

**Community Liaison Committee  
Botany Groundwater Cleanup Project  
Briefing Paper for 17 June 2008 Meeting**

## **1. INTRODUCTION**

This briefing paper is prepared for the Community Liaison Committee (CLC), a community forum established for Orica's Botany Groundwater Cleanup (BGC) Project. It aims to update the CLC on the progress of the BGC Project, Orica actions identified at previous CLC meetings and other matters of interest to the CLC. It covers updates from January 2008 until early June 2008. At the June CLC meeting Orica will make a presentation on the key issues arising this quarter. Orica welcomes discussion on any other matters in this briefing paper or the Groundwater Cleanup Plan Progress Report at the meeting.

## **2. PROGRESS OF BGC PROJECT**

Each quarter, Orica provides a Groundwater Cleanup Plan Progress Report to the Department of Environment and Climate Change (DECC) with the most recent report, No.18, submitted on 30 May 2008. The reporting period for Progress Report No.18 is from 1 January 2008 to 31 March 2008, however more recent information is included. The report is distributed to stakeholders and regulators as requested. Section 2 of the CLC briefing paper attempts to summarise key points from the quarterly report.

### **2.1. Notice of Clean Up Action (NCUA)**

Orica has achieved compliance with all ten conditions of the NCUA that had specific completion deadlines, and has also achieved ongoing compliance with 15 more conditions of the NCUA that typically relate to recurring or routine timeframes (e.g., progress reports). Two further conditions are works in progress:

- Condition 5: Remedial measures to ensure groundwater and surface water flows into Botany Bay and Penrhyn Estuary achieve ANZECC Guidelines for slightly to moderately disturbed ecosystems. Progress against this condition is discussed in Section 2.3 below.
- Condition 6: Emissions from the works and measures required by the NCUA must be strictly controlled through adoption of best practice. Works and operations to be carried out in a controlled and competent manner. Ongoing monitoring is being performed (see Section 2.4 for further discussion).

An extract from the BGC Plan Progress Report providing a summary on the compliance status against the current Notice of Clean Up Action condition requirements is attached.

### **2.2. Hydraulic Containment**

The key containment issue for this quarter is that URS will be undertaking a review of the effectiveness of containment at the *Primary Containment Area* (PCA) following rainfall events, particularly with respect to the shallow aquifer. This review is being undertaken because although hydraulic containment was achieved along the majority of the PCA during this quarter, our data indicates that containment may not have been achieved in the vicinity of two deep extraction wells near the western end of the containment line for a period following the rain event in February 2008. The review will provide more information on pumping rates and their impact on shallow and deep groundwater at the PCA during rain events, at specific locations. The majority of groundwater contamination at the PCA is in the deep groundwater.

At the *Secondary Containment Area* (SCA) hydraulic containment was achieved in both shallow and the deep aquifer at the SCA with the exception of a period in February when shallow groundwater levels temporarily exceeded targets following heavy rainfall.

At the *Botany Industrial Park (BIP) Containment Area* hydraulic containment of the deep aquifer was achieved from January to March 2008. With respect to the shallow aquifer, containment was achieved along First Street but does not appear to have been achieved along all of Second Street during this monitoring period. Containment is not required under the NCUA and the BIP line is operated as GTP capacity allows. Regardless, Orica considers containment at BIP important in order to effect low contaminant concentrations in Springvale Drain and Penrhyn Estuary.

### 2.3. Chemical Monitoring

#### **Southern Plumes**

- The distribution of volatile CHCs in the shallow groundwater within the Southern Plumes recorded during the March 2008 monitoring event is mostly stable or decreasing against historical data which is broadly consistent with that reported in previous monitoring rounds.

#### **Central Plume**

- The distribution and concentrations of volatile CHCs in the Central Plume are similar to those reported in previous rounds and concentrations are typically stable or decreasing against historical averages.

#### **Northern Plumes**

- The distribution and concentrations of volatile CHCs recorded within the Northern Plumes – in particular ethylene dichloride (EDC) and carbon tetrachloride (CTC), which represent the majority of the contaminant mass – are consistent with historical data and in some instances showing signs of decreasing.

#### **Penrhyn Estuary**

- In general, volatile CHC concentrations measured in pore<sup>1</sup> water within Penrhyn Estuary are similar to or lower than historical concentrations.
- Concentrations of the key contaminants typically trended lower with shallower sampling depths, which is consistent with previous reporting.

#### **Penrhyn Estuary Surface Water**

- Surface water concentrations of total volatile CHCs in Penrhyn Estuary in March 2008 were generally similar to the concentrations determined in previous monitoring rounds, with concentrations of all volatile CHCs less than respective ANZECC (2000) Trigger Values.

#### **Springvale Drain**

- Concentrations of volatile CHCs varied in the different monitoring locations in Springvale Drain. Concentrations of CHCs were typically higher in the (non-flowing) realignment channel than in the drain itself, and in recent monitoring periods the relative proportion of EDC in the drain is much lower than it has been historically. This variation is most likely attributable to the effects of hydraulic containment (at BIP and PCA) changing the groundwater plumes' flow paths and reducing the amount of groundwater intercepted by the drain.

The data gathered this monitoring period do not alter the conclusions of the Human Health Risk Assessment.

### 2.4. Groundwater Treatment Plant Operation Update

The following table summarises the key operating issues at the GTP that Orica has worked on during this reporting period. These issues have been previously reported to the CLC and the table below provides an update on their status.

Key issues worked on during this reporting period	Progress	Comment
Biological fouling in air stripping unit	<ul style="list-style-type: none"> <li>• Investigations of new fungicides are planned. Results will be reported to the CLC when available.</li> <li>• Investigations into the use of chlorine dioxide as a sterilising agent are planned.</li> <li>• A clean-in-place system is being developed to improve the environment during the cleaning process.</li> </ul>	All these actions will be undertaken in a staged approach to determine which one or combination is most successful.

<sup>1</sup> Pore is a space in soil not filled by solid particles, but with air or water.

<b>Key issues worked on during this reporting period</b>	<b>Progress</b>	<b>Comment</b>
Improving iron/aluminium removal at Stripped Water Treatment Plant	<ul style="list-style-type: none"> <li>Sodium hypochlorite dosage trials to provide a more robust oxidising environment and encourage precipitation of iron were undertaken. [This trial is complete because of the mixed results]</li> </ul>	<ul style="list-style-type: none"> <li>Mixed results obtained. Earlier positive results have been affected by issues arising during Biological Aerated Filter (BAF) development.</li> </ul>
Biological fouling in pressure filters and reverse osmosis (RO) units	<ul style="list-style-type: none"> <li>BAF units are being converted to co-current (upwards flow direction). Over the next few weeks the BAF commissioning will continue moving from recycle mode to forward flow. The aim is to remove readily biodegradable organic matter from water.</li> <li>Additional zeolite media has been added.</li> </ul>	<ul style="list-style-type: none"> <li>Organic removal performance is encouraging and commissioning will continue.</li> <li>During BAF trials, sulphide production downstream of the BAFs has led to severe fouling of the RO units. This has limited the GTP treatment capacity (see Figure 2). Techniques to manage this issue have been identified.</li> </ul>
Ammonia Pollution Reduction Program (PRP). Ammonia is resulting from chemically eliminating chloramine in discharged treated water, by using sodium metabisulphite.	<ul style="list-style-type: none"> <li>Part of the PRP is to determine the likely fate of Treated Water in the environment. Part of this is to consider other water flows. Following discussions with Amcor (Amcor pumps water from Snape Park which travels via Bunnerong Canal to Long Dam, where it mixes with water discharged from the GTP treated water pipe), data shows that at least 50% dilution of the treated water with existing flows is expected.</li> <li>The BAF trials are an important part of the PRP as it is expected that a reduction in the organic content of the water will lead to a reduced chloramine demand and hence reduced ammonia concentrations in the excess water discharged.</li> </ul>	<ul style="list-style-type: none"> <li>Trials with activated carbon continue. The performance of some of the carbons being trialled has reduced significantly during the trial.</li> <li>An update on progress under the PRP was submitted to the DECC April 2008.</li> <li>Dilution by existing flows is important as it decreases the likelihood of environmental impact from treated water.</li> </ul>
Biological fouling of shallow wells on Foreshore Road	<p>In early June 2008, work is planned to commence on:</p> <ul style="list-style-type: none"> <li>well sleeve installation inside two extraction wells to prevent ingress of oxygenated water from the shallow aquifer in order to limit bacterial growth in the wells and header pipes;</li> <li>installation and trial of an additional two mono-pumps, to improve extraction performance; and</li> <li>maintenance of pumps, electrical equipment and instrumentation.</li> </ul>	<ul style="list-style-type: none"> <li>The height of barrier fencing along Foreshore Road has been raised for worker safety reasons</li> </ul>

Since commencing the BGC Project on 28 October 2004, Orica has treated over 3.3 GL of contaminated groundwater and has recovered (from the interim operation of the Steam Stripping Unit [SSU]) and/or destroyed (at the thermal oxidiser of the GTP) 570 tonnes of CHCs (Figure 1).

**Thermal Oxidiser and Dioxin Air Emissions**

The thermal oxidiser continues to operate within licence specifications. A trial undertaken in February 2008 to evaluate dioxin concentrations in the stack gas during the destruction of recovered CHCs from the SSU showed no impact on dioxin concentrations in the stack. The DECC has changed the sampling frequency from every two months to every six months.

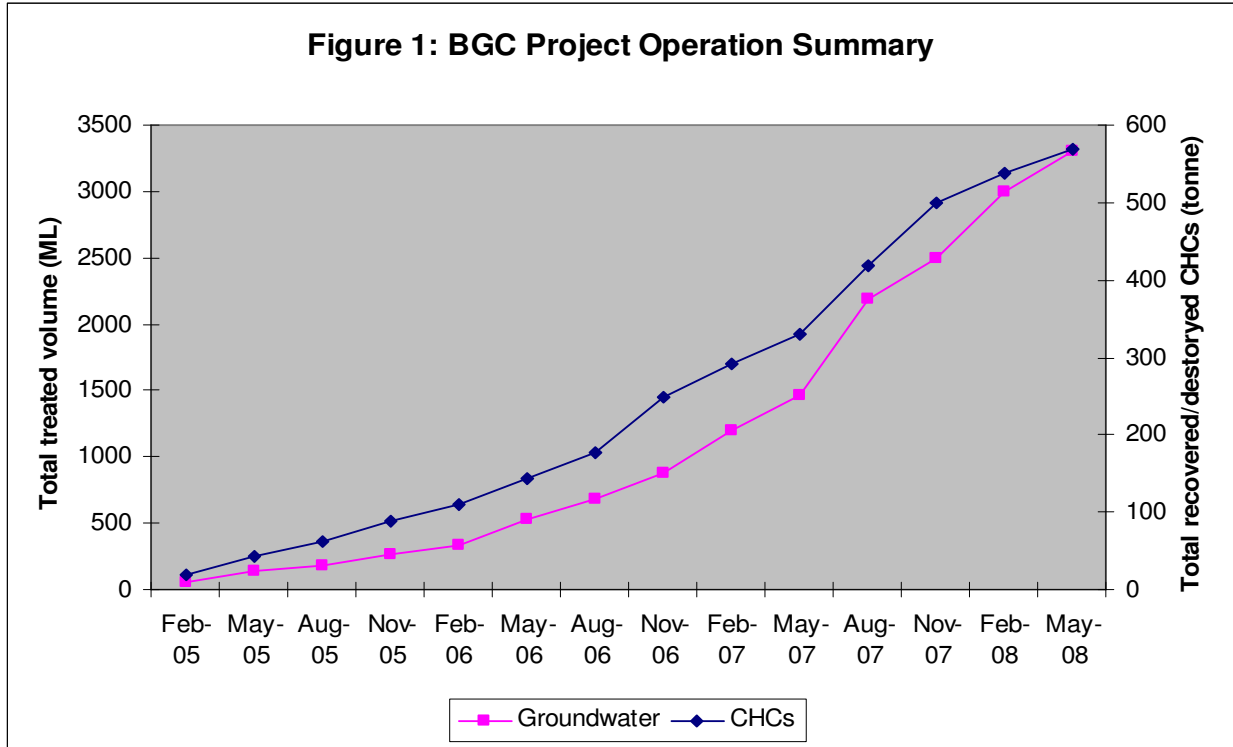
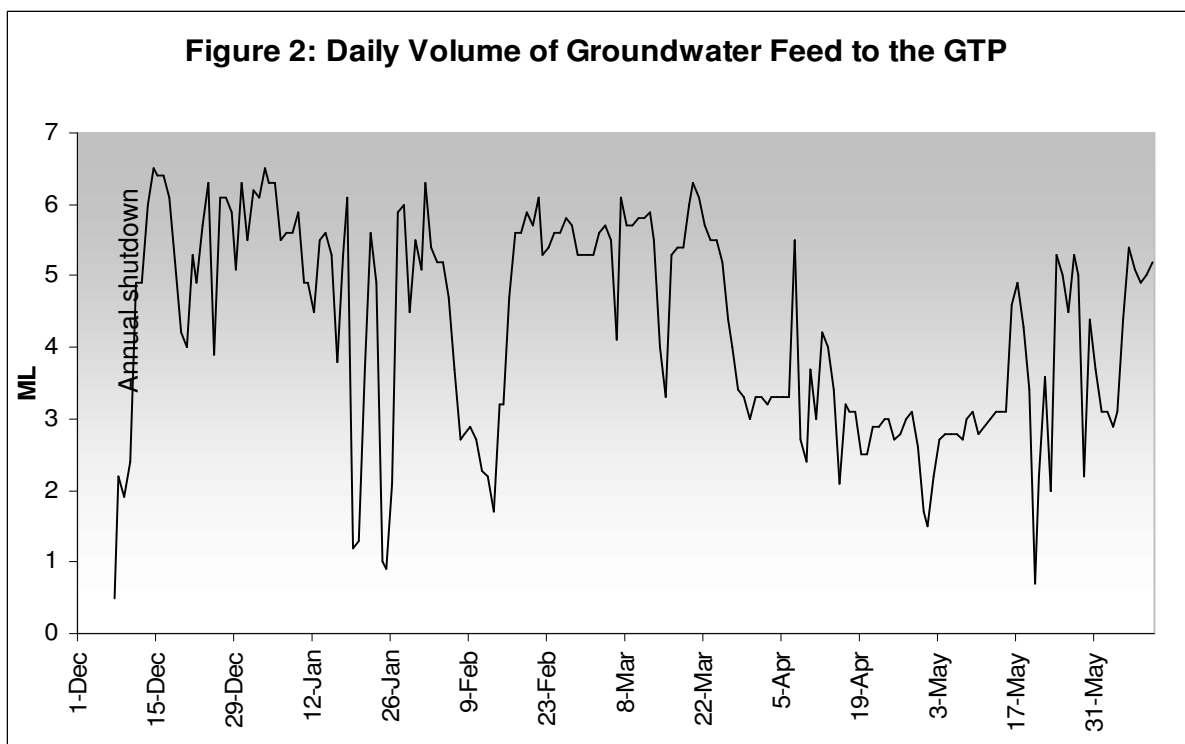


Figure 2 shows the daily volume of groundwater fed to the GTP for treatment during this reporting period. A reduced amount of groundwater was treated owing to the BAF trials and addressing fouling issues. During this period adequate containment was achieved, though treated water production was lower.



### **2.5. Springvale Drain: Air Monitoring, Spear Point Extraction System, Infill Work**

Monitoring results around Springvale Drain suggest that pumping at the PCA and BIP containment lines is not maintaining reduced shallow groundwater discharge into Springvale Drain immediately after rainfall events. Monthly air monitoring has been performed for the past 12 months in MCS, Discovery Cove and in Southlands. No results outside of Southlands have exceeded the threshold limits outlined in the Consolidated Human Health Risk Assessment<sup>2</sup>, even after heavy rainfall events. Results in Southlands are consistently higher than the threshold limits and controls are in place to ensure workers in Southlands are protected. If Southlands is to be developed, further remedial measures will be required, such as infilling the re-alignment channel and the installation of a spear point system.

These works are currently in the planning stage and will be the subject of separate planning applications.

### **2.6. DNAPL**

Three representatives from Orica attended the 6<sup>th</sup> International Conference on the Remediation of Chlorinated and Recalcitrant Compounds in California in May. Many hundreds of presentations were given and posters displayed covering topics ranging from monitoring and risk assessment to remediation and site closure, including three relating to the Botany Groundwater Project. Many technology providers and consultants participated in the trade exhibit as well. The Orica representatives were able to meet with most of the North American consultants who have worked on the BGP, as well as a number of additional organisations that had products or services that might be relevant to Orica's legacy site projects.

### **2.7. Temporary Aquifer Storage and Recovery (TASR)**

As previously reported, Orica is proposing to replace the SSU with Temporary Aquifer Storage and Recovery (TASR), as a backup for the GTP in the event of a significant plant shutdown. Orica now aims to submit the draft REF for TASR to the DECC in June 2008. A copy of the REF will be placed in the Botany Transformation Projects website.

## **3. WATER RECYCLING PROGRAM**

Solvay Interlox re-commenced using GTP treated water since February 2008. Orica is yet to resolve the issue of chloramine and total organic content in treated water, which has prevented supply of treated water to existing customers' demineralised water plants. The successful operation of the BAF units will assist with this issue.

Orica is currently focusing on implementing Stage One (provision of treated groundwater to BIP and Solvay Interlox at up to 8 ML/day) and Stage Two (treatment of process effluent). Stage Three (sewer mining) has been deferred and is not being actively pursued at present.

Orica is looking into other water source options for Stage Two. We are currently looking into the possibility of sourcing water from stormwater harvesting and BIP process effluent. Specific strategies for Stage Two will be further developed once the State government's administrative and pricing arrangements for the establishment of a recycled water grid, which will pipe and distribute Orica recycled water to customers beyond BIP, are finalised. The Department of Water and Energy has offered to make a presentation to the CLC at some stage on the recycled water grid.

## **4. FORMER CHLORALKALI PLANT MERCURY INVESTIGATIONS**

As previously reported, mercury was detected in groundwater and soil at the site of the now demolished former ChlorAlkali Plant at the BIP. Orica has been conducting soil investigations on the BIP site, and groundwater investigations both on and off the site. These investigations have detected mercury in groundwater at off-site monitoring wells. All off-site wells included in these investigations are situated on industrial properties and Orica has confirmed with property occupiers that groundwater is not used at these sites.

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<sup>2</sup> Consolidated Human Health Risk Assessment 2005, URS.

#### **4.1 Groundwater investigations**

Several rounds of groundwater sampling have been conducted both on and off-site. The most recent monitoring included collection of data such as mercury species (e.g., elemental, organic and total mercury concentrations) and other parameters that are needed for an assessment of mercury fate and mobility in the aquifer. A data report containing the results will be issued to the DECC prior to the CLC meeting, and will be made available on the Botany Transformation Projects website. Results of groundwater analyses will be included in the hydrogeochemical model and Human Health and Environmental Risk Assessment (HHERA).

#### **4.2 Soil Sampling**

Orica has received the report on the latest soil sampling on the BIP, however it is not complete, as the results do not yet include those for speciation of mercury. Speciation analysis of soil samples is extremely complex and is being conducted by the CSIRO. The analyses have taken a lot longer than anticipated. Like that from the groundwater analyses, this detailed data is required for the hydrogeochemical model and HHERA. Orica anticipates that the complete report will be available by the September CLC meeting.

#### **4.3 Soil Emission Investigations**

Orica also undertook near-surface fluxhood (soil emission) sampling within the BIP site in late May. The data from this sampling is also incorporated into the HHERA.

#### **4.4 HHERA**

As mentioned above, the analytical/speciation data from the groundwater, soil and emission sampling is used in a hydrogeochemical model. The model, which considers spatial and compositional relationships in soil and groundwater, is required for the completion of the HHERA as it forms the basis for assessing the distribution and exposure pathways of mercury in the areas in and around the former ChlorAlkali Plant. The HHERA will provide Risk-Based Criteria to assist Orica in determining the extent of soil remediation. Orica is still awaiting the analytical data from CSIRO so the finalising of the HHERA report has been delayed. Orica is therefore unable to report on the HHERA at the June CLC meeting.

#### **4.5 Soil Washing Trials**

Planning for the soil washing trial is continuing and contractors have been appointed. Trials are likely to commence early July 2008. A letter of Notification has been sent to the City of Botany Bay Council, with a copy to the DECC.

#### **4.6 Site Management Plan**

The Site Management Plan has been updated. The main issue to follow up on is the undertaking of minor stormwater control works.

#### **4.7 Updating Stakeholders**

A letter report on groundwater sampling will be issued to owners/occupiers of properties where off-site groundwater sampling was undertaken, once analysis is complete. An update on the project will be provided to the BIP workers in June.

### **5. INDEPENDENT MONITORING COMMITTEE (IMC)**

A combined CLC/IMC meeting was held on 27 May. At the meeting the attendees reviewed recently completed tasks and Dr McCracken referred to his progress on Task 21. An email dated 28 May from Dr McCracken regarding Task 21 was distributed to the CLC. At the combined meeting, the IMC also completed Task 22 and recommended that the validation audit and environmental review continue. Dr McCracken sent an email dated 28 May to summarise comments he made at the meeting (distributed to the CLC).

The combined IMC/CLC meeting held 27 May also provided the opportunity to progress planning for the combined workshop with Sydney Ports to discuss the interface of the groundwater cleanup and the Sydney Ports Expansion. Key attendees were identified and issues to address were gathered. These outcomes have been distributed to the CLC. Time has been allocated for discussion at the 17 June CLC meeting.

The IMC also held their own meeting on 27 May. The draft minutes from this meeting have been distributed to the CLC and are listed as an agenda item for the June CLC meeting.

## 6. COMMUNITY COMMUNICATION UPDATE

### 6.1. Community Workshops

No groundwater-specific community workshops have been held in the reporting period. Orica still plans to hold another workshop on water recycling once the various recycling initiatives have been further developed. A community update note on the progress of Orica's Water Recycling Program was distributed in March 2008. Planning for the Sydney Ports/Orica workshop is discussed in Section 5 above.

### 6.2. Newspaper Columns

Three newspaper columns were published in both the *Southern Courier* and *St George and Sutherland Shire Leader* since the last quarterly report. These columns incorporated information on a range of Orica projects. Reporting on the BGC Project was as follows:

- *Column 76: 25 March 2008:* Groundwater treatment, Botany site bus tour and results for the November residential bore monitoring event;
- *Column 77: 29 April 2008:* Groundwater treatment, 2008 Harding Orica Prize recipients and the Botany Transformation website; and
- *Column 78: 27 May 2008:* Groundwater cleanup project, Car Park Waste Encapsulation and a reminder that Orica's rainwater tank rebate program ends on 30 June 2008.

Orica is following up on recent feedback regarding our monthly columns in the *St George and Sutherland Shire Leader*. Orica is reviewing the frequency and value of its columns in this area.

### 6.3. Website

The website is an important tool which provides immediate access to information about the BGC Project and supports Orica's commitment to open and transparent communication.

The following material has been posted on the website during the reporting period:

- Groundwater Cleanup Plan Progress Report No.17 and Appendices;
- Recent newspaper columns;
- March 2008 CLC newsletter;
- CLC Briefing Paper, April 2008 2007; and
- Presentation materials from 1 April CLC Meeting.

Orica released another new webpage for the BGC Project during this reporting period: for the Recycled Water project. As agreed at the April CLC meeting, an email feedback feature has been established on the website, which allows browsers to comment on the CLC's activities and achievements. This email feedback feature is found on the pages dedicated to the CLC.

### 6.4. 1800 Number

Orica continues to operate the free-call number, 1800 025 138. The majority of calls during this reporting period related to Orica's Rainwater Tank Rebate Program. Other calls included queries relating to sponsorship of community events, air monitoring, sediment monitoring, bore testing, BIP issues (including a complaint about rabbits) and requests for site tours. The Arncliffe Community Centre advised that they no longer wish to receive the CLC Newsletters.

### 6.5. Email Feedback

Several e-mails were received in this reporting period from viewers of the Orica Botany Groundwater website. There were several requests for information about sediment monitoring and remediation technologies, queries about Orica's rainwater tank rebate, several requests for BIP site and GTP tours and one BIP-related complaint about rabbits. Another email that was received provided a CLC member's thoughts on CLC processes and the 2020 Forum.

### 6.6. Outreach Projects

As the CLC is aware, Orica operates a number of outreach programs in the local community. The programs have been developed to respond specifically to community concerns surrounding the groundwater contamination issue. A brief update on matters occurring in this reporting period is provided for each of the Outreach Projects below:

**Residential Bore Monitoring** – 17 residential bores were tested in the May monitoring event. Results will be provided to owners of the tested bores and will be submitted to the DECC. They will be reported in a future CLC Newsletter. The next round of residential bore testing is scheduled to take place in early November 2008.

***Rainwater Tank Rebate Program*** – At the time of writing, 969 tanks had either been installed or approved for installation. The program will end on 30 June 2008.

## **7. ATTACHMENTS**

- a) Extract from Progress Report Section 2.1: Summary of the compliance status against current NCUA (including variation notices) condition requirements.