planning process, which is yet to confirm the final arrangement and timing of the works, and the use of a properly managed Alliance delivery mechanism should ensure that the cost of the proposed works, which equates to a unit rate cost of approximately $4,190 per EP, is efficient.

7.3 General Observations

7.3.1 Overview

The following sections set out a brief discussion of several influencing factors in an endeavour to provide some broader context to the assessment presented in this report. These factors include:

- Regional planning;
- Design standards; and
- General assessment of costs.

7.3.2 Regional Planning

It is noted that there is evidence to suggest that, following the formation of the new entities on 1 July 2010, a broader regional approach has been taken to the planning of infrastructure. This is particularly apparent in the case of the Goodna Sewage Treatment Plant Upgrade and the Stapylton Wastewater Treatment Plant projects where options involving the use of existing treatment plant lying outside areas previously constrained to municipal boundaries.

This regional approach to planning, which is now more readily facilitated under the new jurisdictions, is supported and applauded. Whilst the adopted solution may not ultimately change (either in the form of the solution or the timing of its implementation), this approach ensures that more efficient servicing solutions are identified and considered.

7.3.3 Design Standards

Design standards for treatment plant works are typically driven by the required effluent quality. Generally, proposed treatment is to Class B standard (for recycled water), although in the case of the Stapylton WWTP, Class A+ will ultimately be targeted in order to comply with the adopted long term no-release (of effluent) strategy.

Elimination of discharge to streams is a requirement that is increasingly being imposed on water authorities; the specific standard of treatment required is dependent upon the forecast demand for effluent reuse.

7.3.4 General Assessment of Costs

In order to provide a comparative assessment of costs, the equivalent unit rate cost per equivalent person (EP) has been determined for each of the five projects. These unit rate costs are presented in **Table 7.1**.

With the exception of the proposed Bromelton STP, the unit rate costs can be considered to be relatively consistent. Given the preliminary status of planning of the Bromelton STP, it is not surprising that the equivalent unit rate is lower than the other facilities, for which planning is more advanced (albeit not yet finalised).

It is noted that the variation between the individual unit rates for the remaining four plants varies by a maximum of 10 percent from their average. This is considered to be well within typical confidence levels for estimates at various stages of design development, as follows:

- detailed design/tender stage: ±10 percent;
- preliminary design: ±15-25 percent; and
- concept design: ±25-35 percent.

Actual costs will vary quite significantly dependent upon a range of factors including, but not limited to, the proposed standard of treatment, the nature and relative location of the site, the extent of peripheral components such as connecting pipework and inlet/outfall pumping stations.

Table 7.1 Comparative Unit Rate Costs

Project	Selected Option	Estimated Cost ($million)	Current Capacity (EP)	Proposed Capacity (EP)	Capacity Increase (EP)	Unit Rate Cost ($/EP)
Goodna Sewage Treatment Plant Upgrade	Option 3 Modified Regional Approach	$110m	65,000	90,000	25,000	$4,400
Lockyer Valley East Sewerage Scheme	Option 1, Stage 1	$18.5m (including pipes and pump station)	8,000	13,000	5,000	$3,700 (including pipes and pumping station) $1,100 (treatment only)
Somerset Fernvale Sewage Treatment Plant Upgrade	4,000EP STP for Fernvale only	$17.5m	New plant	4,000	4,000	$4,400
Bromelton (Scenic Rim) Regional Sewage Treatment Plant	Subdivide into 3 sewerage catchments	$102.8m	New plant	36,400EP (14,000ET)	36,400EP	$2,800
Stapylton Wastewater Treatment Plant	Stage 1	$58.1m	New plant	13,800	13,800	$4,200

It is also noted that the expenditure forecast for the Stapylton WWTP (as included in **Table 7.1**) is based on the actual outturn cost for construction of the Pimpama WWTP Stage 1, a similar plant that has recently been constructed. It has also been validated through the TOC development process under the Alliance delivery arrangement. This provides some degree of verification for the adopted unit rate costs.

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