REPORT

KCGM

Kaltails TSF Hydrogeological Review

June 2006

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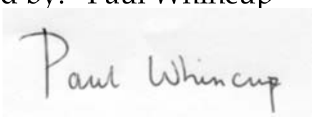
For and on behalf of Environmental Resources Management Australia

Approved by: Paul Whincup

Signed: 

Position: Technical Director – Asia Pacific

Date: 23 June 2006

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EXECUTIVE SUMMARY

Recommissioning and increasing the height of the Kaltails TSF is being considered by KCGM as one of the options for storage of tailings generated from the proposed Fimiston Gold Mine Operations Extension, Stage 3. Use of the Kaltails TSF is one of two options being considered and involves raising of both the Fimiston and Kaltails TSFs from year 2008 to year 2017.

This historical review of the Kaltails TSF and the implications of raising the height of the TSF has been prepared primarily to evaluate the impact on groundwater levels and potentially to vegetation on the Lakeside Timber Reserve east-southeast of the TSF.

A considerable amount of hydrogeological and related data was collected over the ten years life of the Kaltails project which ceased operations in September 1999. Since closure, continued groundwater abstraction has been undertaken to reduce groundwater levels to agreed pre-Kaltails levels. This has been supported by ongoing groundwater monitoring, modelling and geotechnical studies. Actual water table levels as recorded in September 2004 had declined by between 0.2 m and 9.2 m since the use of the Kaltails TSF was discontinued in 1999 corresponding to levels between 0.8 m and 6.5 m below the target water levels. Groundwater recovery on a reduced scale is continuing.

The proposed use of the existing Kaltails TSF is to raise the embankment height by 20m or a maximum of 2.0 m/a over the period 2008 - to 2017 to increase capacity by a maximum of about 60 Mt. This equates to an average annual disposal of 6.0 Mt. This disposal would be undertaken concurrently with disposal to Fimiston I and II TSFs and at Kaltails would be non-continuous, occupying a period of five to six months each year.

This compares with the average continuous disposal of approximately 7 Mt/a during the previous Kaltails operation whereby the annual continuous raising of the TSF averaged about 2.3m/a.

The groundwater levels on the southern/south western margins of the TSF were historically near surface, as shallow as 1.4m below ground level, and since 1999 have been restored to historical pre-Kaltails level. Review of historical data including air photographs indicates that groundwater levels in this area of shallow water table rose close to the surface and impacted vegetation, particularly on the southwestern margin of the TSF and also within the former boundary of the Lakeside Timber Reserve. The impacted area was subsequently excised and no impacts were observed or would be expected to occur within the revised boundary should the recommissioning of the Kaltails TSF be approved.

It is considered that engineering design of groundwater control measures can be introduced to safeguard the vegetation of the Lakeside Timber Reserve and other vegetation to the south of the Kaltails TSF under the proposed height increase scenario. These measures would include minimising the area of the decant pond and enhanced constructing seepage recoveryr as well as groundwater abstraction bores in the deeper semi-confined aquifer. This would need to be supported by extending the Seepage and Groundwater Management Plan southwards from Fimiston to incorporate the activities at the Kaltails TSF and surrounds.

1 *INTRODUCTION*

KCGM, as part of the proposed Fimiston Gold Mine Operations Extension (Stage 3) has nominated two options for tailings disposal and storage. Option 1 envisages raising the Fimiston I and II TSFs to heights of 50 m and 60 m respectively. Option 2 is for raising of Fimiston I and II TSFs to 40 m and 45 m respectively and incorporates raising the existing embankment of the Kaltails TSF to 45 m.

A preliminary PER was submitted to the Environmental Protection Authority (EPA) in March 2006 and comments were returned by EPA to KCGM in April 2006.

The EPA Services Unit has requested that KCGM consider the following:

- there is no evidence presented that the re-commissioned Kaltails TSF will seep at the same rate as during previous use or that raising the level will not increase seepage;
- there is no evidence presented on the potential impact of the Kaltails seepage on groundwater or to show an understanding of groundwater movement and current levels in the area, or potential impact to the Lakeside Conservation Reserve;
- there is no evidence presented that all seepage can be intercepted nor that current recovery of groundwater is successful in preventing contaminated water spreading downstream and that it will be successful in future; and
- there are no figures, based on modelling and monitoring, such as of groundwater flow in the area, the extent of the groundwater mound and water levels, changes over time due to water recovery and extent of contaminated transport included to demonstrate groundwater impact and management.

ERM has been commissioned to review the hydrogeology of the Kaltails TSF and to address the above comments, as far as practicable, based on existing and referenced hydrogeological data and reports available to KCGM from Normandy Kaltails.

2 EXISTING KALTAILS TAILINGS STORAGE FACILITY (TSF)

2.1 INTRODUCTION

The Kalgoorlie Tailings Retreatment Project (Kaltails Pty Ltd) was a Joint Venture between Normandy Mining Limited (90%) and Gold Corporation (10%). Subsequently Normandy was acquired by Newmont Mining which with Barrick Gold is a 50% equal shareholder of KCGM. Gold Corporation is owned by the Government of Western Australia.

A total of 64 million tonnes of tailings was reclaimed and retreated by Kaltails between August 1990 and September 1999.

One option being considered by KCGM for disposal of tailings in the future is to raise the existing Kaltails TSF and alternate tailings disposal between the Fimiston TSFs and the Kaltails TSF. This will require approval from the Western Australian Government and negotiation of an agreement between the current owners of Kaltails (Newmont and Gold Corporation) and KCGM.

2.1.1 Location and Land Tenure

Kaltails is situated 10 km southeast of Kalgoorlie-Boulder, near Lakewood on General Purpose Lease G 1 SA. This is an area of 951 ha of which 250 ha is occupied by the TSF. The original licences to remove and treat tailings were surrendered in favour of a single special licence achieved through the Tailings Treatment (Kalgoorlie) Agreement Act (1988).

The tenements held by Kaltails include State Agreement tenements covering the TSF, the main plant area, mining leases covering the areas covered by the old tailings, and general purpose and miscellaneous leases covering other areas of infrastructure.

2.1.2 Geomorphology and geology

The former tailings dumps at Lakewood which predated the Kaltails TSF were located on the eastern flank of a low, northerly trending hill belt on which the main Kalgoorlie mining activity is located. There is a gentle south westerly slope of 1:150.

This area is underlain by a deeply weathered profile extending up to 40 m over Archaean basement rocks. A thin veneer of superficial alluvial sands, gravelly sands and clays overlies the weathered profile. Site drainage has been extensively modified by mining activity.

The TSF is situated on an alluvial/colluvial slope underlain at shallow depth by deeply weathered basement rock.

The surface soils consist of red brown loams and sandy clay loams. At 0.2 to 0.3 m depth there is a gradual increase in gravel and clay components giving rise to gravelly light clays commonly containing calcareous nodules. These are underlain at 1 to 1.5m depth by sporadically mottled, dry red brown sandy clays and stiff brown clays. Soils become increasingly saline as they approach Hannans Lake.

2.1.3 *Surface water*

The TSF site is crossed by a braided drainage system, which drains a catchment extending approximately 10 km upstream from the site. This catchment lies almost completely upstream (northeast) from the Trans Australia railway line, which is about 300 m from the northeast corner of the TSF. The presence of the railway embankment has influenced the downstream drainage patterns by concentrating sheet flow runoff into discrete channels.

Local infiltration of runoff generates some subsurface flow within the surficial sandy material that underlies the site to a depth of 1 to 2m. Deeper percolation through the underlying clayey sediments is minimal. The area drains to Hannans Lake by sheet flow and via a series of indistinct, shallow channels with runoff diverted around the TSF.

There are no stock dams downstream of the plant and tailings site or the former tailings dump area.

2.1.4 *Groundwater*

The regional groundwater flow generally follows the same broad drainage patterns as the surface flows. The major aquifers are Tertiary palaeochannel sands. Process water from the production borefield has been drawn from one of the major palaeochannels in the area. Palaeochannel sands also underlie the plant and tailings storage site at depths of around 20 m. A discontinuous ferricrete aquifer overlies these palaeochannel sands, separated by impermeable clays, and covers much of the plant and tailings storage area. The ferricrete aquifer has been a conduit for seepage water from the tailings storage. Because of the shallow water table downstream of the TSF the Oroya Plant used a shallow groundwater interception trench for water supply purposes prior to the establishment of the Kaltails TSF.

All groundwater in this area is naturally saline and mildly to strongly acidic.

Water for mining and processing operations at Kaltails was drawn from a borefield located 10km southeast of the main plant within the Lakeside Timber Reserve (R192141). The borefield comprised fifteen bores drawing water from the Yindarlgooda South Palaeochannel at an average depth of 40m under Newmont Groundwater Licence GWL 64266(4). Groundwater from this borefield continues to be utilised by KCGM under Groundwater Licence GWL GWL 63554(2) which covers a series of borefields in the same palaeochannel operated by Kaltails collectively termed the Southern Borefield for monitoring, management and reporting purposes.

During the period of Kaltails operation the licence permitted an annual abstraction of 4,606,000 kL. The water is hypersaline, in the range of 100,000 to 140,000 mg/L TDS, with a pH of 4 to 6.

3 DESCRIPTION OF KALTAILS TSF

3.1 CONSTRUCTION

The main features of the Kaltails TSF were:

- a configuration of six equally-sized contiguous paddocks which were operated independently, but in rotation;
- a fall of 15 m in the natural ground surface from the northeast corner to the southwest corner of the TSF;
- a stormwater interception drain along the northern and eastern walls leading to catchment dams at the northwest and southeast corners;
- surrounding eucalypt woodland at higher elevations grading to a samphire and saltbush shrub steppe at lower elevations;
- topsoil stockpiles located to the south and the north of the facility; and
- main plant and general access at the southwest corner.

The starter embankment was constructed from local clays, including those sourced from the footprint of the TSF, but all subsequent embankments were constructed by upstream raising using hypersaline tailings. Wall lifts of 2 m, constructed in 500 mm increments, were undertaken in rotation using a deposition-drying-construction cycle. Compaction testing was conducted on all lift increments with the minimum standard required being 95% Mean Dry Density. Slope stability analyses of the tailings embankments gave the factors of safety to be 1.93 for normal loading and 1.43 for earthquake loading compared to recommended minimum factors of safety of 1.5 and 1.2 respectively. Embankment settlement was monitored on a quarterly basis during operations and no lateral or otherwise unexpected movement was recorded. An array of standpipe piezometers through both starter and tailings embankments was monitored weekly during operations.

Tailings deposition was via regularly-spaced spigots onto tailings surfaces or by open pipe when borrow trenches are being filled. The overall beach angle is estimated to be 0.22°, or 1:260. During the life of the operation, the facility was independently audited six monthly.

Seepage detection and groundwater monitoring bores around the tailings storage were monitored weekly. The facility had a well documented history of seepage from under the starter embankments which resulted in elevated groundwater levels around the storage.

This was controlled by a network of dewatering bores and by an underdrainage system which collected water from below the decants and from along the inside wall of the starter embankment.

3.2 LEGISLATIVE REQUIREMENTS FOR REHABILITATION

General guidelines both for tailings storages in Western Australia and for specific guidelines for the Kaltails TSF exist.

3.2.1 *Guidelines on the Safe Design and Operating Standards for Tailings Storages*

The general approach to the rehabilitation of Category 1 tailings storages is given in these Guidelines (Department of Minerals and Energy Western Australia, 1999, pp.26-27). In summary, these Guidelines require the following issues to be considered:

- stage by stage rehabilitation plans;
- measures to control dust, water erosion, and contamination of surface and sub-surface waters;
- decommissioning of any decant and underdrainage systems;
- measures to provide long term wall stabilisation;
- measures to be taken to establish a self regenerating cover; and
- measures to be taken to minimise the possibility of uncontrolled release and erosion during flood periods.

The Guidelines also note that "as each tailings storage facility is unique in terms of the mineralogy, process, management, design, climate and location, it is expected that rehabilitation solutions may also be unique to each facility. It is acceptable for the proponent to provide alternative decommissioning systems, especially for the surface of the storage, to DME for consideration and approval".

3.2.2 *Public Environmental Report - Major Environmental Commitments*

The Public Environmental Report issued in January 1988 contained some specific procedures for rehabilitation of the tailings storage. Some of these were revised in 1993.

3.2.3 *Lease conditions*

Condition 3 of lease G 1 SA states that the lessee shall comply "with commitments and statements contained in the Public Environmental Report - Tailings Treatment (Kalgoorlie) Agreement - issued pursuant to Section 45 of the Environmental Protection Act". Condition 13 requires a geotechnical review at decommissioning.

3.2.4 *Rehabilitation issues*

Typical chemical characteristics of the tailings are given in *Table 1*. Only elements which differ significantly from background values are shown. From this information, it appears metal levels do not pose a problem and the tailings are not acid-forming. Given the tendency for cyanide to quickly attenuate to safe levels, principally through the dissociation of metal cyanide complexes and volatilisation of cyanide as hydrogen cyanide, salinity appears to be the major issue.

Physically the tailings are composed of particles 75% less than 0.075 mm. They are potentially erodable by wind or water. In terms of environmental risk, structural failure represents the greatest potential risk posed by the tailings storage. Downstream areas, although a naturally saline environment, could be seriously affected in the event of a significant failure. External surfaces, therefore, must be strongly resistant to erosion and the surface must be capable of comfortably storing rainfall received from 1:100 year events without overtopping.

Table 1 ***Important chemical characteristics of tailings at the Kaltails Project except cyanide value (from Kaltails metallurgical data)***

Characteristic	Value	Benchmark
Total dissolved solids (ppm)	92,000	-
pH	8.70	-
Free cyanide (ppm)	70-100	-
Net Acid Producing Potential (kg H_2SO_4/t)	-190	-
As (ppm)	110	500
Hg (ppm)	130	75
Sb (ppm)	12	-
Se (ppm)	0.47	-

3.2.5 *Proposed groundwater rehabilitation strategy*

Pumping of groundwater from around the tailings storage was seen to be necessary after tailings deposition ceased. Elevated groundwater levels occurred in the vicinity of the storage and these needed to be reduced to an agreed level. The groundwater production bores would be pumped to KCGM to be used as process water. Where periods occurred when KCGM do not require the water it was to be recirculated across the surface of the tailings storage.

Table 2 Target groundwater levels for post closure dewatering of the tailings storage extrapolated from Aquaterra (1999)

Bore	Ground level (m AHD)	Actual water level – August 1999		Target water level	
		m AHD	m BGL	m AHD	m BGL
O	333.9	333.9	0	330	3.9
Q	335.4	328.95	6.45	330	5.4
N2	335.6	330.98	4.62	331	4.6
M	336.15	332.5	3.65	332	4.15
V	338.53	329.03	9.5	333	5.53
X	342.3	338.6	3.7	333	8.7
W	340.7	334.73	5.97	334	5.3
AA	343.56	338.46	5.1	335	8.56
Z	345.09	339.72	5.37	335	10.09
AC	337.92	332.71	5.21	333	4.92
A	335.02	332.65	2.37	331	4.02
AF	334.3	332.19	2.11	331	3.3
AD	332.24	328.71	3.53	329.5	2.74
C1	334.21	331.29	2.92	330	4.21
I	329.88	327.48	2.4	328.5	1.38
K	329.89	325.3	4.59	328.5	1.39

All groundwater in the vicinity of the tailings storage is naturally highly saline and strongly acidic. Most water quality criteria, therefore, do not apply. However, a value of 0.5 mg/L for weak acid dissociable cyanide (WAD CN) was applied to groundwater under the operating licence issued by the Department for Environmental Protection. It was considered appropriate that this value should remain a criterion for the bores shown in *Table 2*.

In instances where water from the dewatering system needed to be stored on the tailings surface, evaporation was be maximised through the use of sprinkler systems.

3.2.6 *Infrastructure*

All decants were to be fully decommissioned by cementing the inlet on the decant structure and sealing the outlet at the base of the external embankment. This would occur at some time to be determined during the decommissioning phase but probably after decommissioning of the dewatering system. This would allow water to be removed from the surface of the tailings storage for as long as there was infrastructure in place to pump it elsewhere. Water would continue to be recovered from the underdrainage system and incorporated with water from the dewatering system. When the dewatering system ceased to operate the single underdrainage outlet would be sealed with cement at the base of the starter embankment.

3.2.7 *Future Options*

The steps outlined in this plan were based on the assumption that the TSF needed to be made safe and stable until such time as changes in technology and market conditions permitted further treatment of the tailings. This is the basis on which rehabilitation, decommissioning and post closure monitoring proceeded.

4 SUMMARY OF GROUNDWATER ACTIVITIES, 1989 TO 2004

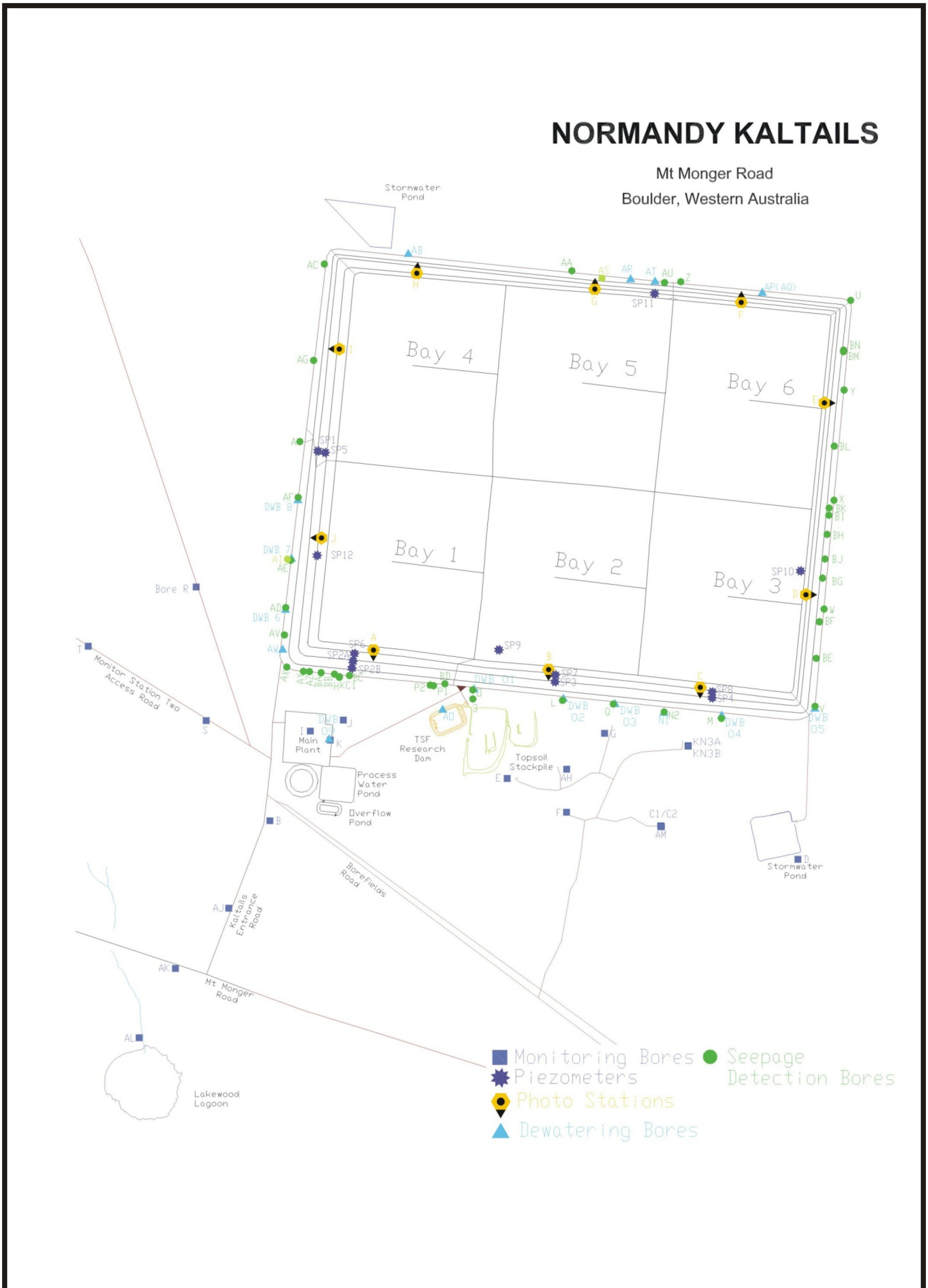
4.1 GROUNDWATER

A large volume of groundwater data has been collected over the period 1989 to 2004 and submitted to Western Australian Government Authorities to comply with Groundwater Licence Conditions. This is summarised in the following sections of this report. During operation constant dewatering of the perimeter of the TSF was undertaken under GWL 63029. This was changed in November 2000 to GWL 66498 with a licensed abstraction of 2 million kL/a. The annual production summary report for 2001 has been sighted and indicates a total abstraction for that year of 785,477 kL. Reporting is also required on a triennial basis with the initial report submitted for a two year period from 1 January 2000 to 31 December 2002. Monitoring was undertaken on a total of 56 monitoring bores around the TSF to determine the performance of the seepage dewatering networks. The latest report due to be submitted using data collected over the period 1 January 2003 to 31 December 2006 has not been sighted for this review report, however the data presented below are considered adequate to evaluate the performance of the groundwater seepage recovery systems and water level trends.

It should be noted that the numbering and designation of dewatering bores and monitor bores has changed over the years. The revised numbering of several significant dewatering bores is indicated in *Table 3* to facilitate comparison of recovery/water level graphs presented as Annexes A and B with bore nomenclature shown in *Figure 1*.

Table 3 Bore nomenclature

Old Name	New Name
DWB1	201
DWB2	202
DWB3	203
DWB4	204
DWB5	205
DWB6	206
DWB7	207
DWB8	208
DWB9	209
AB	209
AP	209
AT	209
AR	209
N2	224
N1	224A
Q	223A
M	204A
V	205A
SOUTH WEST CORNER	223
EASTERN WALL	227
	228
	229
	230



Source: Adapted from Aquaterra (2003)

Figure 1

Kaltails TSF
Bores and Piezometers Location Plan

Kaltails Hydrogeological Project

0051522 Kaltails Hydrogeological Project Diagrams 1-3.cdr

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4.1.1 *Groundwater recovery*

Graphs of monthly production from recovery bores are presented in *Annex A*. Recovery is grouped under north wall bores, south wall bores, east wall bores, west wall bores, outer bores and south sumps and drains.

The graphs indicate that records for groundwater recovery commenced in January 1994 with recovery concentrated along the south wall (about 40,000 kL/month) and lower rates of recovery along the west wall (8,000 kL/month), east wall (5,000 kL/month), north wall (5,000 kL/month) and outer bores (6,000 kL/month). The area to the south and southwest of the TSF was also used for plant and process, both using large volumes of saline water and generating losses to the shallow aquifer. The south sumps and drains were not installed until mid-1997 and recovery peaked at about 13,000 kL/month in 1999 immediately prior to the cessation of tailings deposition on the TSF. Recovery in all sectors tended to peak in 1999 and then gradually declined as recovery was scaled down in line with reducing water levels towards the agreed target levels. Recovery from the south sumps and drains ceased at the end of 2000, from the outer bores in mid 2000, from the east wall bores at end of 2002 and from the west wall bores until mid 2003. However significant recovery (>20,000 kL/month) was continuing from the south wall bores until end of 2003 and currently, year 2006, six recovery bores are still operational recovering between 12,000 and 18,000 kL/month. Peak recovery from all dewatering installations occurred in 1999 and in aggregate was about 127,000 kL/month.

4.1.2 *Water levels*

Graphs of water levels from monitor bores sited on the north wall, south wall, east wall, west wall and the outer monitor bores are presented in *Annex B* for the period July 1992 to end of 2002. Where target water levels have been agreed in the TSF decommissioning plan these are shown on the graphs and can be compared to actual water levels over the ten years period of record.

Water levels generally exceeded the target water levels from 1994 through 2000, declining from 1999 onwards in response to cessation of tailings disposal – the driver of seepage to the aquifers, and to ongoing groundwater recovery. By 2002 all target water levels in the designated monitor bores had been achieved and in some areas such as the north wall exceeded by 5 m or more. A slight rebound in the water levels is noted when recovery was reduced or stopped but was not of sufficient magnitude to exceed the target levels.

The Coffey report of 2004 extended the period of water level records to September 2004 and indicated that since use of the Kaltails TSF was discontinued in 1999 water table levels had fallen significantly in response to continued use of groundwater recovery bores. Along the eastern wall the water table levels fell by 1.2 to 9.2 m, northern wall by 0.7 to 7.3 m, western wall by 0.2 to 4.0 m, and southern wall by 0.7 to 6.2 m. In terms of the target water table levels agreed in 1999 and reported by Aquaterra (1999) this corresponded to water table levels in September 2004 being between 0.8 m and 6.5 m below the target levels.

4.1.3 *Cyanide concentrations*

Total CN and WAD CN have been measured in monitor bores and the records for the period January 1989 to December 2003 are presented graphically in *Annexes C and D* respectively.

The agreed upper concentration level for WAD CN is 0.5 mg/L. During operation of the TSF the WAD CN concentration peaked on several occasions at about 60 mg/L and this was reflected in WAD CN concentrations as high as 1.0 mg/L however in general the concentrations in all monitor bores was generally less than 0.5 mg/L. By 2002 the WAD CN concentrations had stabilised at approximately 0.4 mg/L along sections of the south and west walls and about 0.2 mg/L along the north, east and outer perimeter bores.

4.1.4 *Area impacted by elevated water levels*

The Lakeside Timber Reserve location is indicated on *Figure 2*, a figure produced by ENVIRON and included in the Preliminary PER. This location was formerly closer to the Kaltails TSF and was revised to excise the area of environmental degradation that occurred in the early 1990s due to the operation of the TSF. Preservation of the vegetation from rising water levels is an important consideration in any decision regarding approval for raising the Kaltails TSF. This Figure is derived from aerial photographs and an area of degraded vegetation is discernible as a light green discoloration extending south and southwest from the TSF and encompassing the former Kaltails plant site and process facilities, still discernible on the air photograph. Notably the area of discoloration does not extend into the current Lakeside Timber Reserve.

Figure 3 (source unknown) shows the area of degradation pre- and post-1998. It matches very closely the area of degradation visible on the air photograph and suggests that this degradation is related not only to seepage from the TSF but also from processing and saline water storage ponds used over the period of operation of the Kaltails TSF. However experience from the Oroya TSF which was located west of the Fimiston II TSF and is now covered by a waste dump indicated that tree deaths are related to water table rise rather than to increased groundwater salinity. The Oroya TSF had received fresh water tailings for 15 years and had raised the water table to within 2 m of the surface causing tree deaths.

0051522 Kaltails Hydrogeological Project Diagrams 1-3.cdr

Source: ENVIRON

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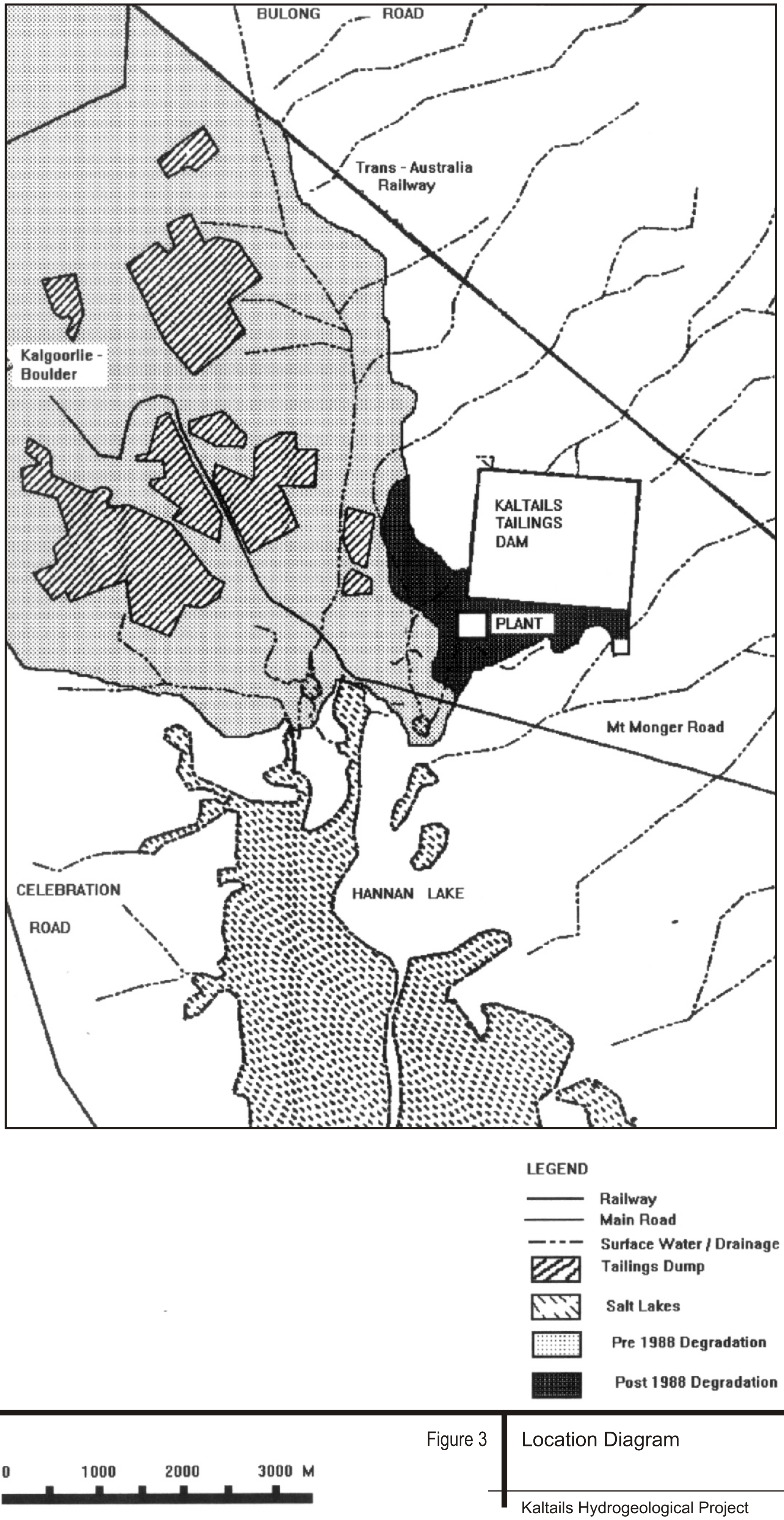
Figure 2 Lakeside Timber Reserve

Kaltails Hydrogeological Project



0051522 Kaltails Hydrogeological Project Diagrams 1-3.cdr

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Figure 3 Location Diagram

Kaltails Hydrogeological Project

4.1.5 *Groundwater modelling*

Groundwater modelling has been undertaken to predict the dissipation of the groundwater mound under the Kaltails TSF. The most recent run of the model was undertaken by Aquaterra in 1999 and summarised in a letter report of January 2006. This was based on a model developed for Kaltails in 1992 (Mackie Martin) and recalibrated in 1997 (Rust PPK).

The results from Aquaterra's rerun in 1999 matched those of the Rust PPK 1997 recalibration.

Predicted hydrographs for monitoring bores showed that groundwater levels close to the tailings storage area were well below ground level from 2 to 10 years after closure on the assumption that groundwater recovery would continue at a rate of 1,500 kL/day for two years after closure (ie. approximately 45,000 kL/month between 1999 and 2001). On cessation of pumping in 2001 the model prediction was for recovery of groundwater levels by 2 to 4m depending on location after which groundwater levels were predicted to remain relatively stable for the remainder (8 years) of the 10 years prediction period.

Model predicted groundwater levels for December 2009 showed relatively flat piezometric levels around 330 m AHD with no groundwater mound apparent under the TSF.

Model predictions also indicated that groundwater levels were expected to be above ground surface in an area south of the TSF and north of Mt Monger Road (note that this is the area shown to be degraded on *Figure 3*). The area immediately south of Bay 1 of the TSF and north of the plant site (refer *Figure 1*) was predicted to have a water table within one metre of the ground surface. The final predicted recovered water levels were consistent with the inferred levels believed to exist prior to commissioning of the TSF in 1989.

In practice the decline of the water levels to the agreed target levels has progressed more rapidly than anticipated in the model possibly due to a recovery rate as high as 90,000 kL/month (ie. higher than the 45,000 kL/month used in the model) for the period immediately after use of the TSF was discontinued and continuation of recovery beyond 2001.

4.2 *GEOTECHNICAL*

4.2.1 *Stability*

Golder Associates (May, 2006) presented a report on the implications of increasing the height of the Fimiston and Kaltails TSFs on structural stability. This was based on field studies in late 2004 including piezoprobe testing to provide information on the grading characteristics of the material in the tailings profile, the pore water pressures, permeability coefficients and the undrained shear strength of the tailings.

To represent the layered nature of the material, the tailings were divided into coarse and fine layers based on interpreted piezoprobe data. It was judged that six layers over the depth of the TSF were sufficient to represent the variation in the tailings.

Additionally the piezoprobe data indicated the presence of weaker saturated zones approximately 5m thick overlying natural ground. It was considered that the strength of material in the weaker zones would likely be influenced by overburden stress and hence decrease in strength closer to the TSF wall.

Modelling was then undertaken using accredited software modelling packages. It was judged unlikely that major slope instability would occur within the raised Kaltails TSF under dynamic loading conditions.

4.2.2 Seepage

Golder (2005) made an evaluation of the proposal to increase the embankment height of the Fimiston II TSF including an estimate of the seepage which would be generated and thereby need to be intercepted and recycled. Seepage modelling was undertaken at the proposed maximum embankment height of 45 m (RL 390 m AHD) with an increase in storage of 91 Mt of tailings. The modelling indicated that the likely seepage resulting from the proposed increase in height would be of the order of 50 L/s and little different to the modelled seepage at the currently licensed height. Current measured flow from the Fimiston II TSF is 76 L/s.

The implication is that increasing the height of the Kaltails TSF will not increase seepage above that generated during its prior operation and in fact the engineered disposal of tailings to reduce seepage, as described in this report, is designed to reduce seepage in the Kaltails TSF below that which was generated during the Normandy Kaltails operation of the facility.

5 ENGINEERING ASPECTS OF PROPOSED KALTAILS TSF

It is proposed to pump tailings to Kaltails from the Fimiston plant in two pipelines in order that the Fimiston and Kaltails TSFs can be operated on a rotational basis ie either all tails to Kaltails or all to Fimiston II under normal conditions. It is not planned to routinely split deposition between TSFs. This would give the greatest flexibility for operations as all the tailings could be deposited to both facilities under any circumstances.

Water from around the Kaltails TSF is currently abstracted and pumped to the Fimiston plant for use as process water. If KCGM recommissions the TSF the existing 14 bores (borefield produced 4.5ML/day at its peak) which encircle the facility near the toe will be recommissioned and additional bores would be constructed to establish a seepage recovery network similar in extent and efficiency to that at the Fimiston TSFs. The focus would be to manage the water level in the area around the facility with a secondary goal being recovery of high salinity seepage.

The Seepage and Groundwater Management Plan (SGMP) agreed for the Fimiston TSFs would be extended southward to encompass the Kaltails TSF and its surrounds. The actions and criteria committed to the SGMP are:

- frequency of water level measurement;
- suite of analytes and sampling frequency;
- installation of data loggers to monitor rapid response to rainfall or tailings deposition;
- more groundwater monitoring bores;
- additional ground water recovery bores;
- minimisation of TSF surface water area to minimise seepage; and
- maximisation of borefield availability to maximise water table control.

Wall lifts at the recommissioned Kaltails TSF would be brought in line with the operating procedure at the Fimiston TSFs. These typically have wall raises of 1 m. Dependent on the remaining height (capacity) in the paddock up to the licensed height the raises would be increased up to 2m. If the Kaltails TSF is to be recommissioned in 2008 it will have 20 m of available embankment height remaining while the Fimiston facilities will have 15 m. Thus on average the Kaltails lifts would be 33% higher than at Fimiston. Fimiston TSF is 50% larger in area than Kaltails.

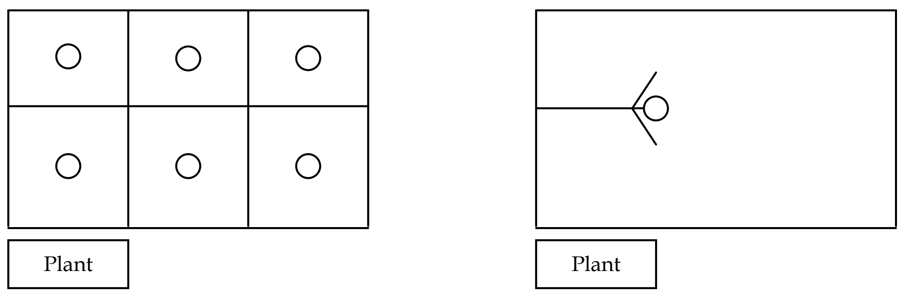
Calculations based on these ratios results in tailings being deposited at Fimiston II and Kaltails 55% and 45% of the year respectively. Kaltails has a capacity of about 65 Mt up to a wall height of 45 m. Should tailings be redeposited at Kaltails it would be at a rate of 13 Mt/a. In 45% of the year or 5.5 months a total of 5.9 Mt of tailings would be stored. The facility would have a rise rate of about 1.4 m/a as an average until 2017. When the Kaltails

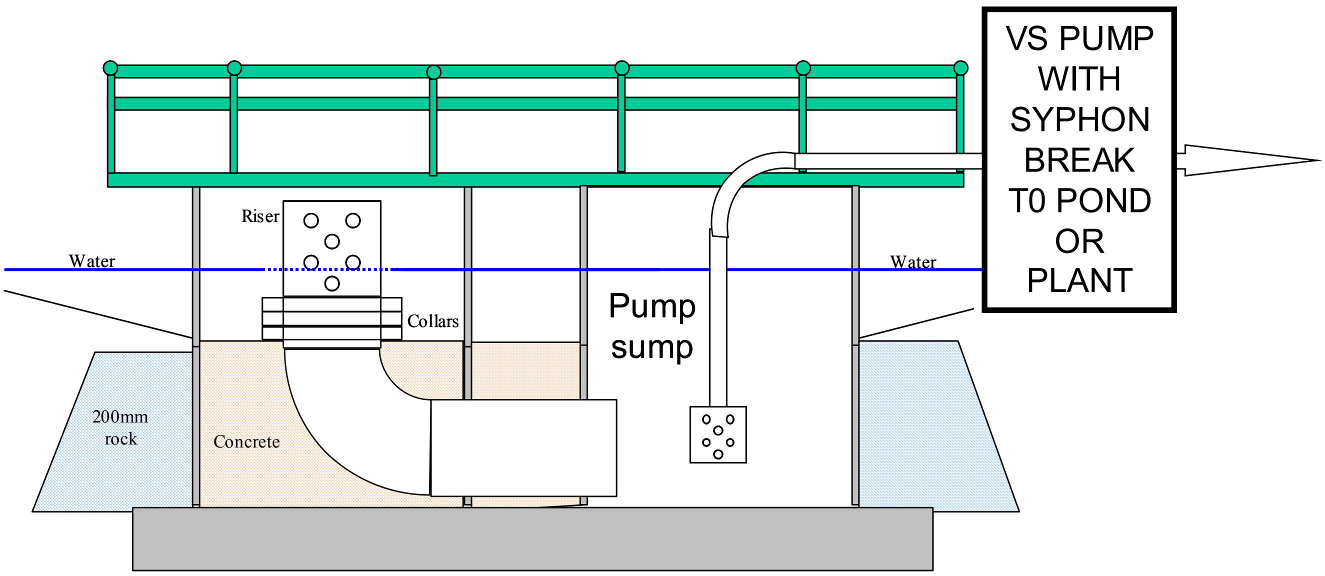
TSF was operated by Newmont about 65 Mt of tailings was deposited over about ten years continuously, alternating between the six cells with an annual deposition rate of about 7 Mt/a giving a rise rate of about 2.3 m/a. Thus should KCGM receive approval to deposit tailings to the Kaltails TSF the ability for the tailings to dry will be significantly improved.

KCGM is also proposing an engineered tailings disposal which will improve the control and recovery of seepage. This design is more efficient in controlling seepage than that practised during previous operations of the Kaltails TSF and is based on operating experience at the Fimiston TSFs. Significant changes proposed for the Kaltails TSF facility should it be recommissioned include:

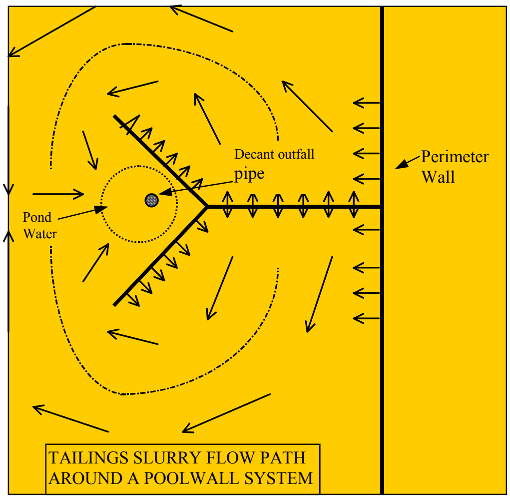
- the new decant point would be a pumped unit operating from a concrete sump configured similar to but larger than that used at the Gidji TSF;
- the current six gravity decants (one for each paddock) would be grout sealed; and
- the six paddocks would be amalgamated to a single paddock with only one single decant point as indicated in the sketch below. This would give a slightly longer seepage path from the decant to the toe.

Former Layout Proposed Layout





- the single paddock would have wing walls constructed each side of the decant with associated tailings deposition pipe work running along the back of these walls similar to the system used at the Fimiston TSFs for the past ten years. Wing walls give several advantages with respect to construction and water management. Construction is aided because the tailings are deposited sub aerially at the back of the wall and thus drying is more efficient than if deposited sub aqueously as they usually are near the decant. The material also contains a course fraction which aids drainage. Deposition along the back of the wing is via small diameter (50mm) spigots compared to the perimeter discharge from large diameter outlets (200mm). This generates a steeper beach due to the low energy contained in the resultant slurry flow which in turn generates a deeper and smaller area supernatant pond at the decant compared to a typical pond. In addition the wings form a glove like feature and this combined with an increased pond depth maintains the pond close to the decant point as indicated in the photographs below.



- The wall raises would be restricted to 1 to 1.5m in height and the borrow pits for winning material for wall construction would be limited to about 1 to 1.5m depth

6 CONCLUSIONS

During the operation of the Kaltails TSF between 1991 and 1999 a groundwater mound developed beneath and adjacent to the TSF. On the southern and south western margins of the TSF, where natural water table levels were within 1.5 to 2 m of natural ground level, the water table rose to the surface and surface vegetation was degraded. A map showing the extent of the degradation (*Figure 3*) accompanies this report. It is noted that plant reprocessing and saline water storage ponds also existed in this area of degradation and may have contributed to the elevation of the water table and associated impacts.

Review of the seepage recovery systems installed around the perimeter of the TSF and in the outer area near the plant site facilities indicates that they were below capacity to adequately manage the rising water table until mid way through the operation of the TSF. Additional seepage recovery capacity was installed in the mid 1990s peaking in 1998/1999 and then reducing over the next few years until the target water levels agreed in the TSF decommissioning plan had been achieved. Seepage recovery is continuing with six groundwater bores currently operational and returning between 12,000 and 18,000 kL/month to Fimiston. The water levels reported by Coffey (2004) compared the levels recorded in August 1999 with those of September 2004 and indicated a considerable drop in water table level adjacent to the perimeter of the TSF, between 1.2 and 9.7 m, with water table levels below the target levels by between 0.8 m and 6.5 m.

The natural hydrogeology of the area indicates a shallow south westerly gradient towards Hannans Lake. Two aquifers have been identified, an alluvial aquifer which is irregular in distribution but is known to underlie the TSF in some areas and which extends down to a ferricrete layer at a depth of 10 to 12 m below natural ground surface. This aquifer is separated from a deeper semi-confined aquifer within weathered bedrock which underlies the ferricrete.

This weathered bedrock aquifer is variable in extent and thickness and yields are very variable. Seepage water from the TSF, from the records of fluctuations in water level and groundwater chemistry, has readily transmitted to the semi confined aquifer suggesting that beneath the TSF there was ready transmission of seepage via the alluvial/ferricrete aquifer to the bedrock aquifer. Seepage water from the TSF will therefore transmit both horizontally into the alluvial/ferricrete aquifer and vertically to the semi confined aquifer. The hypersaline seepage water (120,000 mg/L) is denser than the naturally occurring groundwaters downstream of the TSF (salinity 40,000 mg/L) and will therefore sink to the base of the aquifer displacing the lower salinity groundwater upwards towards the surface. Management and control of the water level rises is therefore the critical aspect of the seepage management rather than control of salinity. The observed degradation of vegetation can be attributed to water logging rather than salinisation.

Should the Kaltails TSF be recommissioned a seepage control and recovery system can be designed to restrict groundwater mounding outside the immediate perimeter of the TSF particularly adjacent to the southern and western walls. The absence of other sources of saline water seepage as occurred during the former operation of the TSF thereby excludes any opportunity for groundwater mounding other than directly from the TSF itself. It would be essential that the current SGMP in place at the Fimiston TSFs be extended southwards to cover the Kaltails TSF and environs including the introduction of a groundwater monitoring regime which conforms to the requirements of the SGMP.

In principle the capacity of the seepage recovery system should be at least equivalent to 30% of the daily volume of the water content in the tailings being discharged to the TSF. During previous operation of the Kaltails TSF at a discharge rate of 7 Mt/a the average monthly seepage of contained water to the groundwater is estimated to have been about 175,000 kL/month ie. 50% density by weight, 30% for evaporation loss and interstitial pore containment and return of 40% of decant water.to process. This can be compared with peak seepage recovery of 127,000 kL/month in 1999. Using equivalent calculations for the proposed Kaltails TSF equates to the need to recover and recycle up to 150,000 kL/month from a network of recovery bores.

In conclusion the proposed recommissioning of the Kaltails TSF is feasible in that seepage recovery can be better managed than during previous operations. This would be undertaken by engineering seepage recovery systems in advance of recommissioning and operating the system during the life of the TSF at a rate calculated to prevent mounding of groundwater and degradation of vegetation outside the immediate perimeter of the TSF.

Notably, despite the degradation which resulted from the previous operation of the Kaltails TSF, together with contribution from associated plant site facilities, there was no impact on the Lakeside Nature Reserve in its current location.

REFERENCES

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Environmental Protection Authority, Fimiston Gold Mine Operations (Stage 3) and Mine Closure Planning, letter to KCGM (ref 489/05), 21 April 2006.

Golder Associates, Draft report on Notice of Intent, Proposed increase in the storage capacity of the Fimiston II TFS, July 2005.

Golder Associates, Report On Implications Of Increase In The Height Of The Fimiston And Kaltails Tailings Storage Facilities On Structural Stability, May 2006.

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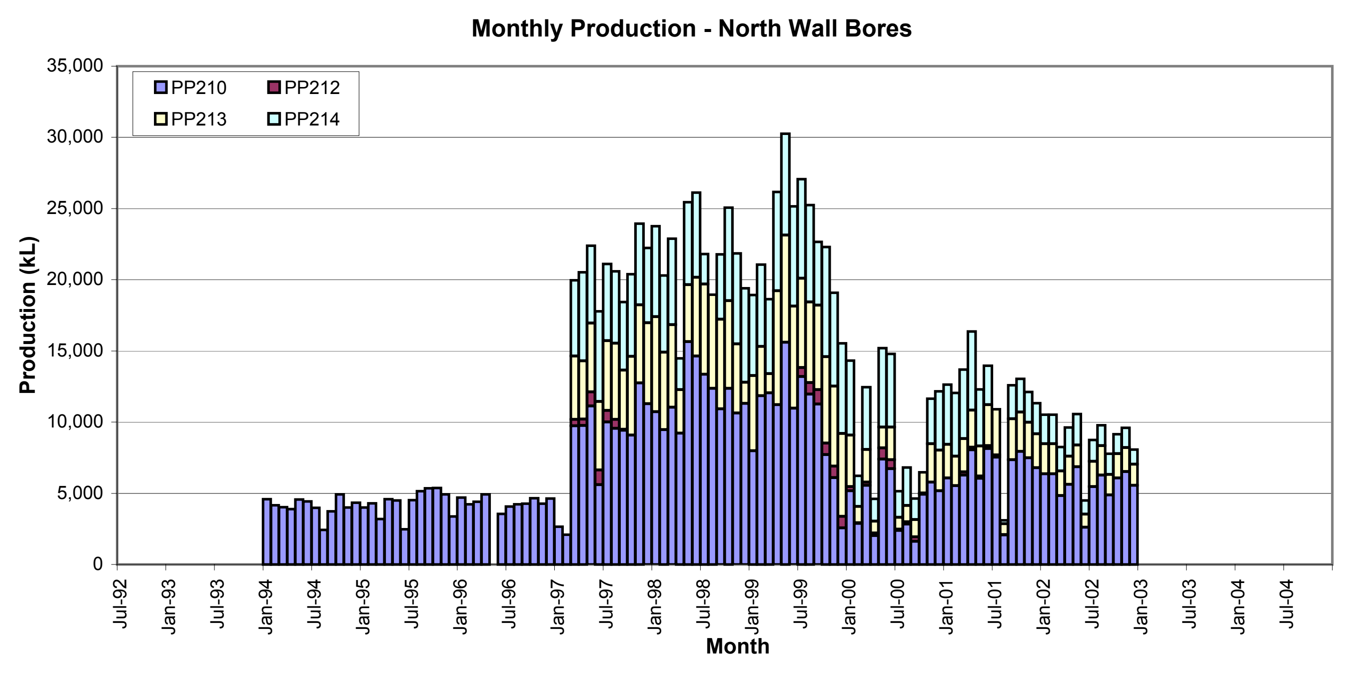
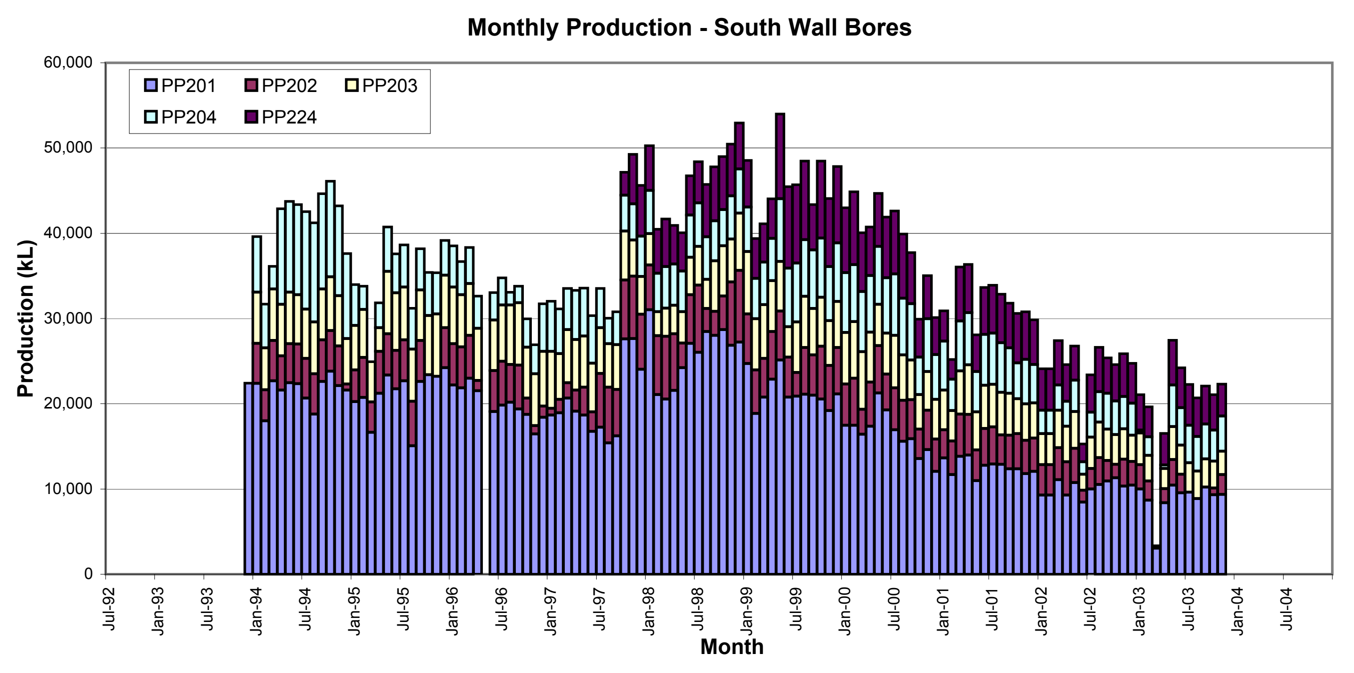
Normandy Kaltails, Tailings Storage Facility, Seepage Dewatering, GWL 66498, 2001 Production Summary Report.

Annex A

Groundwater Recovery, 1992 - 2004


Monthly Production - North Wall Bores
PP210
PP212
PP213
PP214
Production (kL)
Month
35,000
30,000
25,000
20,000
15,000
10,000
5,000
0
Jul-92
Jan-93
Jul-93
Jan-94
Jul-94
Jan-95
Jul-95
Jan-96
Jul-96
Jan-97
Jul-97
Jan-98
Jul-98
Jan-99
Jul-99
Jan-00
Jul-00
Jan-01
Jul-01
Jan-02
Jul-02
Jan-03
Jul-03
Jan-04
Jul-04


Monthly Production - South Wall Bores
PP201
PP202
PP203
PP204
PP224
Production (kL)
Month
60,000
50,000
40,000
30,000
20,000
10,000
0
Jul-92
Jan-93
Jul-93
Jan-94
Jul-94
Jan-95
Jul-95
Jan-96
Jul-96
Jan-97
Jul-97
Jan-98
Jul-98
Jan-99
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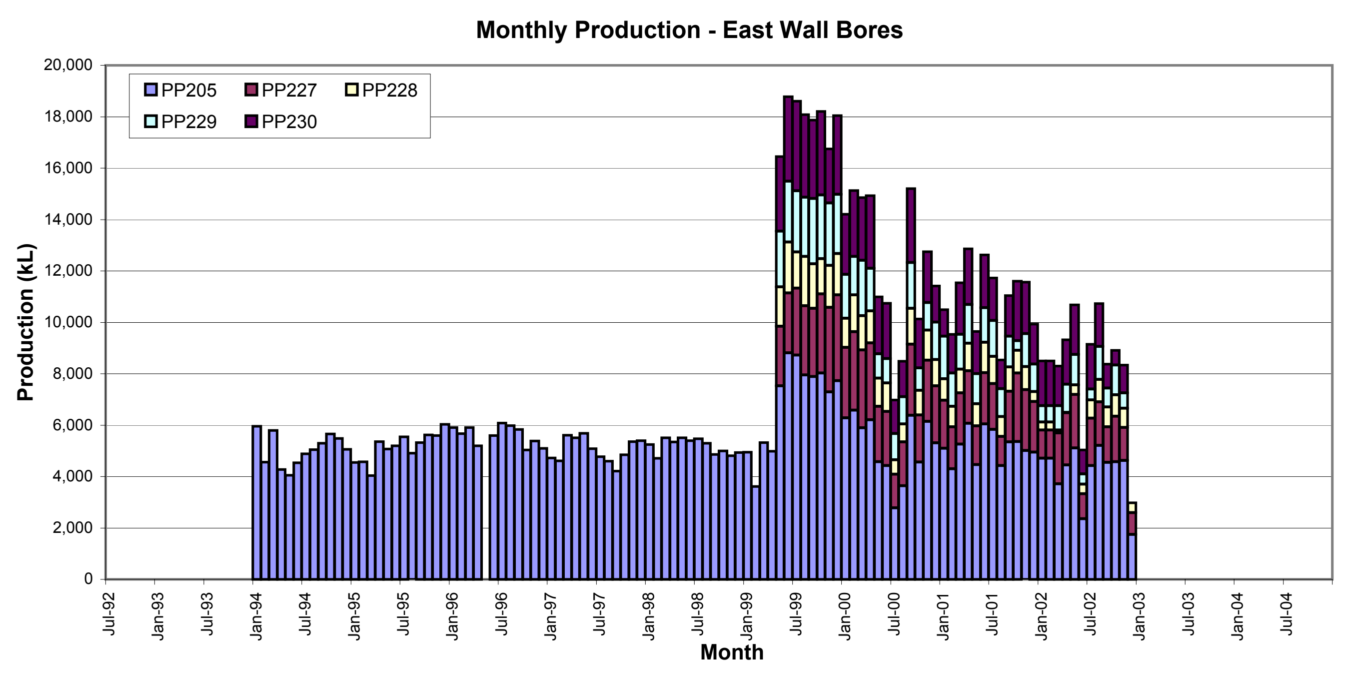
Jan-03
Jul-03
Jan-04
Jul-04


Monthly Production - East Wall Bores
PP205
PP227
PP228
PP229
PP230
Production (kL)
Month
20,000
18,000
16,000
14,000
12,000
10,000
8,000
6,000
4,000
2,000
0
Jul-92
Jan-93
Jul-93
Jan-94
Jul-94
Jan-95
Jul-95
Jan-96
Jul-96
Jan-97
Jul-97
Jan-98
Jul-98
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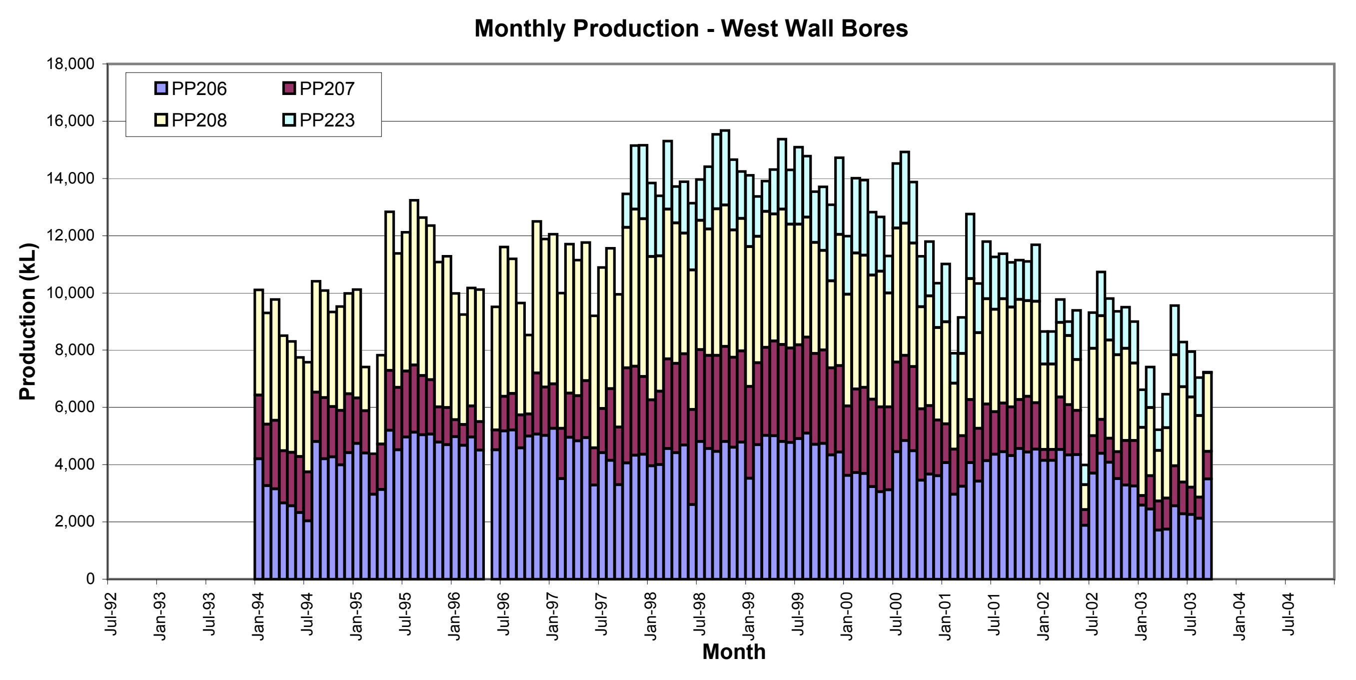
Jul-03
Jan-04
Jul-04


Monthly Production - West Wall Bores
PP206
PP207
PP208
PP223
Production (kL)
Month
18,000
16,000
14,000
12,000
10,000
8,000
6,000
4,000
2,000
0
Jul-92
Jan-93
Jul-93
Jan-94
Jul-94
Jan-95
Jul-95
Jan-96
Jul-96
Jan-97
Jul-97
Jan-98
Jul-98
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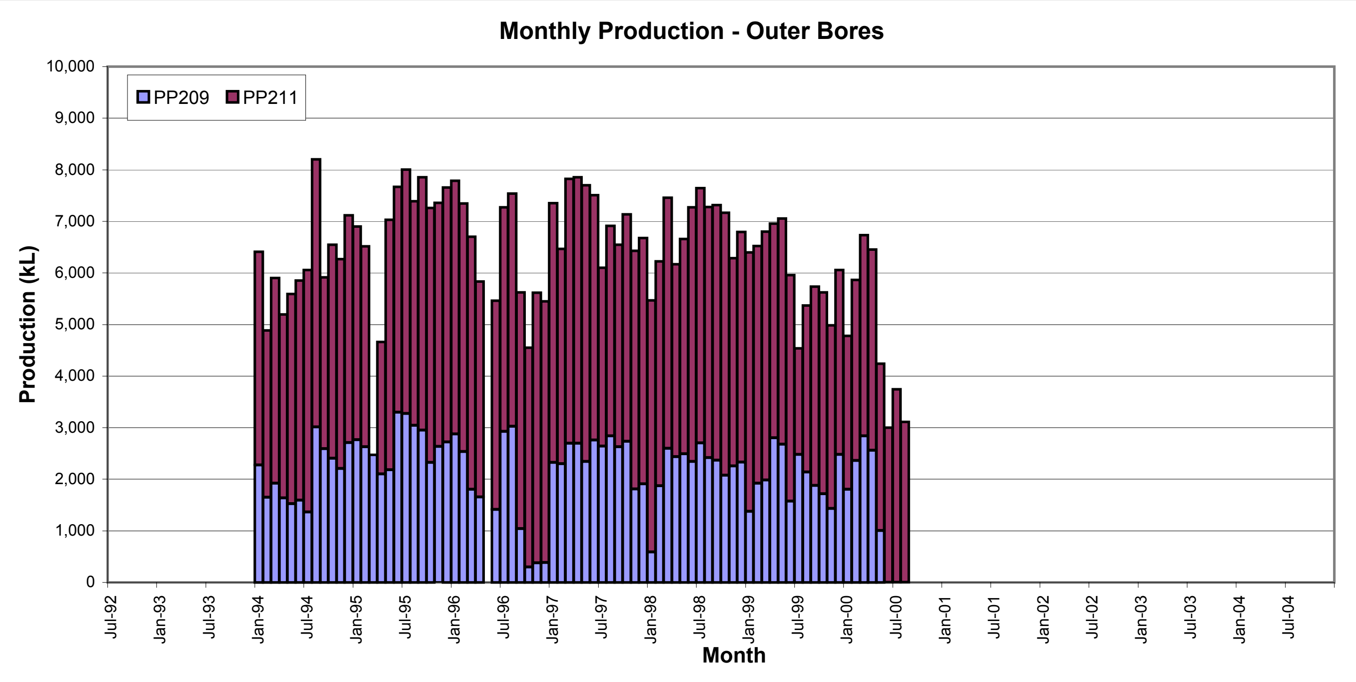
Jul-03
Jan-04
Jul-04


Monthly Production - Outer Bores
PP209
PP211
Production (kL)
Month
10,000
9,000
8,000
7,000
6,000
5,000
4,000
3,000
2,000
1,000
0
Jul-92
Jan-93
Jul-93
Jan-94
Jul-94
Jan-95
Jul-95
Jan-96
Jul-96
Jan-97
Jul-97
Jan-98
Jul-98
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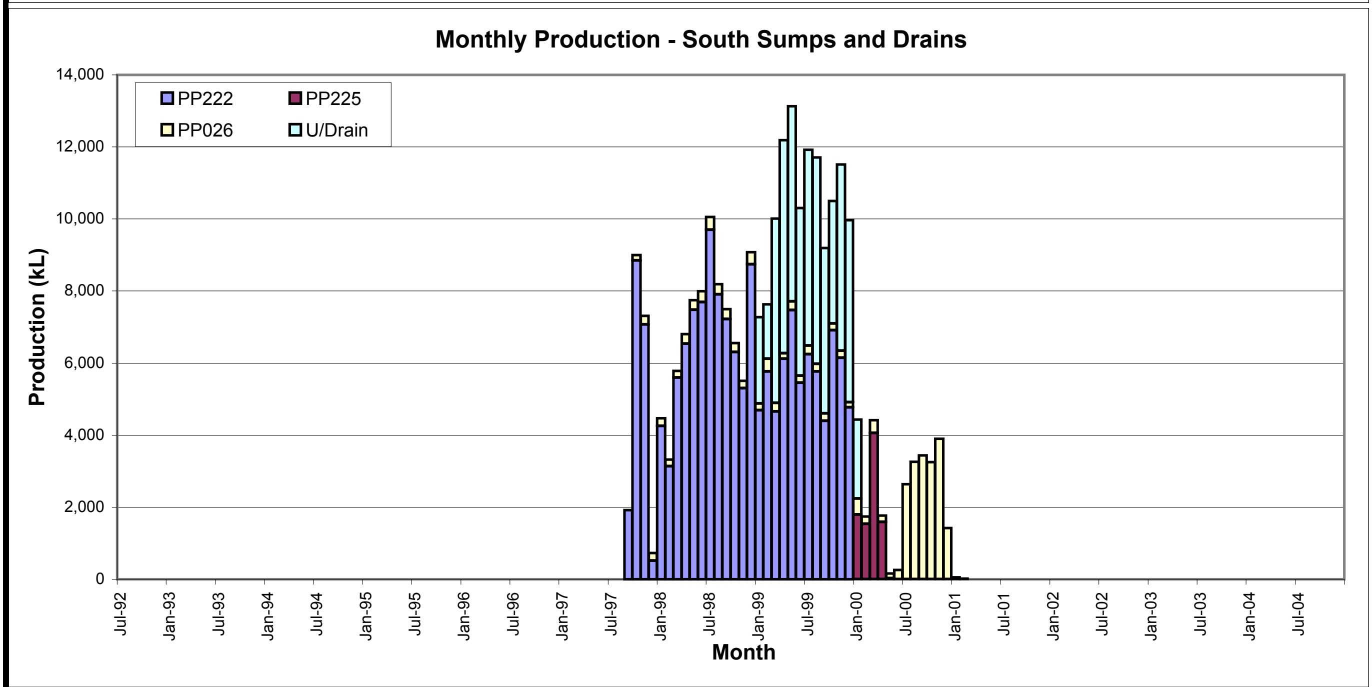
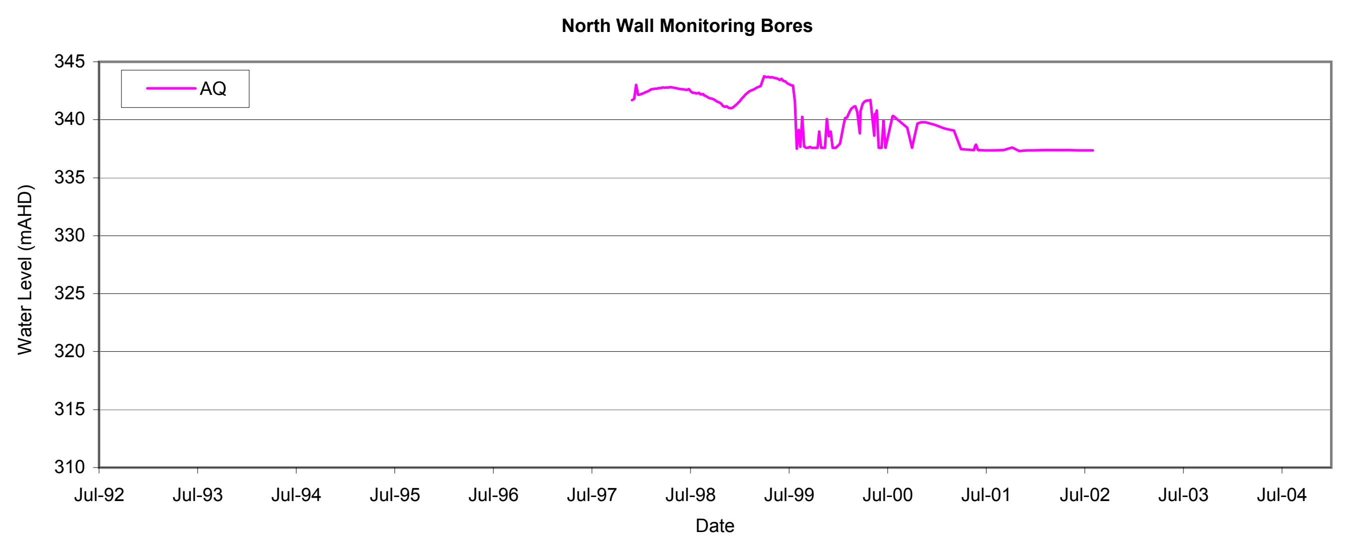
Jul-03
Jan-04
Jul-04

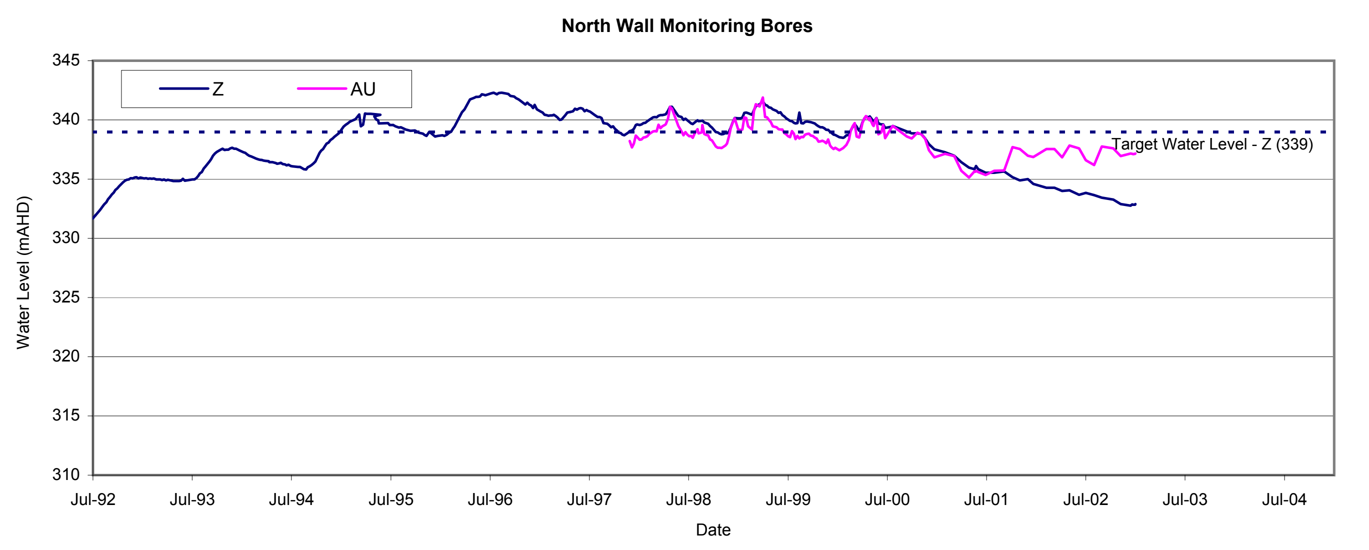

Monthly Production - South Sumps and Drains
PP222
PP225
PP026
U/Drain
Production (kL)
Month
14,000
12,000
10,000
8,000
6,000
4,000
2,000
0
Jul-92
Jan-93
Jul-93
Jan-94
Jul-94
Jan-95
Jul-95
Jan-96
Jul-96
Jan-97
Jul-97
Jan-98
Jul-98
Jan-99
Jul-99
Jan-00
Jul-00
Jan-01
Jul-01
Jan-02
Jul-02
Jan-03
Jul-03
Jan-04
Jul-04

Annex B

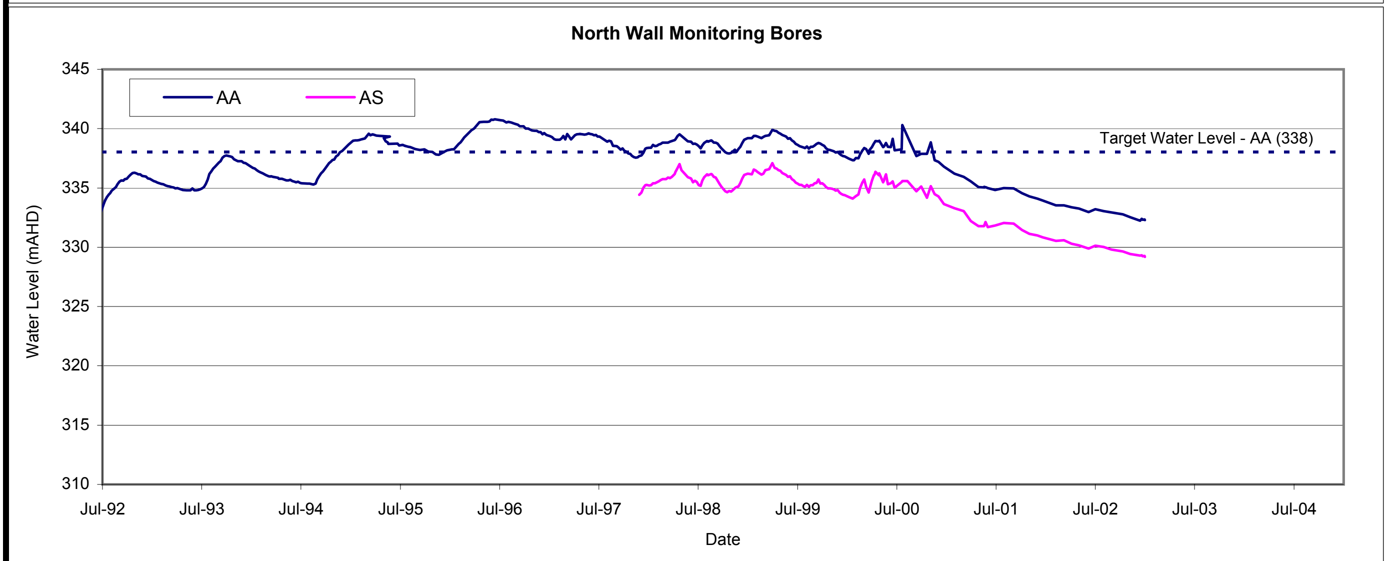
Water Level Graphs, 1992 - 2004



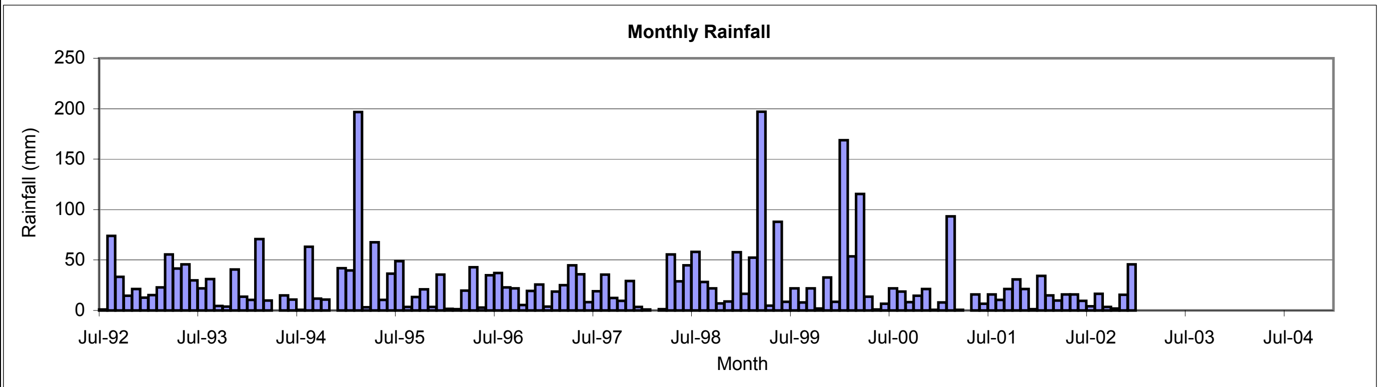
North Wall Monitoring Bores
AQ
Water Level (mAHD)
345
340
335
330
325
320
315
310
Jul-92
Jul-93
Jul-94
Jul-95
Jul-96
Jul-97
Jul-98
Jul-99
Jul-00
Jul-01
Jul-02
Jul-03
Jul-04
Date



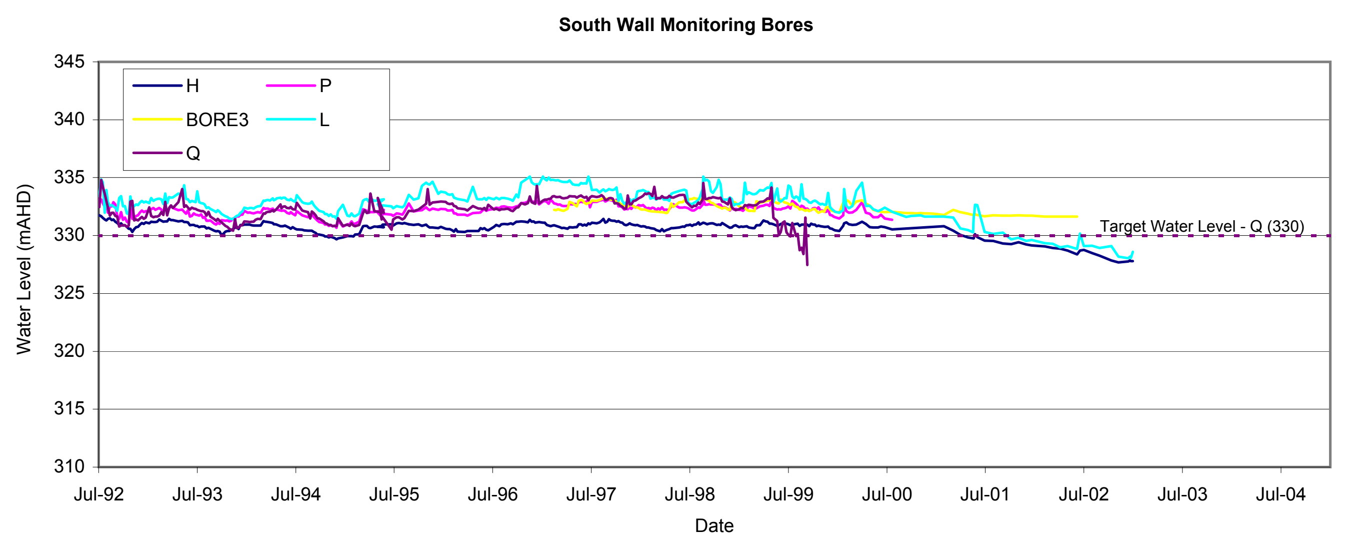
North Wall Monitoring Bores
Z
AU
Target Water Level - Z (339)
Water Level (mAHD)
345
340
335
330
325
320
315
310
Jul-92
Jul-93
Jul-94
Jul-95
Jul-96
Jul-97
Jul-98
Jul-99
Jul-00
Jul-01
Jul-02
Jul-03
Jul-04
Date

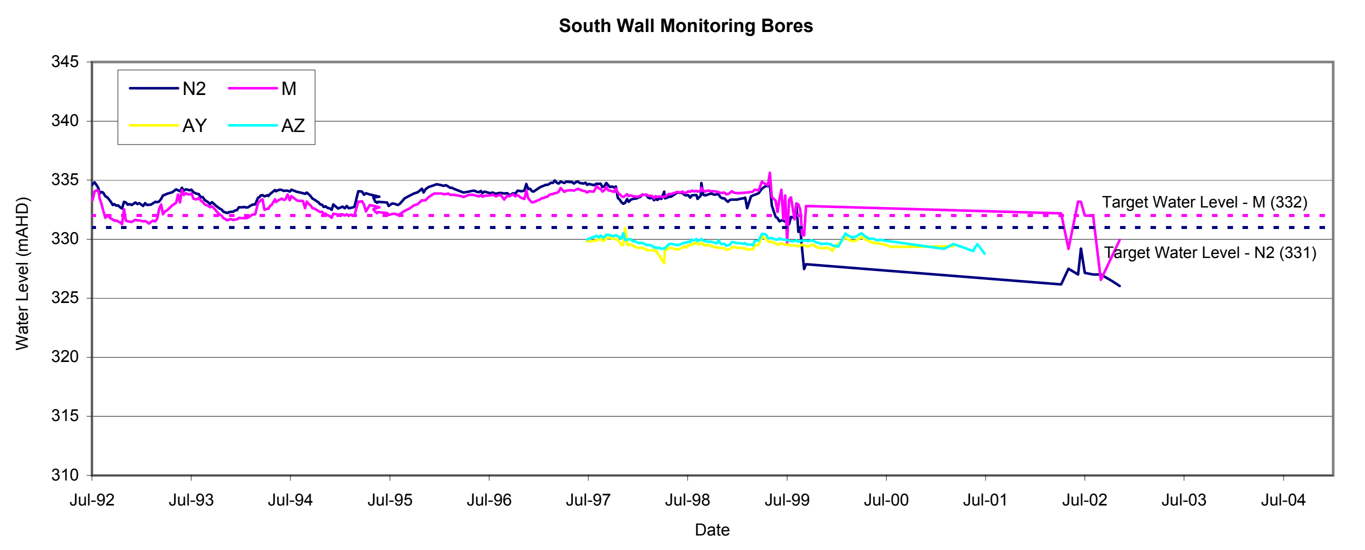


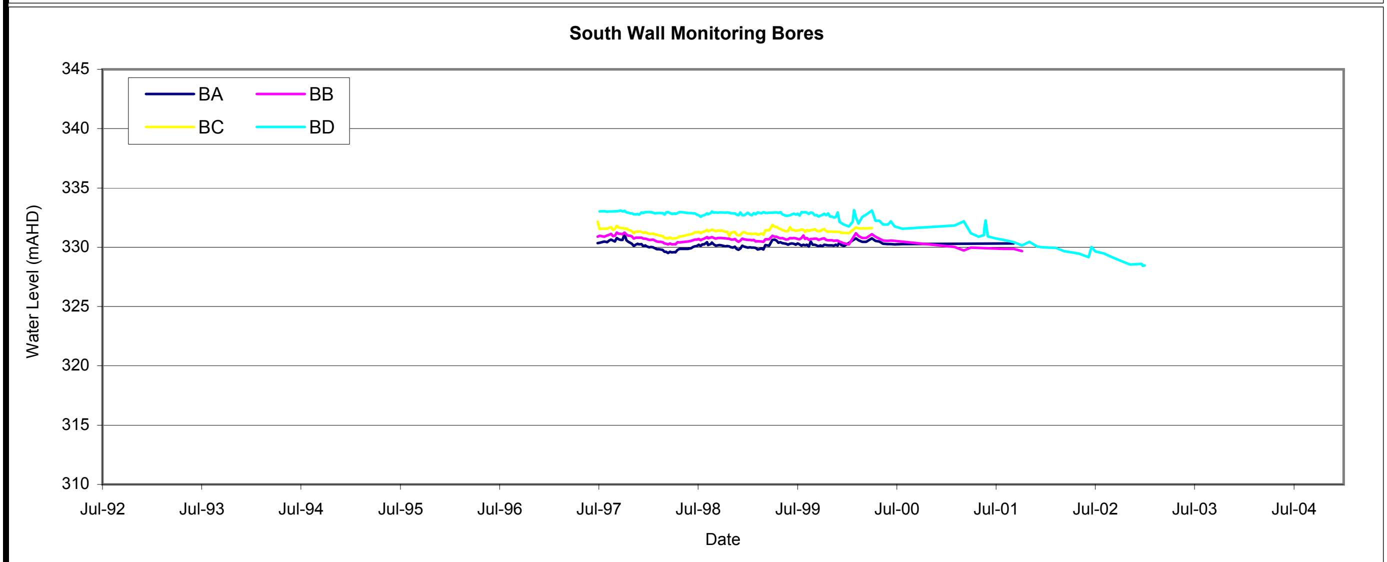
North Wall Monitoring Bores
AA
AS
Target Water Level - AA (338)
Water Level (mAHD)
345
340
335
330
325
320
315
310
Jul-92
Jul-93
Jul-94
Jul-95
Jul-96
Jul-97
Jul-98
Jul-99
Jul-00
Jul-01
Jul-02
Jul-03
Jul-04
Date

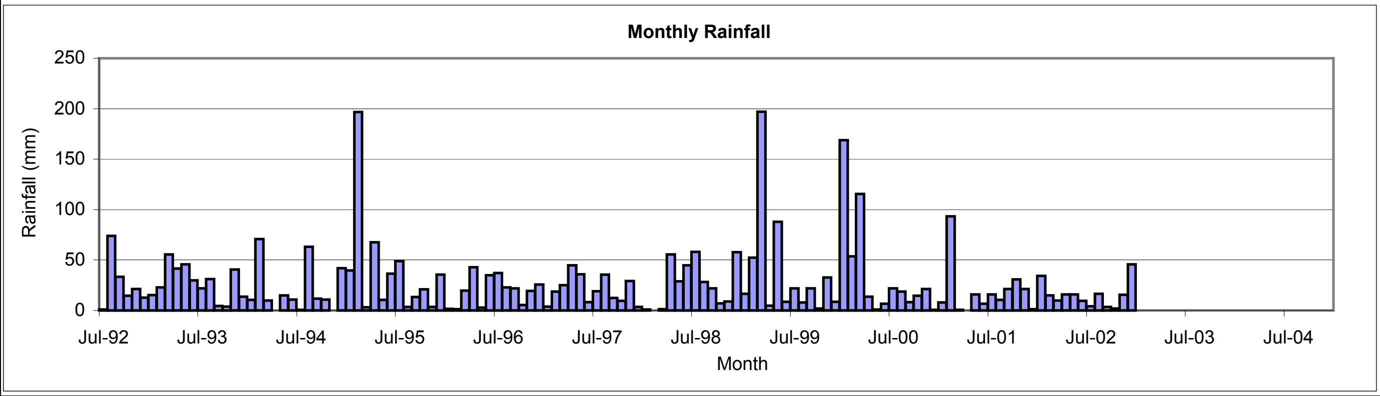


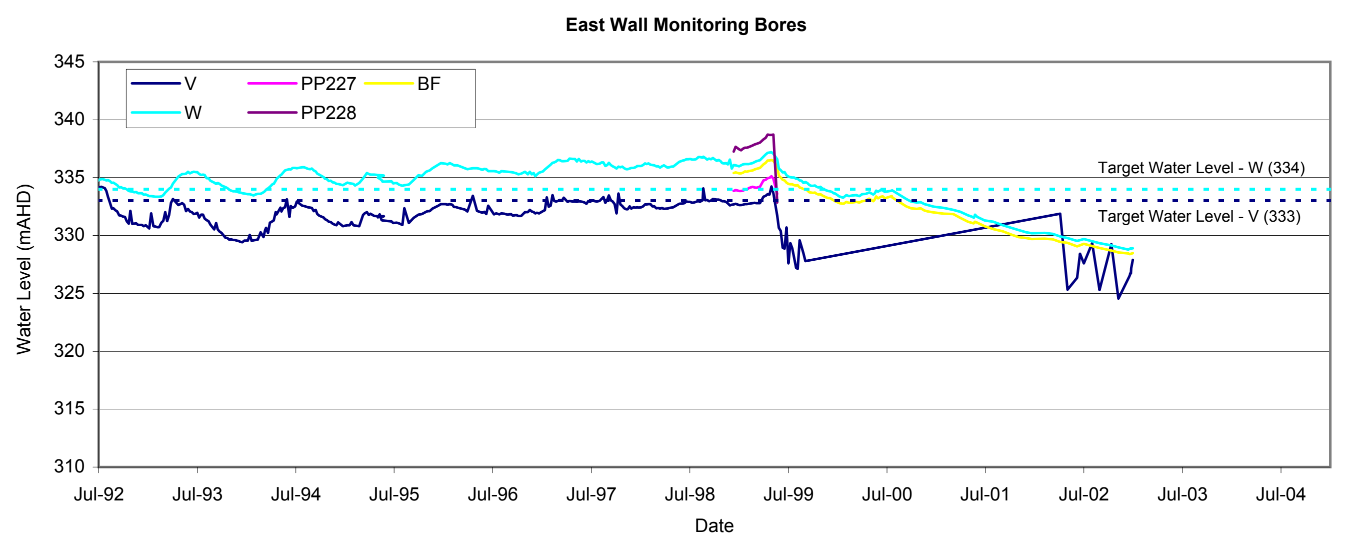
Monthly Rainfall
Rainfall (mm)
250
200
150
100
50
0
Jul-92
Jul-93
Jul-94
Jul-95
Jul-96
Jul-97
Jul-98
Jul-99
Jul-00
Jul-01
Jul-02
Jul-03
Jul-04
Month

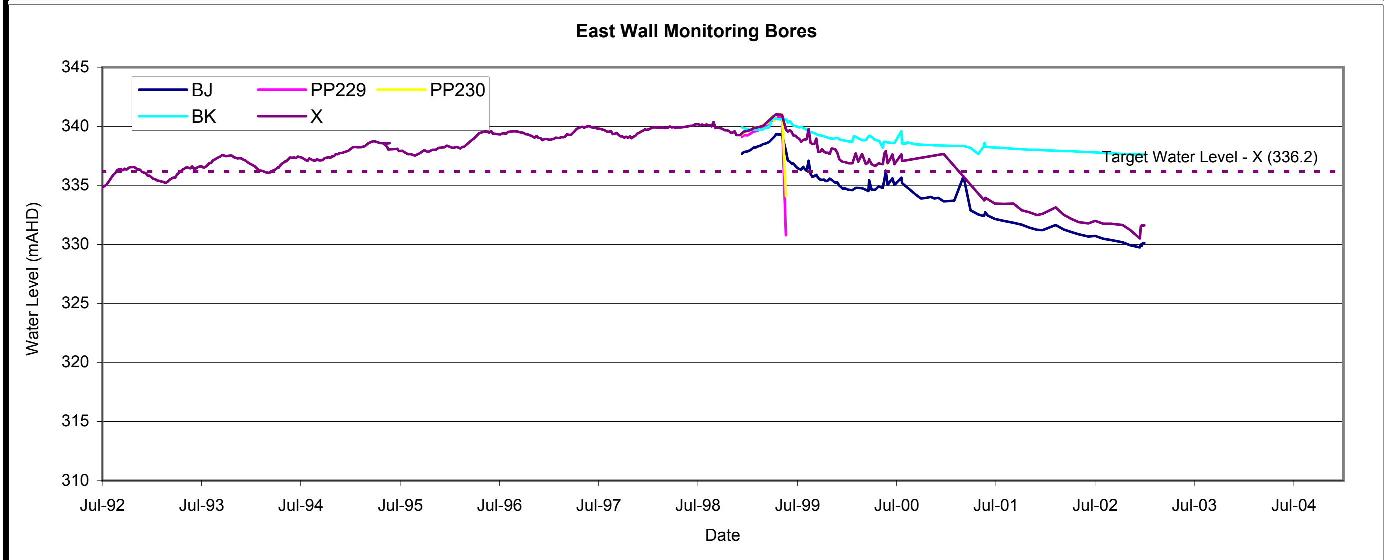

South Wall Monitoring Bores
H
P
BORE3
L
Q
Target Water Level - Q (330)
Water Level (mAHD)
345
340
335
330
325
320
315
310
Jul-92 Jul-93 Jul-94 Jul-95 Jul-96 Jul-97 Jul-98 Jul-99 Jul-00 Jul-01 Jul-02 Jul-03 Jul-04
Date

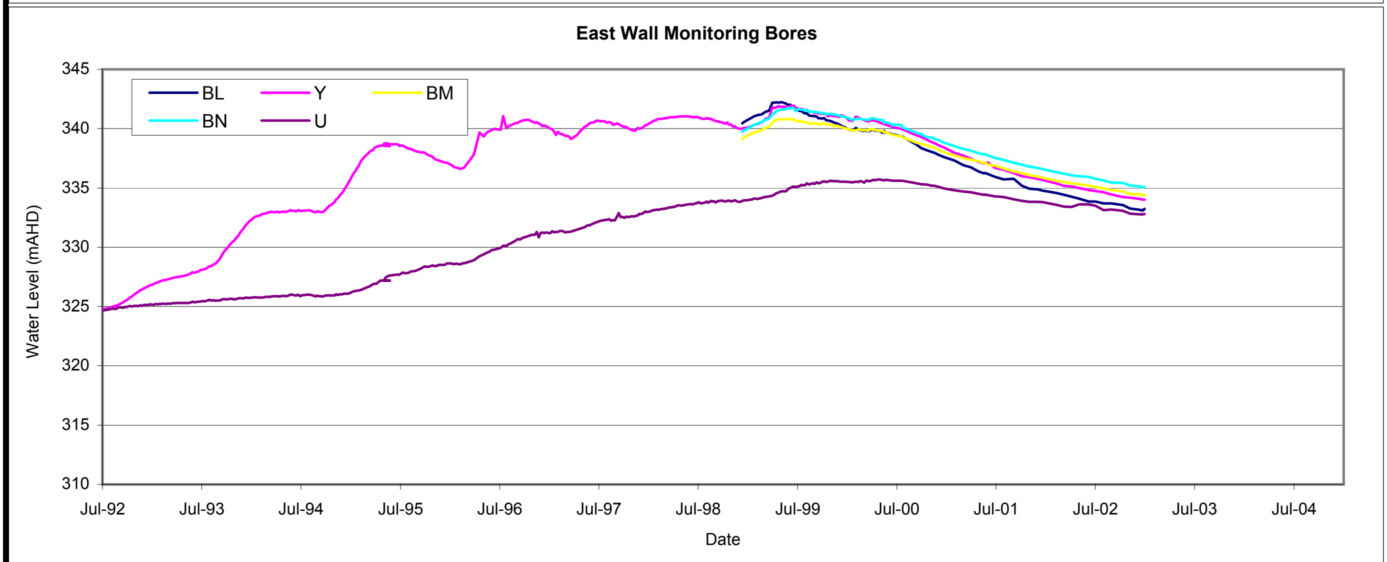

South Wall Monitoring Bores
N2
M
AY
AZ
Target Water Level - M (332)
Target Water Level - N2 (331)
Water Level (mAHD)
345
340
335
330
325
320
315
310
Jul-92 Jul-93 Jul-94 Jul-95 Jul-96 Jul-97 Jul-98 Jul-99 Jul-00 Jul-01 Jul-02 Jul-03 Jul-04
Date

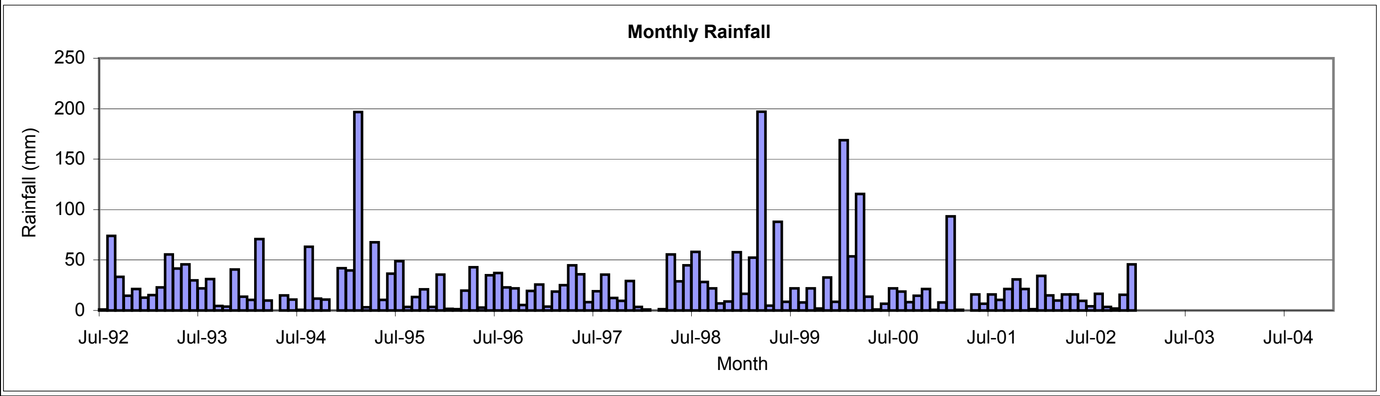

South Wall Monitoring Bores
BA
BB
BC
BD
Water Level (mAHD)
345
340
335
330
325
320
315
310
Jul-92 Jul-93 Jul-94 Jul-95 Jul-96 Jul-97 Jul-98 Jul-99 Jul-00 Jul-01 Jul-02 Jul-03 Jul-04
Date

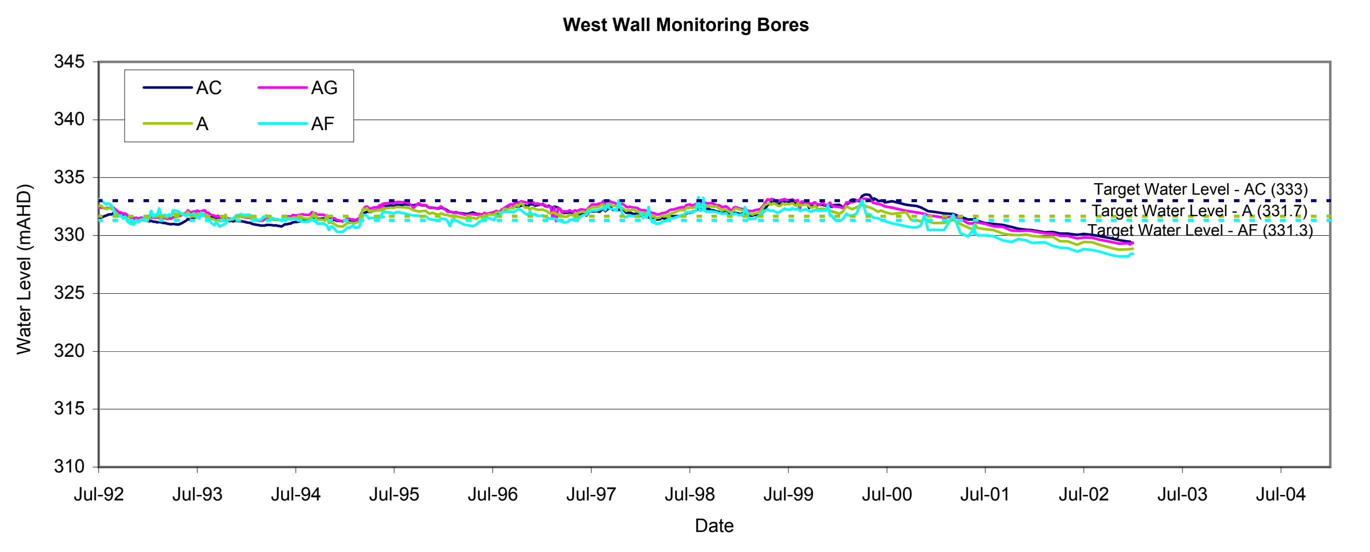

Monthly Rainfall
Rainfall (mm)
250
200
150
100
50
0
Jul-92 Jul-93 Jul-94 Jul-95 Jul-96 Jul-97 Jul-98 Jul-99 Jul-00 Jul-01 Jul-02 Jul-03 Jul-04
Month

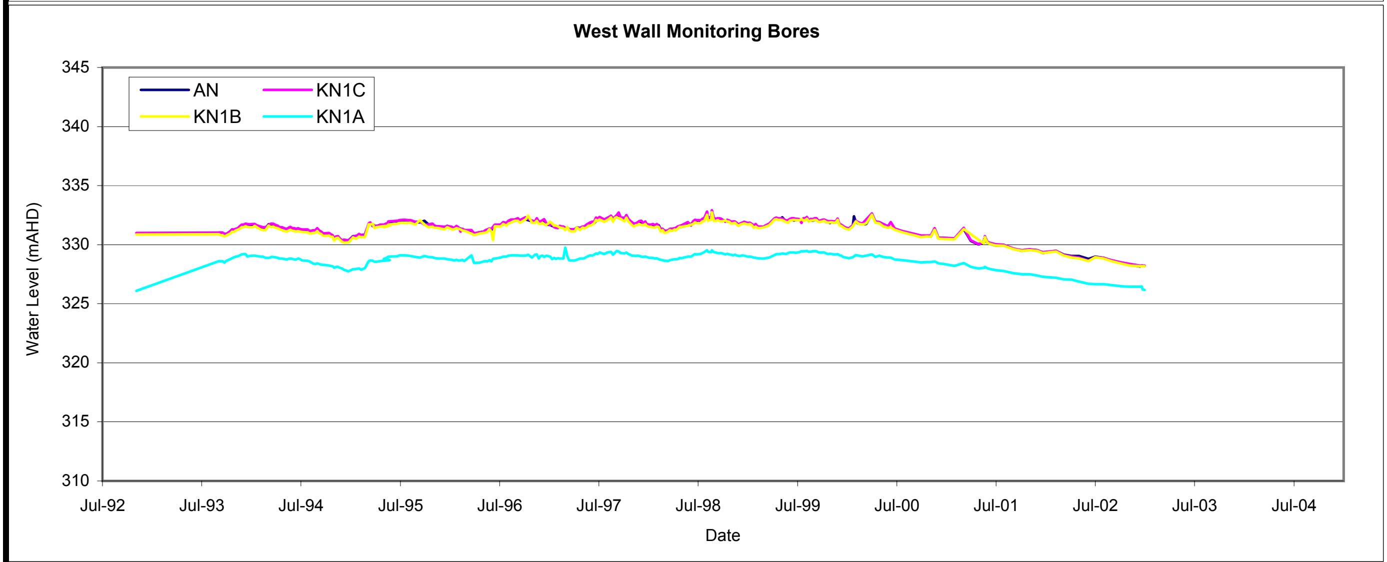

East Wall Monitoring Bores
V
PP227
BF
W
PP228
Target Water Level - W (334)
Target Water Level - V (333)
Water Level (mAHD)
345
340
335
330
325
320
315
310
Jul-92
Jul-93
Jul-94
Jul-95
Jul-96
Jul-97
Jul-98
Jul-99
Jul-00
Jul-01
Jul-02
Jul-03
Jul-04
Date

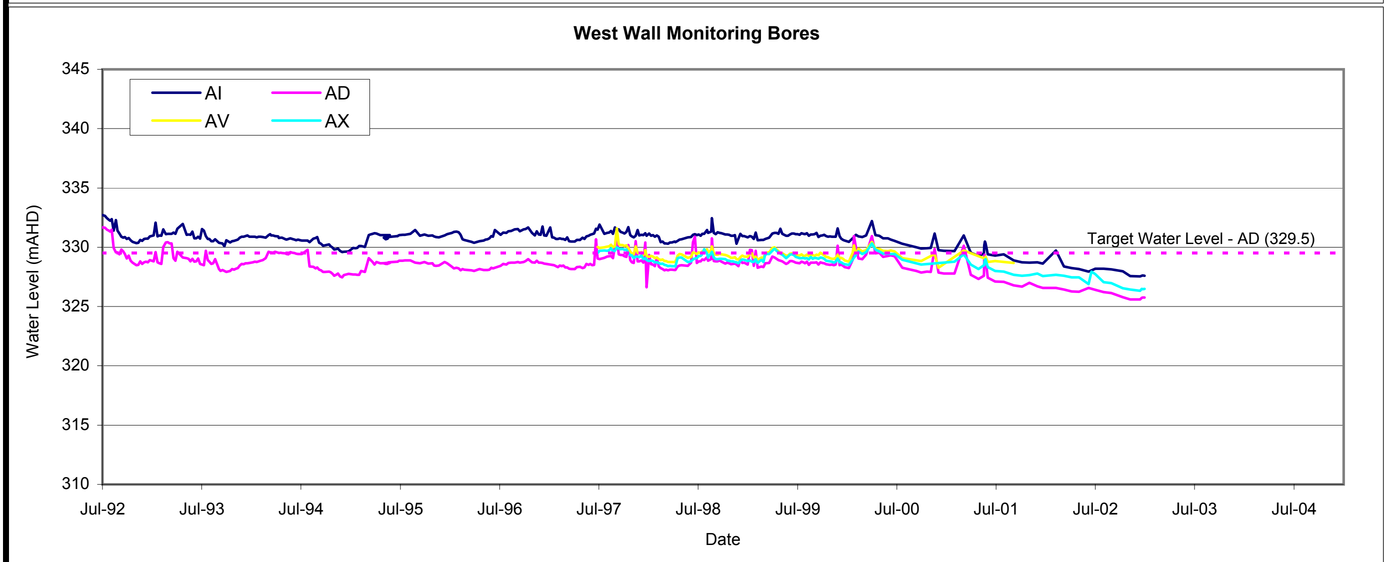

East Wall Monitoring Bores
BJ
PP229
PP230
BK
X
Target Water Level - X (336.2)
Water Level (mAHD)
345
340
335
330
325
320
315
310
Jul-92
Jul-93
Jul-94
Jul-95
Jul-96
Jul-97
Jul-98
Jul-99
Jul-00
Jul-01
Jul-02
Jul-03
Jul-04
Date

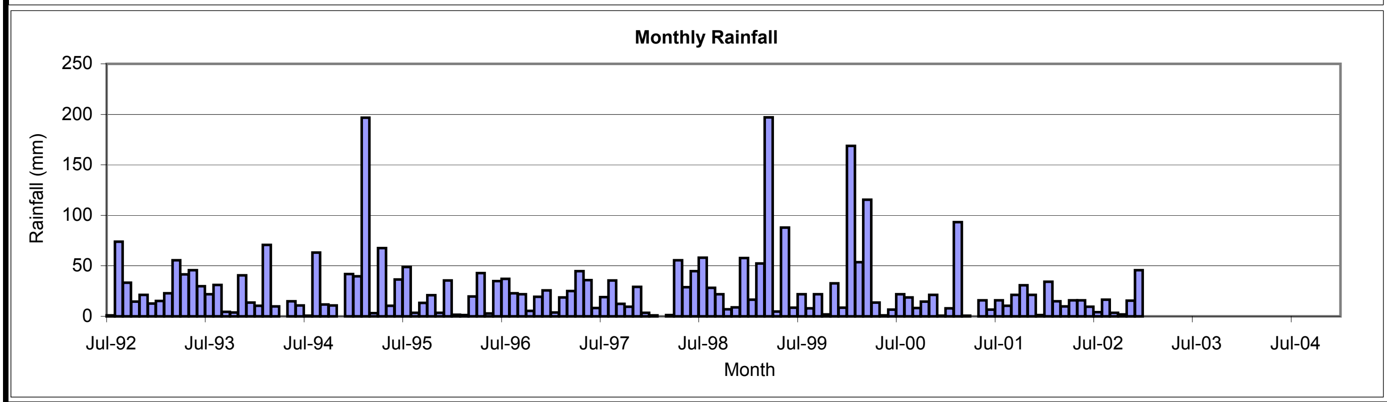

East Wall Monitoring Bores
BL
Y
BM
BN
U
Water Level (mAHD)
345
340
335
330
325
320
315
310
Jul-92
Jul-93
Jul-94
Jul-95
Jul-96
Jul-97
Jul-98
Jul-99
Jul-00
Jul-01
Jul-02
Jul-03
Jul-04
Date

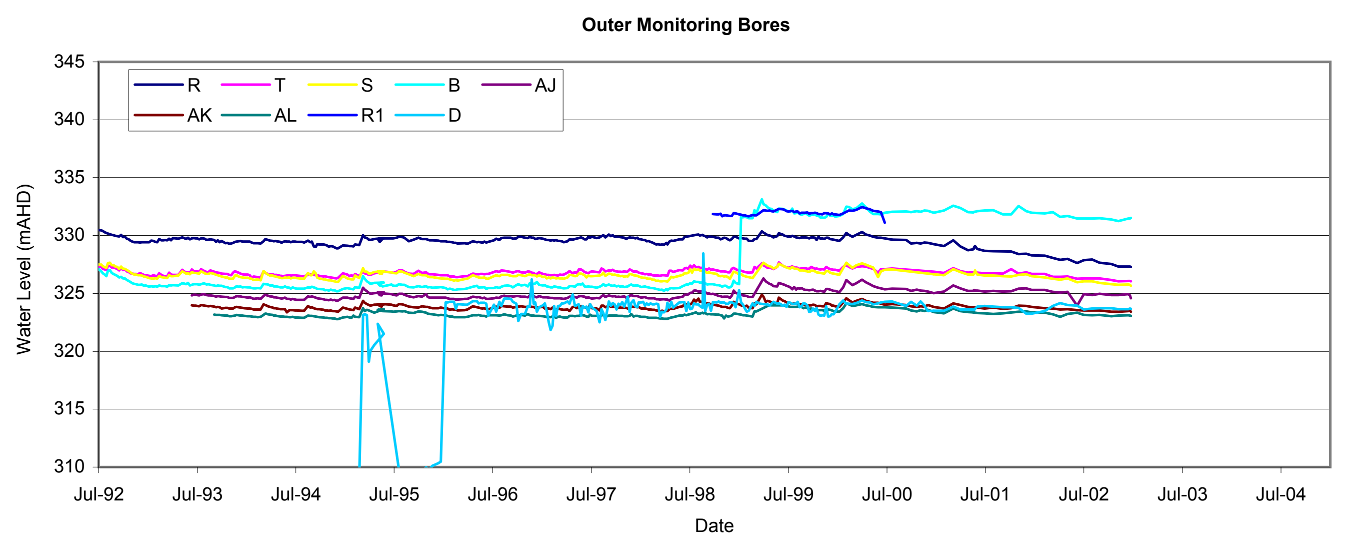

Monthly Rainfall
Rainfall (mm)
250
200
150
100
50
0
Jul-92
Jul-93
Jul-94
Jul-95
Jul-96
Jul-97
Jul-98
Jul-99
Jul-00
Jul-01
Jul-02
Jul-03
Jul-04
Month

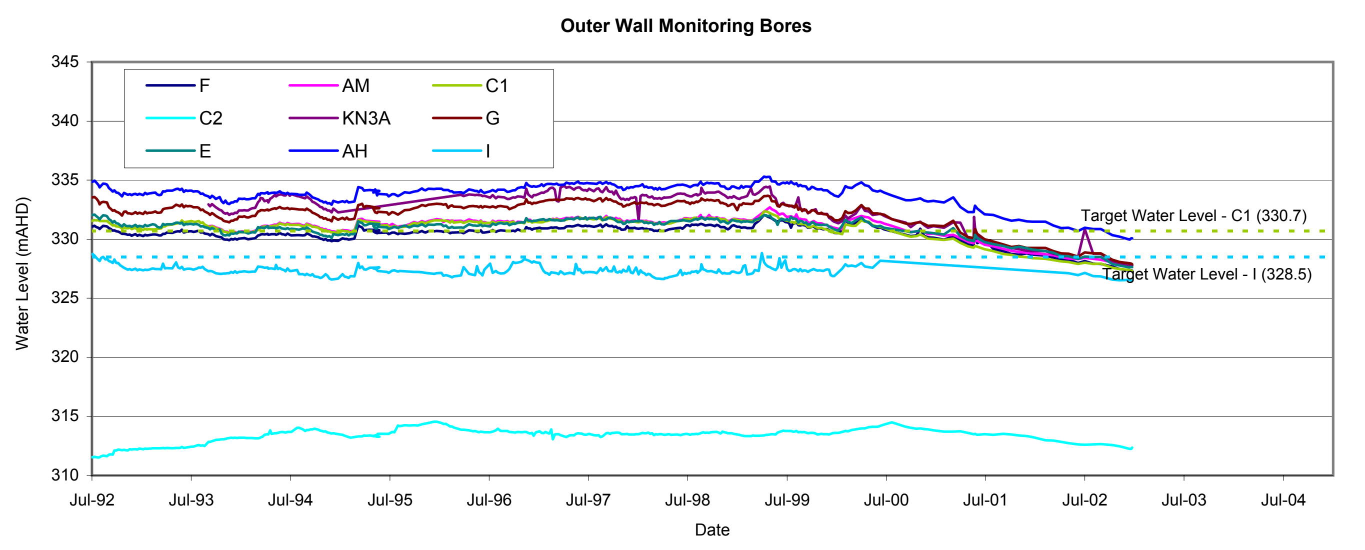

West Wall Monitoring Bores
AC
AG
A
AF
Target Water Level - AC (333)
Target Water Level - A (331.7)
Target Water Level - AF (331.3)
Water Level (mAHD)
345
340
335
330
325
320
315
310
Jul-92
Jul-93
Jul-94
Jul-95
Jul-96
Jul-97
Jul-98
Jul-99
Jul-00
Jul-01
Jul-02
Jul-03
Jul-04
Date

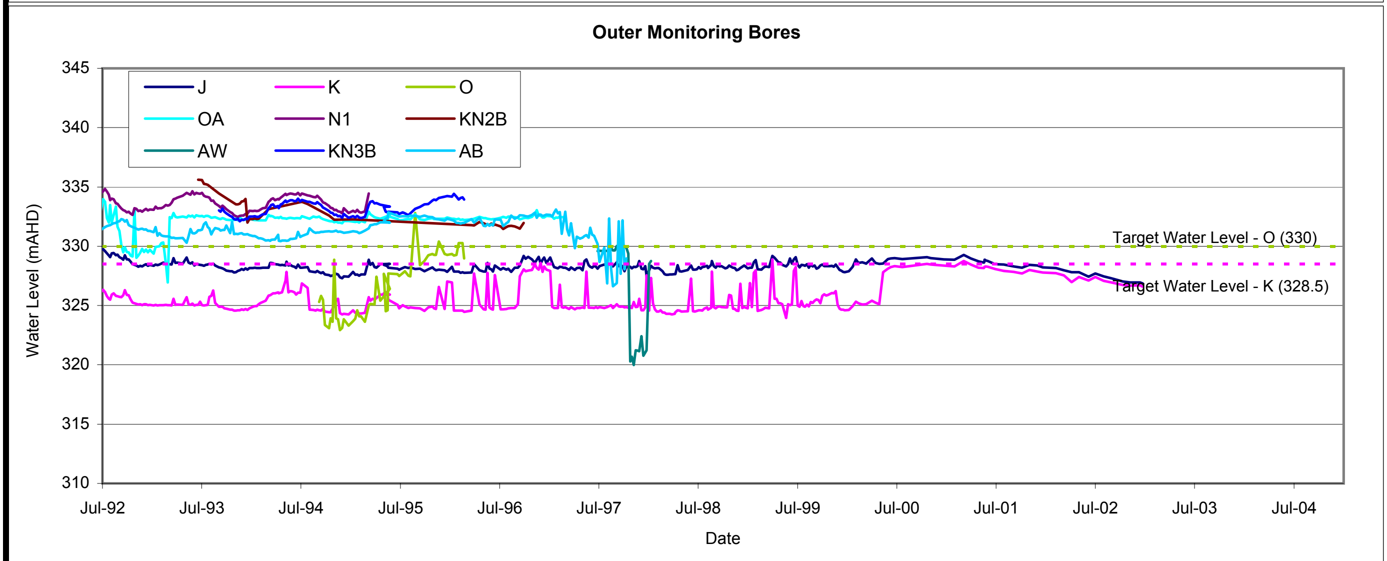

West Wall Monitoring Bores
AN
KN1C
KN1B
KN1A
Water Level (mAHD)
345
340
335
330
325
320
315
310
Jul-92
Jul-93
Jul-94
Jul-95
Jul-96
Jul-97
Jul-98
Jul-99
Jul-00
Jul-01
Jul-02
Jul-03
Jul-04
Date

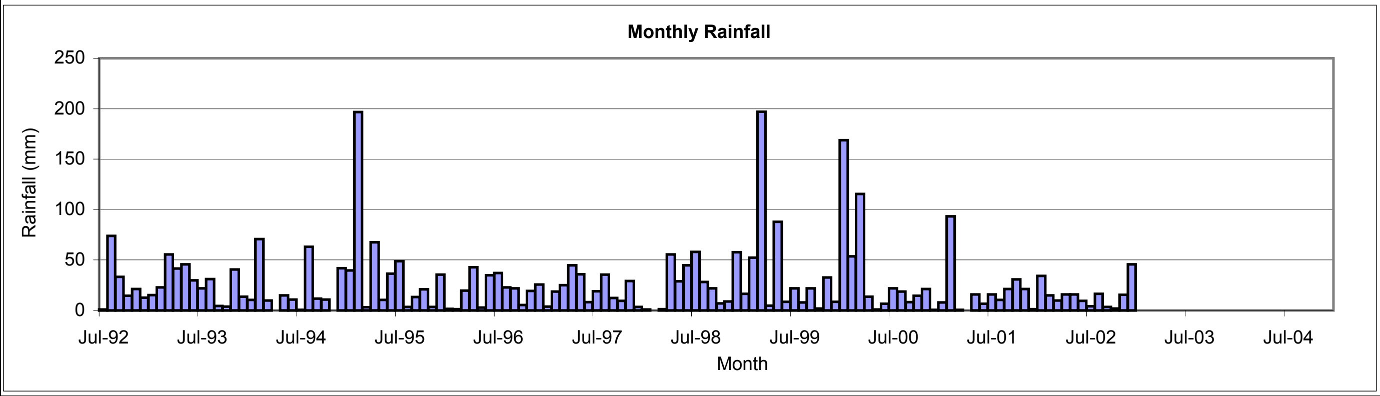

West Wall Monitoring Bores
AI
AD
AV
AX
Target Water Level - AD (329.5)
Water Level (mAHD)
345
340
335
330
325
320
315
310
Jul-92
Jul-93
Jul-94
Jul-95
Jul-96
Jul-97
Jul-98
Jul-99
Jul-00
Jul-01
Jul-02
Jul-03
Jul-04
Date


Monthly Rainfall
Rainfall (mm)
250
200
150
100
50
0
Jul-92
Jul-93
Jul-94
Jul-95
Jul-96
Jul-97
Jul-98
Jul-99
Jul-00
Jul-01
Jul-02
Jul-03
Jul-04
Month


Outer Monitoring Bores
Water Level (mAHD)
345
340
335
330
325
320
315
310
R
T
S
B
AJ
AK
AL
R1
D
Jul-92
Jul-93
Jul-94
Jul-95
Jul-96
Jul-97
Jul-98
Jul-99
Jul-00
Jul-01
Jul-02
Jul-03
Jul-04
Date

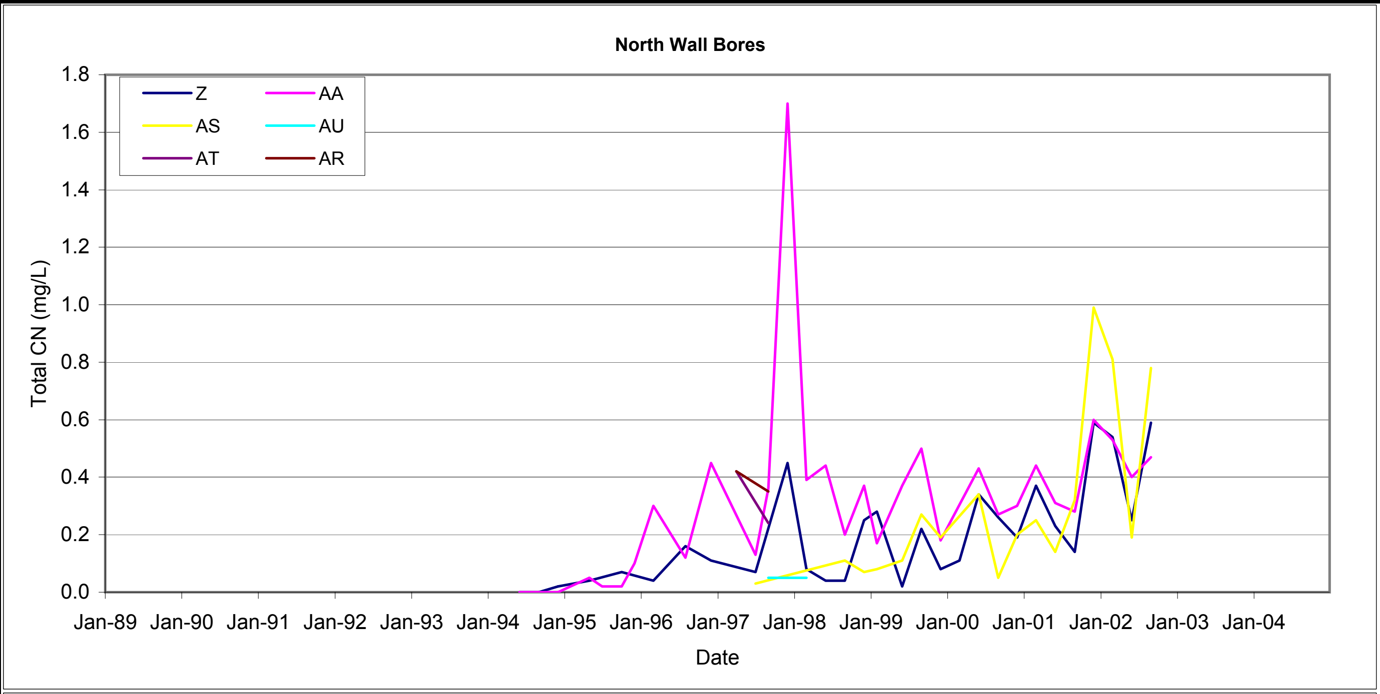

Outer Wall Monitoring Bores
Water Level (mAHD)
345
340
335
330
325
320
315
310
F
AM
C1
C2
KN3A
G
E
AH
I
Target Water Level - C1 (330.7)
Target Water Level - I (328.5)
Jul-92
Jul-93
Jul-94
Jul-95
Jul-96
Jul-97
Jul-98
Jul-99
Jul-00
Jul-01
Jul-02
Jul-03
Jul-04
Date

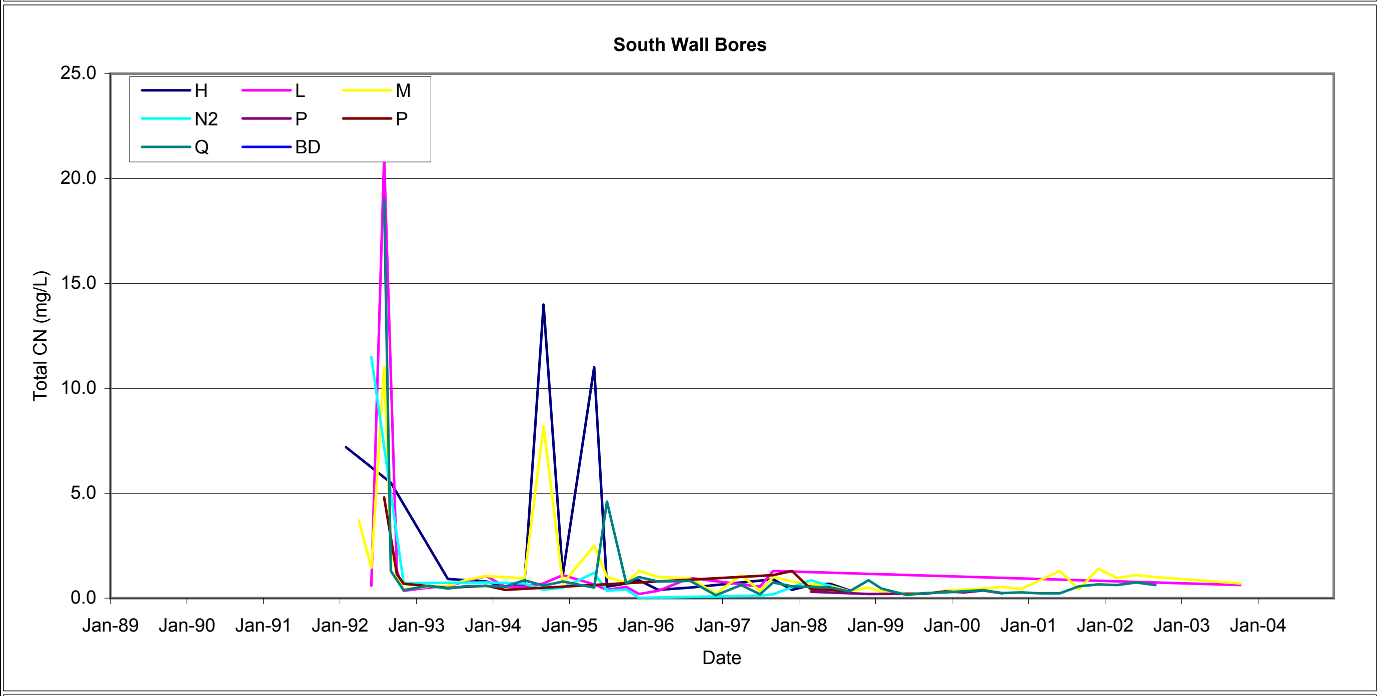

Outer Monitoring Bores
Water Level (mAHD)
345
340
335
330
325
320
315
310
J
K
O
OA
N1
KN2B
AW
KN3B
AB
Target Water Level - O (330)
Target Water Level - K (328.5)
Jul-92
Jul-93
Jul-94
Jul-95
Jul-96
Jul-97
Jul-98
Jul-99
Jul-00
Jul-01
Jul-02
Jul-03
Jul-04
Date

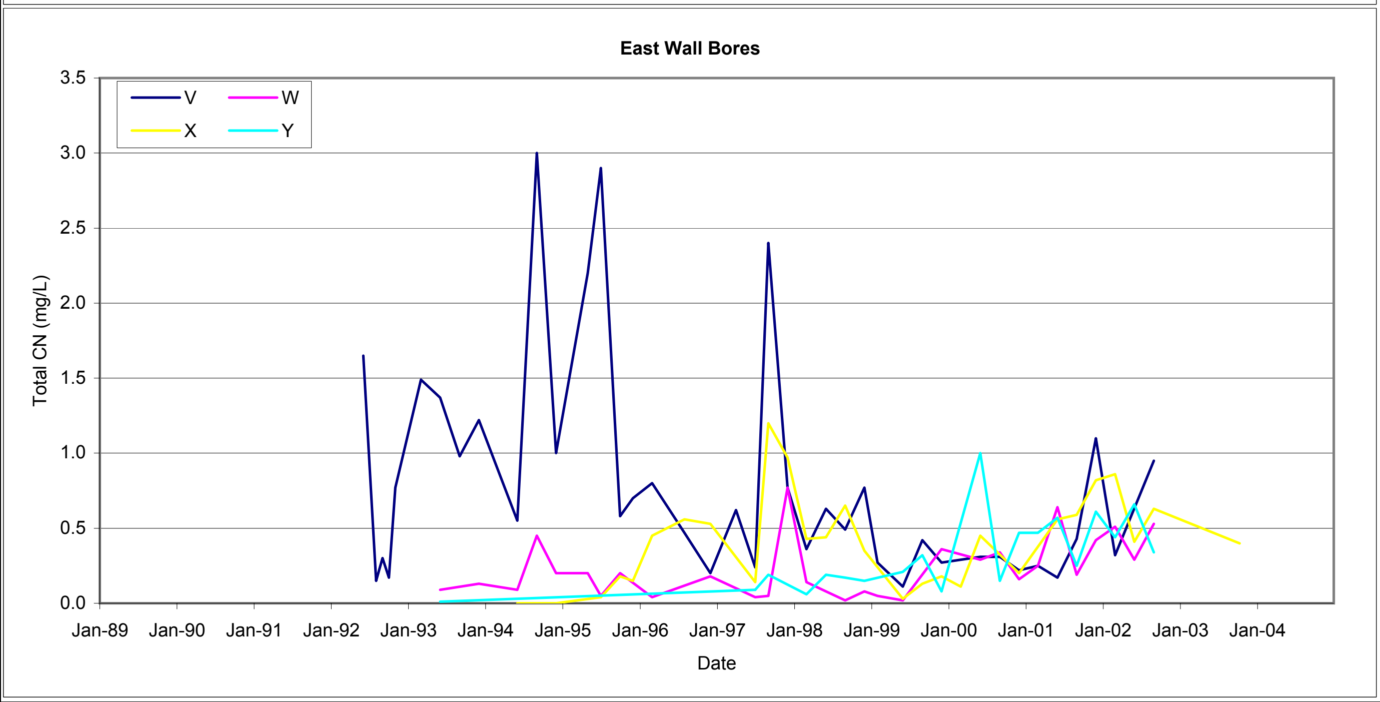

Monthly Rainfall
Rainfall (mm)
250
200
150
100
50
0
Jul-92
Jul-93
Jul-94
Jul-95
Jul-96
Jul-97
Jul-98
Jul-99
Jul-00
Jul-01
Jul-02
Jul-03
Jul-04
Month

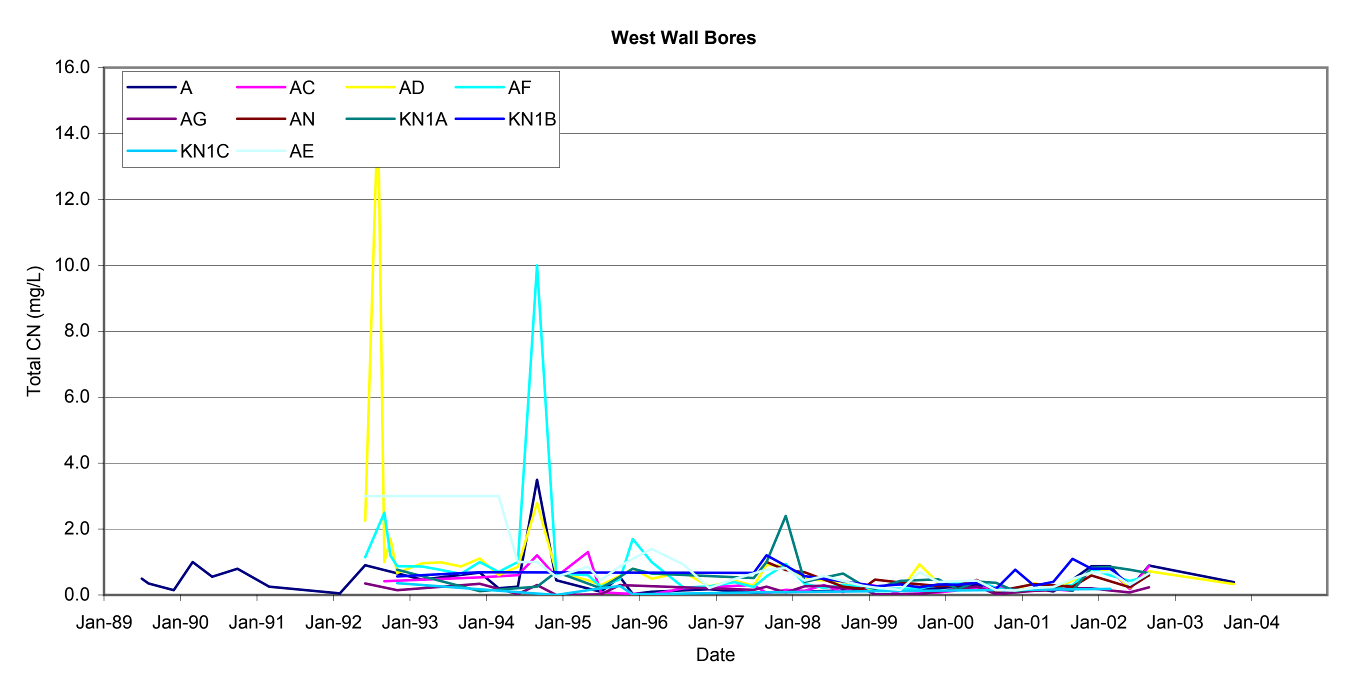
Annex C

Total CN Concentrations, 1989 - 2004

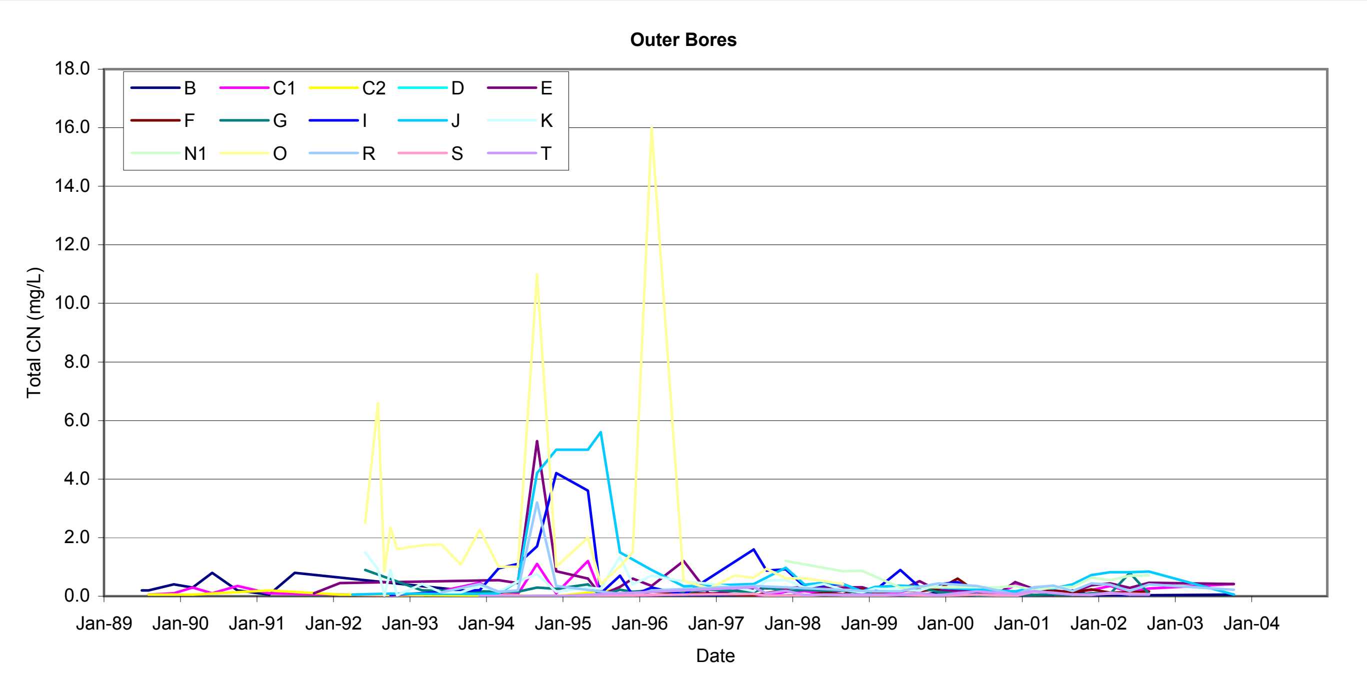

North Wall Bores
Z
AA
AS
AU
AT
AR
1.8
1.6
1.4
1.2
1.0
0.8
0.6
0.4
0.2
0.0
Total CN (mg/L)
Jan-89
Jan-90
Jan-91
Jan-92
Jan-93
Jan-94
Jan-95
Jan-96
Jan-97
Jan-98
Jan-99
Jan-00
Jan-01
Jan-02
Jan-03
Jan-04
Date


South Wall Bores
H
L
M
N2
P
P
Q
BD
25.0
20.0
15.0
10.0
5.0
0.0
Total CN (mg/L)
Jan-89
Jan-90
Jan-91
Jan-92
Jan-93
Jan-94
Jan-95
Jan-96
Jan-97
Jan-98
Jan-99
Jan-00
Jan-01
Jan-02
Jan-03
Jan-04
Date

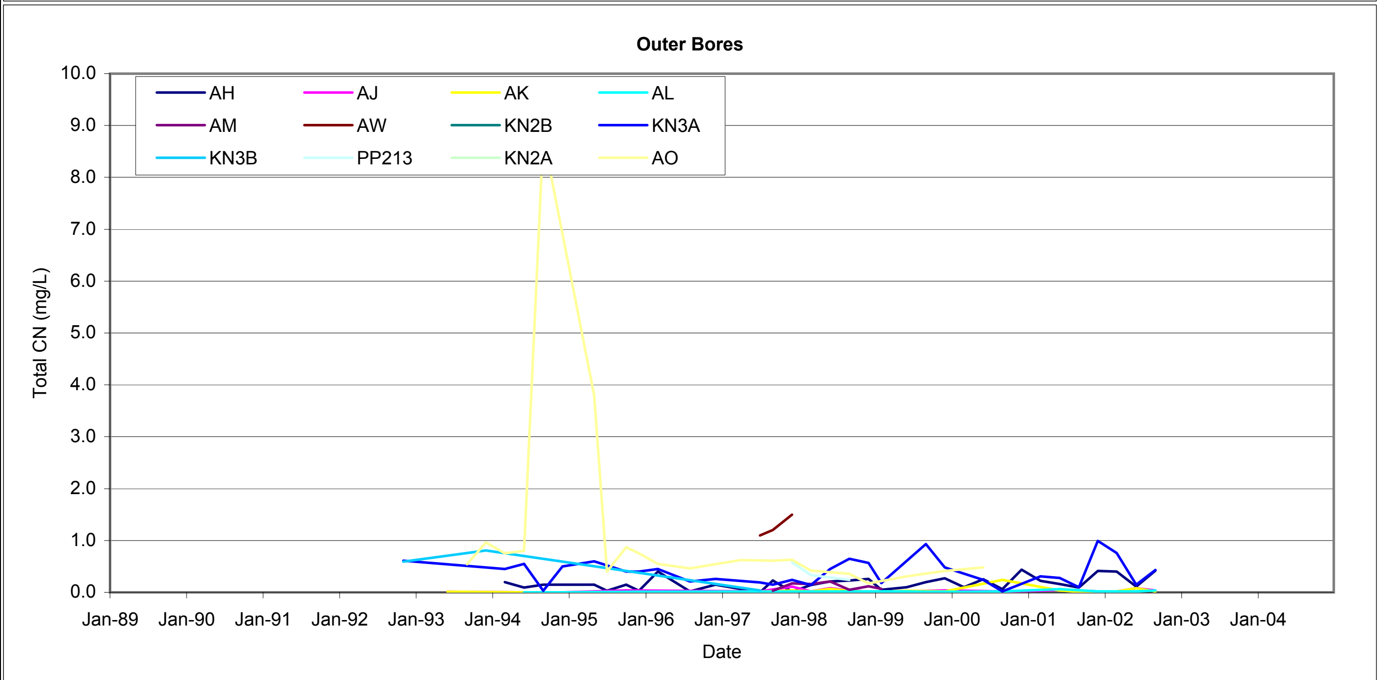

East Wall Bores
V
W
X
Y
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0.0
Total CN (mg/L)
Jan-89
Jan-90
Jan-91
Jan-92
Jan-93
Jan-94
Jan-95
Jan-96
Jan-97
Jan-98
Jan-99
Jan-00
Jan-01
Jan-02
Jan-03
Jan-04
Date



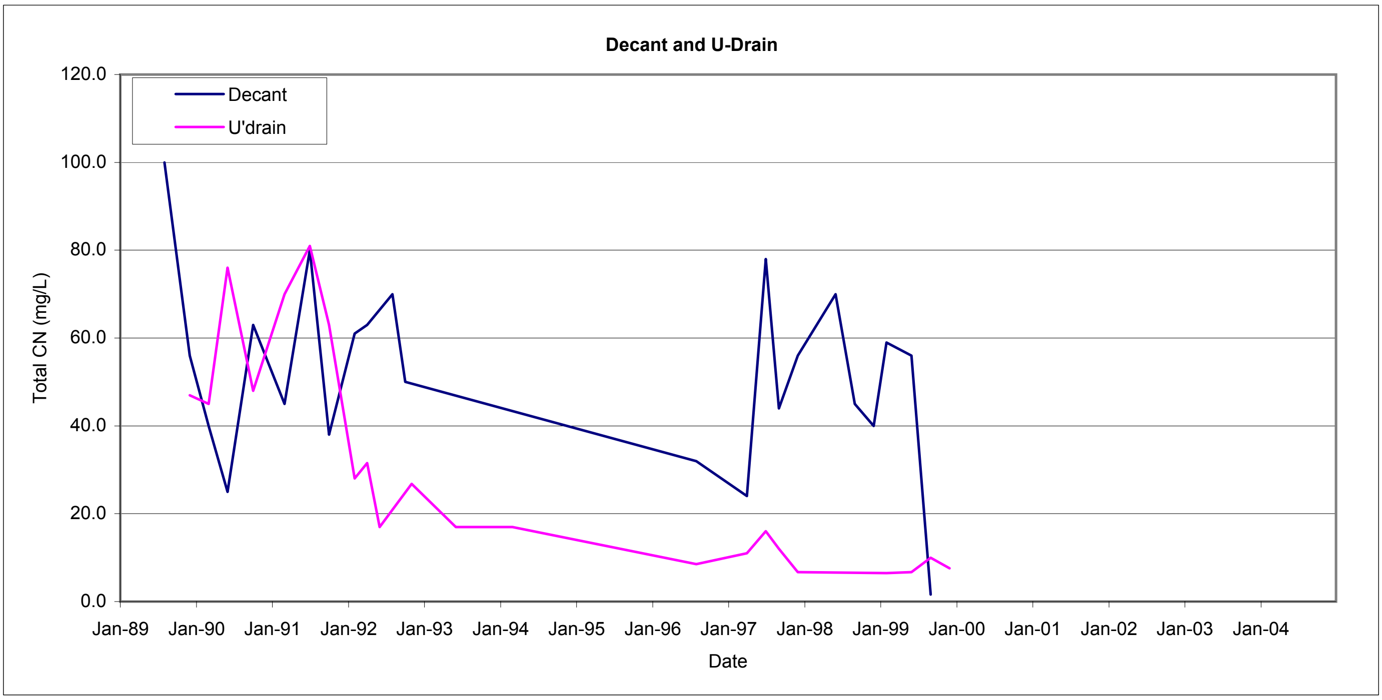
West Wall Bores
Total CN (mg/L)
Date
A
AC
AD
AF
AG
AN
KN1A
KN1B
KN1C
AE



Outer Bores
Total CN (mg/L)
Date
B
C1
C2
D
E
F
G
I
J
K
N1
O
R
S
T



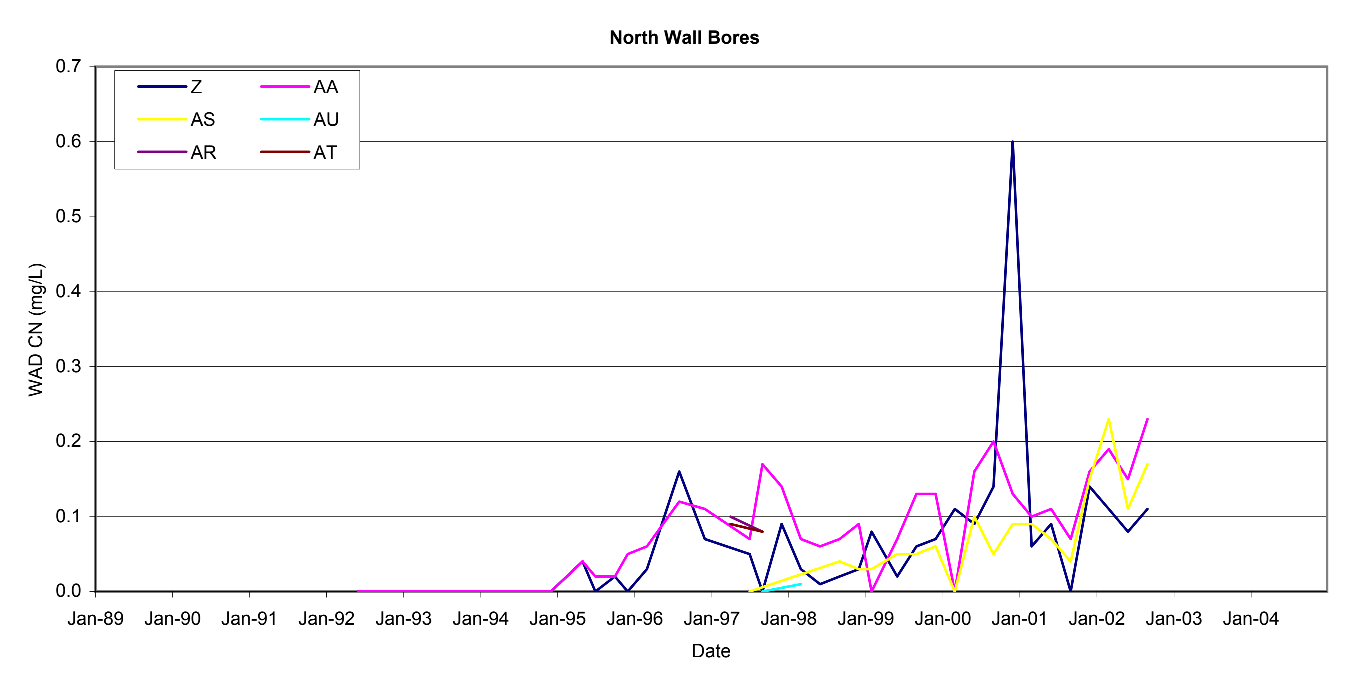
Outer Bores
Total CN (mg/L)
Date
AH
AJ
AK
AL
AM
AW
KN2B
KN3A
KN3B
PP213
KN2A
AO

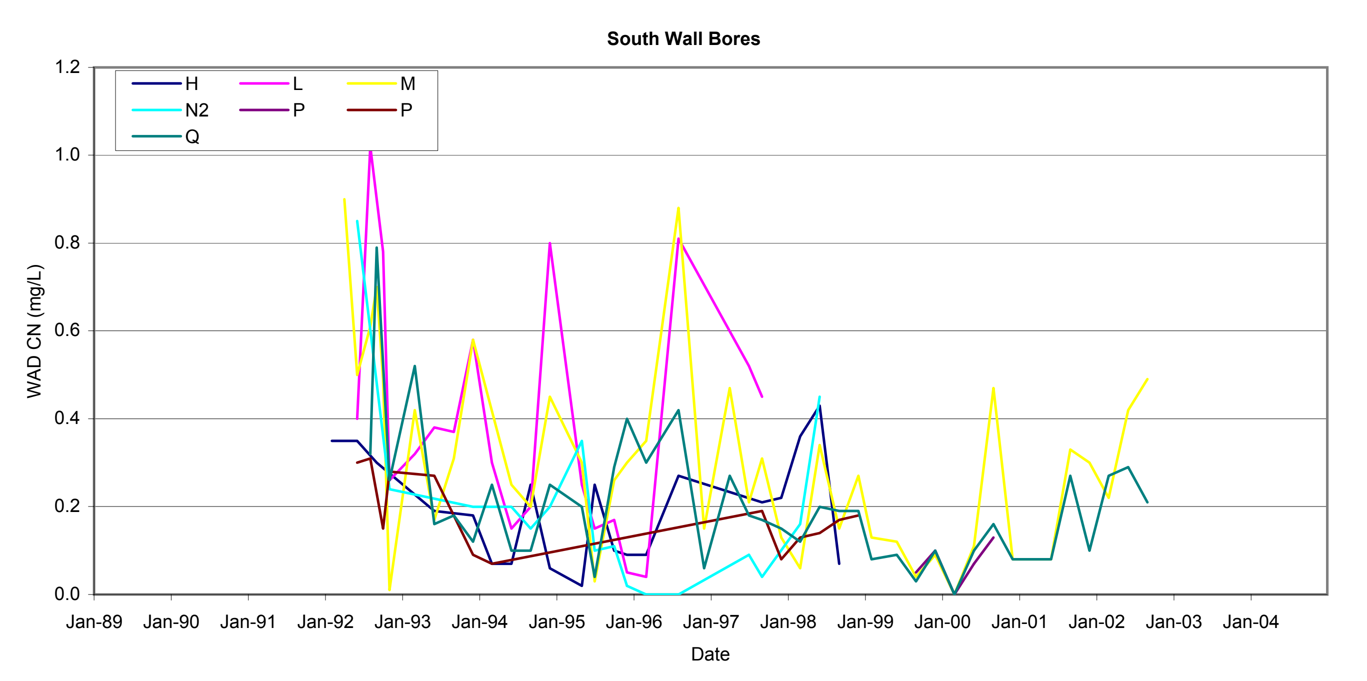


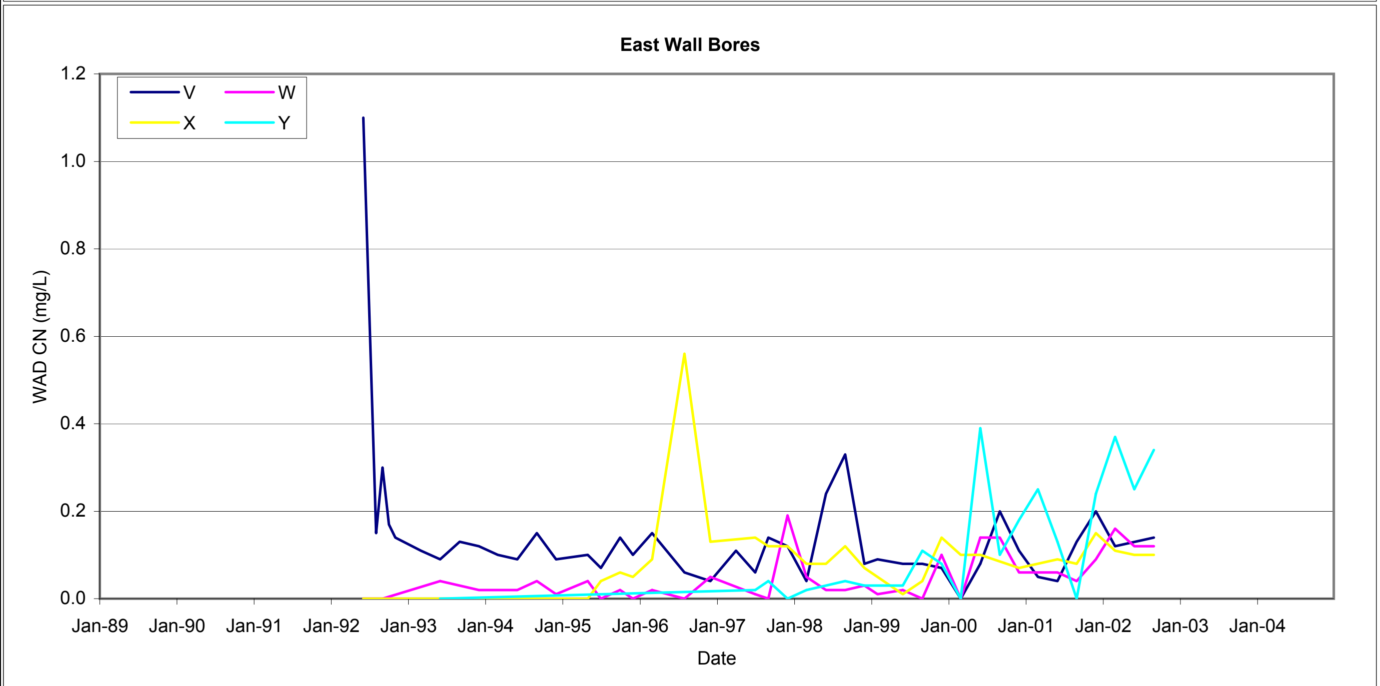
Decant and U-Drain
Decant
U'drain
Total CN (mg/L)
120.0
100.0
80.0
60.0
40.0
20.0
0.0
Jan-89
Jan-90
Jan-91
Jan-92
Jan-93
Jan-94
Jan-95
Jan-96
Jan-97
Jan-98
Jan-99
Jan-00
Jan-01
Jan-02
Jan-03
Jan-04
Date

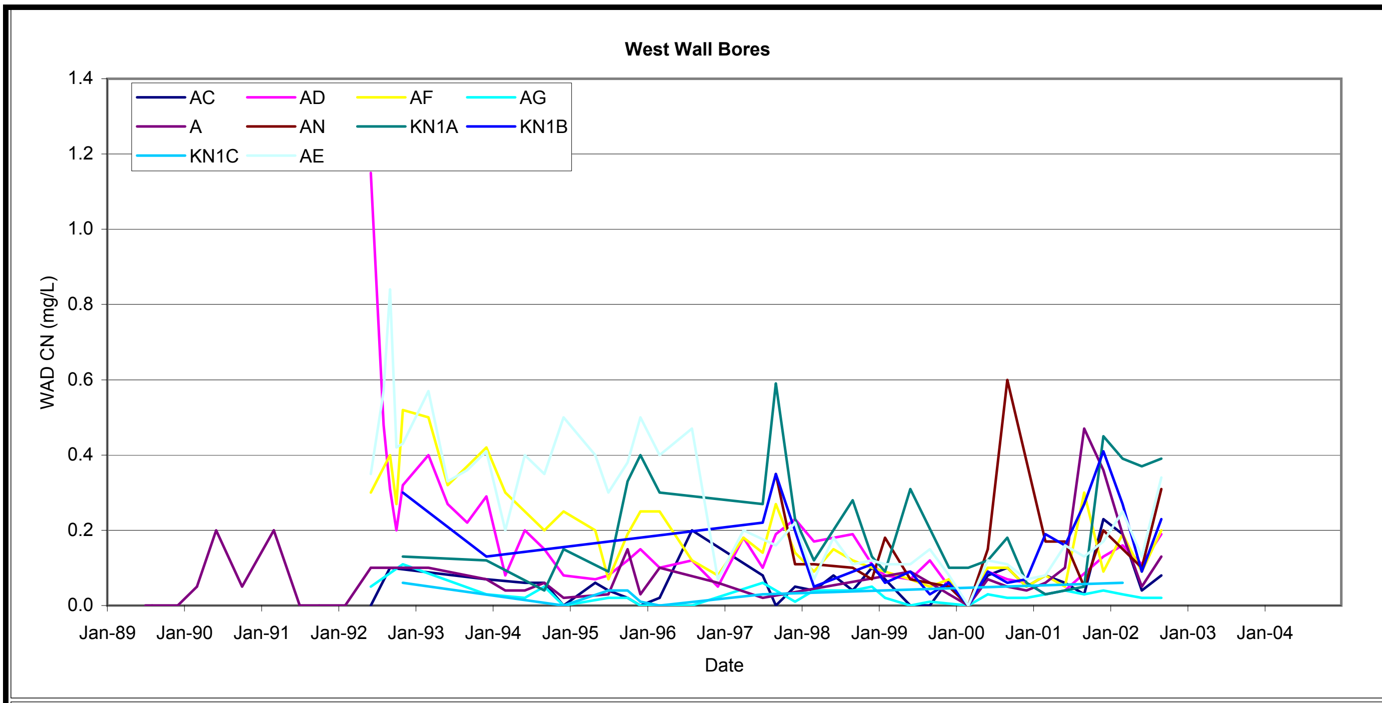
Annex D

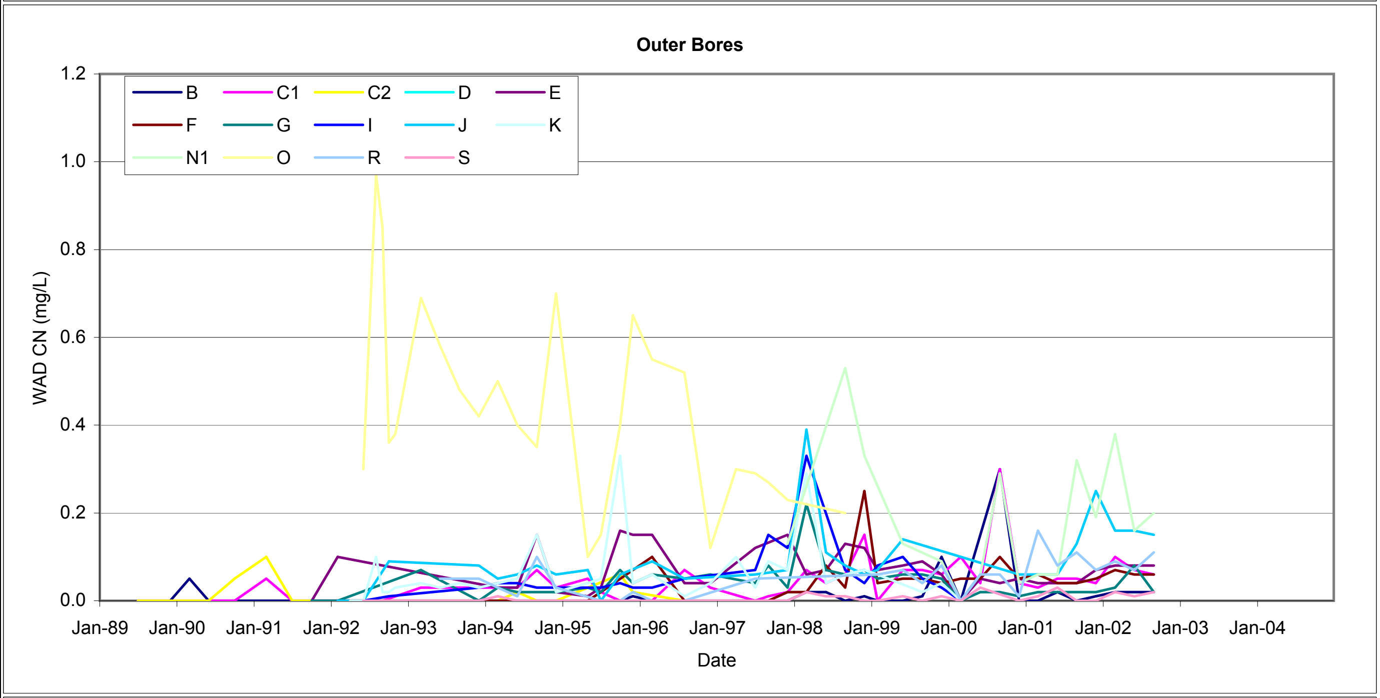
WAD CN Concentrations, 1989 - 2004

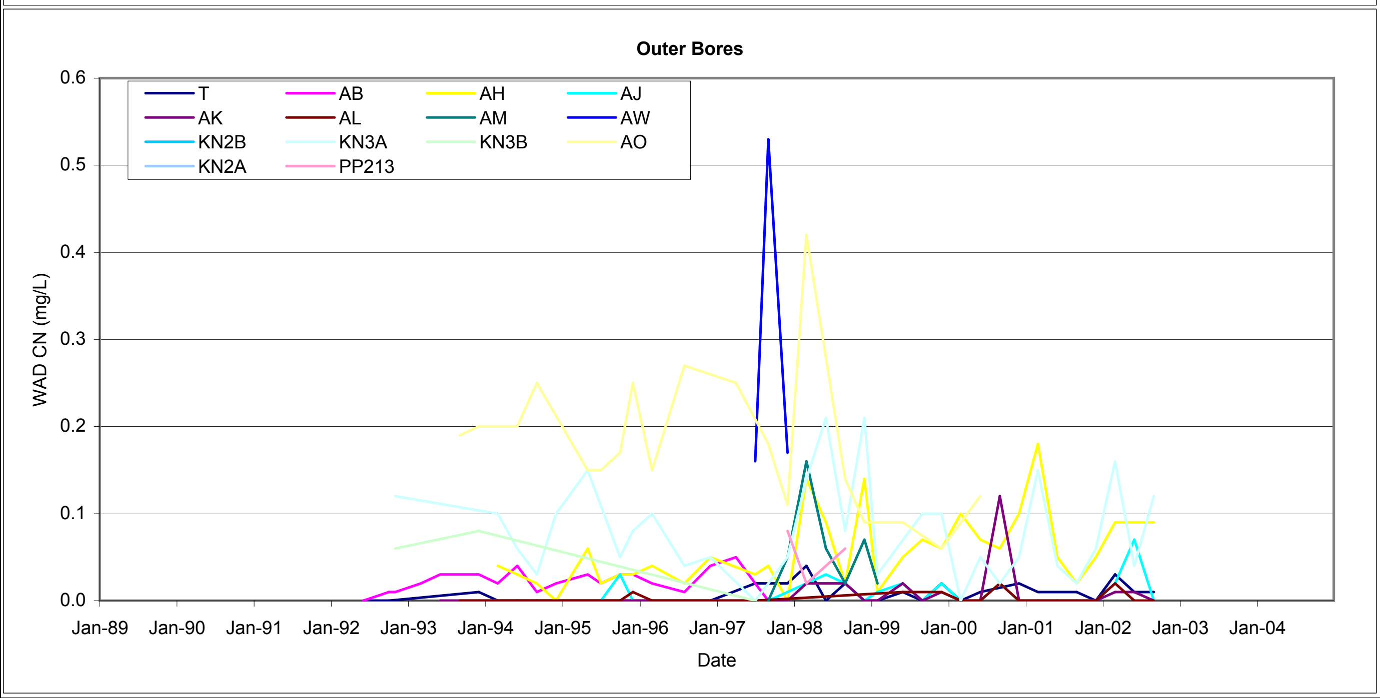

North Wall Bores
Z
AA
AS
AU
AR
AT
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0.0
WAD CN (mg/L)
Jan-89
Jan-90
Jan-91
Jan-92
Jan-93
Jan-94
Jan-95
Jan-96
Jan-97
Jan-98
Jan-99
Jan-00
Jan-01
Jan-02
Jan-03
Jan-04
Date

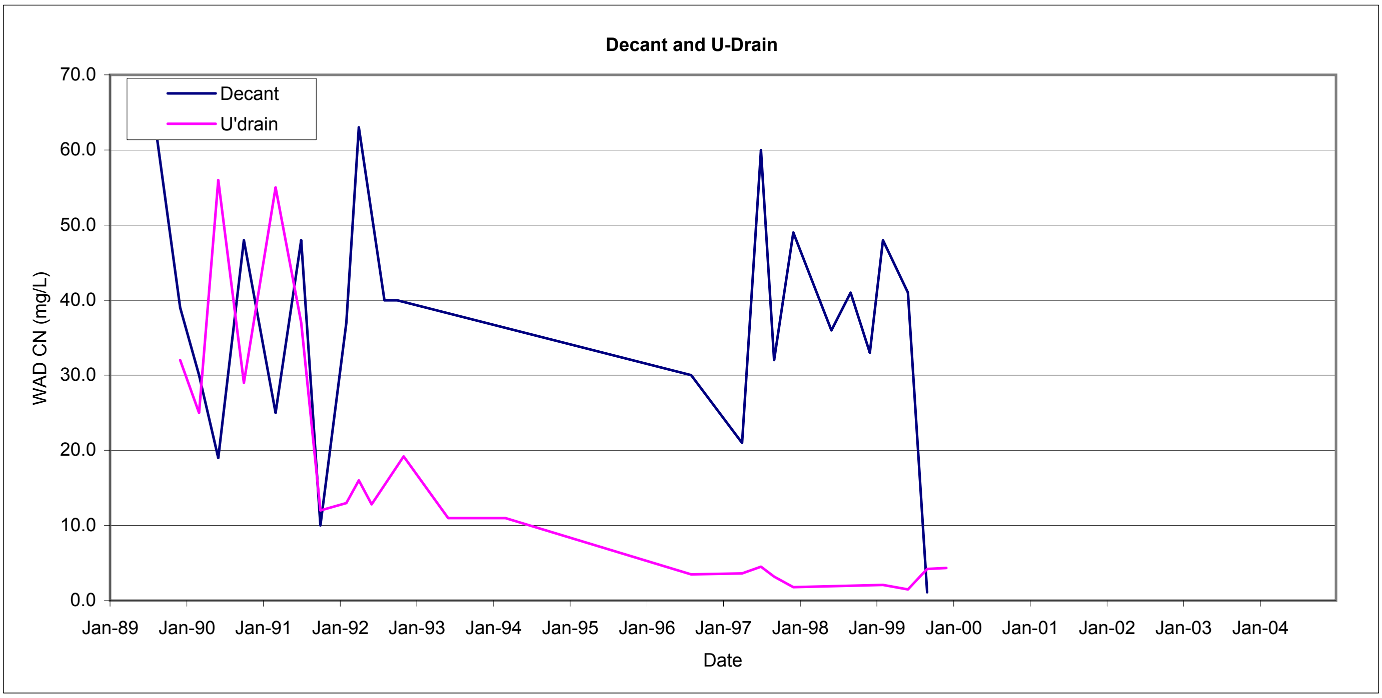

South Wall Bores
H
L
M
N2
P
P
Q
1.2
1.0
0.8
0.6
0.4
0.2
0.0
WAD CN (mg/L)
Jan-89
Jan-90
Jan-91
Jan-92
Jan-93
Jan-94
Jan-95
Jan-96
Jan-97
Jan-98
Jan-99
Jan-00
Jan-01
Jan-02
Jan-03
Jan-04
Date


East Wall Bores
V
W
X
Y
1.2
1.0
0.8
0.6
0.4
0.2
0.0
WAD CN (mg/L)
Jan-89
Jan-90
Jan-91
Jan-92
Jan-93
Jan-94
Jan-95
Jan-96
Jan-97
Jan-98
Jan-99
Jan-00
Jan-01
Jan-02
Jan-03
Jan-04
Date


West Wall Bores
AC
AD
AF
AG
A
AN
KN1A
KN1B
KN1C
AE
1.4
1.2
1.0
0.8
0.6
0.4
0.2
0.0
WAD CN (mg/L)
Jan-89
Jan-90
Jan-91
Jan-92
Jan-93
Jan-94
Jan-95
Jan-96
Jan-97
Jan-98
Jan-99
Jan-00
Jan-01
Jan-02
Jan-03
Jan-04
Date


Outer Bores
B
C1
C2
D
E
F
G
I
J
K
N1
O
R
S
1.2
1.0
0.8
0.6
0.4
0.2
0.0
WAD CN (mg/L)
Jan-89
Jan-90
Jan-91
Jan-92
Jan-93
Jan-94
Jan-95
Jan-96
Jan-97
Jan-98
Jan-99
Jan-00
Jan-01
Jan-02
Jan-03
Jan-04
Date


Outer Bores
T
AB
AH
AJ
AK
AL
AM
AW
KN2B
KN3A
KN3B
AO
KN2A
PP213
0.6
0.5
0.4
0.3
0.2
0.1
0.0
WAD CN (mg/L)
Jan-89
Jan-90
Jan-91
Jan-92
Jan-93
Jan-94
Jan-95
Jan-96
Jan-97
Jan-98
Jan-99
Jan-00
Jan-01
Jan-02
Jan-03
Jan-04
Date



Decant and U-Drain
Decant
U'drain
70.0
60.0
50.0
40.0
30.0
20.0
10.0
0.0
WAD CN (mg/L)
Jan-89
Jan-90
Jan-91
Jan-92
Jan-93
Jan-94
Jan-95
Jan-96
Jan-97
Jan-98
Jan-99
Jan-00
Jan-01
Jan-02
Jan-03
Jan-04
Date