

The copyright of this thesis vests in the author. No quotation from it or information derived from it is to be published without full acknowledgement of the source. The thesis is to be used for private study or non-commercial research purposes only.

Published by the University of Cape Town (UCT) in terms of the non-exclusive license granted to UCT by the author.

3

**An Assessment of Water Demand Management and
the Attitudes, Perceptions and Practices of Large
Potable Water Consumers within the Cape
Metropolitan Area**

VOLUME 2

Hylton Allison

Andrew Hester

Joseph Kombe

Mark van Druten

Department of Environmental and Geographical Science
University of Cape Town

August 2000

An Assessment of Water Demand Management and the Attitudes, Perceptions and Practices of Large Water Consumers within the Cape Metropolitan Area

The Masters' group would like to thank the following organisations:



BP– Southern Africa and WWF– SA for their financial assistance in this project.

SIDA/ SAREC – East African Coastal Management Programme for their financial assistance

The financial assistance of National Research Foundation (NRF) is hereby acknowledged. Opinions expressed and conclusions arrived at, are those of the author and are not necessarily attributed to the National Research Foundation.

**Department of Environmental and Geographical Science
University of Cape Town**



CONTENTS

The following appendices are contained in this volume: -

| | |
|-----------------------|--|
| APPENDIX I: | Contract |
| APPENDIX II: | Project Terms of Reference |
| APPENDIX III: | List of relevant persons consulted |
| APPENDIX IV: | List of Large water users in the CMA |
| APPENDIX V: | Questionnaire Document |
| APPENDIX VI: | MLC Information Letter |
| APPENDIX VII: | Project Explanation from CMC and ARCUS GIBB |
| APPENDIX VIII: | Audit Sheets (copyright - Mr Roy Donovan) |
| APPENDIX IX: | Diagrams of Fixtures and Fittings |

APPENDIX I: Contract

University of Cape Town

STANDARD GIBB AFRICA TERMS OF AGREEMENT FOR SUB-CONSULTANTS

THIS AGREEMENT is made the 26th of May 2000

BETWEEN:-

GIBB AFRICA (PROPRIETARY) LIMITED whose registered office is situated at 14 Kloof Street, Cape Town, South Africa ("GIBB") of the first part, and

the THE DEPARTMENT OF ENVIRONMENTAL AND GEOGRAPHICAL SCIENCE AT THE UNIVERSITY OF CAPE TOWN ("the Sub-Consultant") of the second part

WHEREAS:

- A. GIBB has entered into an agreement according to the Terms of Reference dated 22 March 2000 ("the Principal Agreement") between the Cape Metropolitan Council ("the Client") and GIBB whereby GIBB has agreed on the terms and conditions therein contained to perform the services in connection with the INTEGRATED WATER RESOURCE PLANNING STUDY detailed in Schedule 1 ("the Principal Services") together with Ninham Shand Consulting Engineers.
- B. GIBB wishes to sub-contract part of the Principal Services as set out in Schedule 2 ("the Sub-Contracted Services") to the Sub-Consultant and the Sub-Consultant has agreed to undertake the Sub-Contracted Services on the terms and conditions herein contained.

NOW THIS AGREEMENT WITNESSETH as follows:-

1. The Sub-Consultant undertakes to perform the Sub-Contracted Services set out in Schedule 2 in accordance with the terms and conditions of this Agreement including any Supplementary Conditions set out in Schedule 2.
2. In consideration of the proper provision of the Sub-Contracted Services GIBB shall pay to the Sub-Consultant the sums set out in Schedule 3.
3. Within 30 days after the Consultant receives monies from the Client in respect of and following an application for payment which the Sub-Consultant was entitled to make GIBB shall (subject as hereafter provided) pay the same to the Sub-Consultant. If payment is not made by such date, subject to any deduction which GIBB was entitled to make, GIBB shall also pay interest compounded monthly at the rate of 2% per annum above the base lending rate of Nedbank Limited.
4. If GIBB intends to withhold any payment, it shall notify the Sub-Consultant.
5. If the Sub-Consultant intends to claim any additional payment, it shall promptly notify GIBB accordingly. The Sub-Consultant shall not be entitled to additional payment to the extent that GIBB is unable to seek compensation from the Client therefor.
6. Any payments due under this Agreement will be paid without deduction of income tax on receipt of a Tax Exemption Certificate or tax directive. In the absence of such documents GIBB will deduct income tax in accordance with the South African Revenue Services requirements. Should the tax deduction not be processed the Sub-Consultant is solely responsible for its own tax payments.
7. The Sub-Consultant shall be deemed to have knowledge of all necessary provisions of the Principal Agreement (including any subsequent variations thereto which variations will be notified by GIBB to the Sub-Consultant as soon as reasonably practicable) and accepts these stipulations of the Principal Agreement as binding on it. Provided that if any variation of the provisions of the Principal Agreement results in an increase or decrease in the amount of work to be performed by the Sub-Consultant hereunder, the sums payable to the Sub-Consultant under Clause 2 above will be adjusted upwards or downwards (as appropriate) to such sums as in the opinion of GIBB is fair and reasonable.

8. The Sub-Consultant undertakes that in connection with the performance of its obligations in connection with this Agreement:-

- i) it will provide all material, staff and every other thing of the quality and standards necessary for the execution of the Sub-Contracted Services, and
- ii) it will comply with all legal and statutory requirements in relation to the execution of the Sub-Contracted Services in force from time to time, and
- iii) it will observe, perform and comply with all the provisions of the Principal Agreement on the part of GIBB to be observed, performed and complied with so far as they relate and apply to the Sub-Contracted Services.

Without prejudice to the generality of (iii) above it will be liable for and shall indemnify GIBB against any expense liability loss claim or proceedings in respect of:

- (a) personal injury to or the death of any person arising out of or in the course of or caused by the carrying out of the Sub-Contracted Services; and
- (b) any injury or damage whatsoever to any property real or personal insofar as such injury or damage arises out of or in the course of or by reason of the carrying out of the Sub-Contracted Services; and
- (c) its performance of (or failure to perform in accordance with the terms of this Agreement) the Sub-Contracted Services to the extent that the same is due to any negligence, omission or default of the Sub-Consultant, the Sub-Consultant's servants or agents; and
- (d) any violation by the Sub-Consultant of legal provisions or rights of third parties in respect of patents and/or copyrights.

9. Further to Clause 8 hereof the Sub-Consultant also undertakes that in connection with the performance of its obligations in connection with this Agreement:-

- i) before the coming into force of this Agreement it has effected Professional Indemnity Liability Insurance and which insurance adequately covers the Sub-Contracted Services to be provided by it under this Agreement. It will use its best endeavours to maintain such insurance for the duration of this Agreement and for such period thereafter during which any third party may have a right of claim against it arising out of the Sub-Contracted Services. It will provide evidence to GIBB that it has such Professional Indemnity Insurance in force and that the level of cover held is adequate for the Project. It will provide evidence to GIBB that such Professional Indemnity Insurance is renewed annually for the duration of the Project and for such period thereafter during which any third party may have the right of claim against it arising out of the Sub-Contracted Services. In the event of it not being able to maintain such insurance it shall inform GIBB to that effect at least two months before any change in insurance cover takes place. In that event GIBB shall be entitled to arrange replacement insurance and recover the premium therefor from the Sub-Consultant;
- ii) it will maintain such other insurances as are necessary to cover the liability of the Sub-Consultant in relation to its obligations in connection with this Agreement and shall on reasonable request of GIBB furnish to GIBB full details of such insurances. If the Sub-Consultant fails to maintain such insurances GIBB may take out the necessary insurance and may either deduct the amounts of the premiums for such insurances from any monies due to the Sub-Consultant under this Agreement or shall recover the same as a debt due to GIBB from the Sub-Consultant.

10 The time for completion of the Sub-Contracted Services is as set out in Schedule 4.

- 11 Without prejudice to any rights or remedies which the parties may have against each other or to any other provision of this Agreement, this Agreement may be terminated forthwith by either party:
- i) in the event of either party committing any breach of this Agreement which is remediable and not remedying the same within 21 days of written notice from the other party requiring such remedy or
 - ii) upon written notice being given by either party if the other party commits any irremediable breach of this Agreement or repeats any such breach as has previously been the subject of a notice under sub-clause (i) above, or
 - iii) upon written notice by either party to the other party if
 - a) being a partnership any partner in such other party shall become bankrupt or have a receiving order or administration order made against him or shall make any composition or arrangement with or for the benefit of his creditors or shall make any conveyance or assignment for the benefit of his creditors or shall grant any trust deed on behalf of his creditors or shall purport so to do or shall have any application made against him under any Bankruptcy Act for the time being in force for the sequestration of his estate or
 - b) such other party being a company an order is made or an effective resolution is passed for the liquidation or winding up or any similar judicial process or
 - c) such other party ceases or threatens to cease to carry on its business or substantially the whole of its business or disposes of its undertaking or stops or threatens to stop payment of its debts.
- 12 The rights and obligations of each of the parties of this Agreement are personal to such party and may not be assigned sub-contracted, charged, delegated or transferred in any way whatsoever by such party without the written consent of the other party.
- 13 Any notice required or authorised to be given under this Agreement shall be served by pre-paid registered letter or airmail letter (as appropriate) or by facsimile addressed to either party at the address given above or any other address notified to the other as its address for service.
- Any notice so given by post shall be deemed to have been served three days after the same shall have been posted and any notice so given by facsimile shall be deemed to have been received on despatch. In proving such service it shall be sufficient to prove that the letter or facsimile containing the notice was properly addressed and as the case may be put into the post or transmitted. Any such notice transmitted by facsimile shall be confirmed by letter.
- 14 This Agreement shall be governed and construed and performed solely in accordance with the laws of the Republic of South Africa. The Courts of the Republic of South Africa shall have exclusive jurisdiction save that any judgement, award or order obtained therein can be enforced in any jurisdiction. The language used in connection with this Agreement shall be English.

15 Insofar as any part of this Agreement may conflict or be inconsistent with any provision of the Principal Agreement this Agreement shall always prevail.

IN WITNESS whereof this Agreement has been entered into the day and year first above written.

SIGNED by

for and on behalf of

GIBB AFRICA (PROPRIETARY) LIMITED

in the presence of *J.H. de Klerk*

SIGNED by ...

for and on behalf of

THE DEPARTMENT OF ENVIRONMENTAL AND GEOGRAPHICAL SCIENCE AT THE UNIVERSITY OF

the presence of ..

M. Sweni SH. (MSc)

SCHEDULE 1
THE PRINCIPAL SERVICES

CAPE METROPOLITAN COUNCIL

**ALTERNATIVE OPTIONS
TO MEET THE DEMAND
FOR WATER IN THE CAPE
METROPOLITAN REGION**

TERMS OF REFERENCE

(FINAL DRAFT AS AT 22/03/00)

TABLE OF CONTENTS

1. INTRODUCTION
 - 1.1 General
 - 1.2 Work Packages and Allocation

2. WORK PACKAGES
 - 2.1 Management, Synthesis and Main Report
 - 2.1.1 Administration
 - 2.1.2 Multi-criteria Decision Making
 - 2.2 Public Involvement
 - 2.2.1 General
 - 2.2.2 Announcement and publicity
 - 2.2.3 Scoping of water supply options
 - 2.2.4 Investigation of water demand management strategies
 - 2.3 Eerste River Diversion
 - 2.3.1 Objectives
 - 2.3.2 Scheme Conceptualisation
 - 2.3.3 Hydrology and Yield Analysis
 - 2.3.4 In-stream Flow Requirements
 - 2.3.5 Estuarine Freshwater Requirements
 - 2.3.6 Scheme Development
 - 2.3.7 Water Quality
 - 2.3.8 Environmental Assessment
 - 2.4 Lourens River Diversion
 - 2.4.1 Scheme conceptualisation
 - 2.4.2 All other aspects
 - 2.5 Cape Flats Aquifer
 - 2.6 Water Demand Management
 - 2.6.1 Introduction
 - 2.6.2 Evaluation of Current and Future Water Demand
 - 2.6.3 Water Demand Management Issues to be Evaluated
 - 2.6.4 Water Loss Management and Control
 - 2.6.4.1 Evaluation of Minimum Night Flows

- 2.6.4.2 Pressure Control
- 2.6.4.3 Household Leakage Repair Programme
- 2.6.5 Water Efficient Fittings
 - 2.6.5.1 Estimate of current domestic water use
 - 2.6.5.2 Replacement of automatic flushing urinals
- 2.6.6 Promotion of Private Boreholes and Wellpoints
- 2.6.7 Water Audits of Large Consumers
- 2.6.8 Price Elasticity of Water
- 2.6.9 Constraints to Implementation
- 2.7 Water Reclamation
 - 2.7.1 Use of Grey-water
 - 2.7.2 Use of Treated Sewage Effluent

3 BUDGET

4 STUDY PROGRAMME

APPENDICES:

- APPENDIX A: LIST OF SUB-CONSULTANTS
- APPENDIX B: BUDGET
- APPENDIX C: SCHEDULE
- APPENDIX D: LIST PROVIDED BY D NAIDOO OF DWAF WATER CONSERVATION

CAPE METROPOLITAN COUNCIL

ALTERNATIVE OPTIONS TO MEET THE DEMAND FOR WATER IN THE CAPE METROPOLITAN REGION

TERMS OF REFERENCE

(FINAL DRAFT AS AT 22/03/00)

1. INTRODUCTION

The Cape Metropolitan Council (CMC) is responsible for developing local water supplies and for water demand management in the Cape Metropolitan region. Indications are that this region will be exposed to undesirable levels of water supply risk and increasing likelihood of having to impose water restrictions from next summer onwards.

The CMC initiated a study to investigate the alternative options to meet the demand for water in the Cape Metropolitan region. The scope of the study includes water demand management and three supply options. This document contains the terms of reference for the study, as developed by the consultants in collaboration with CMC and the Management Committee constituted for the study.

The approach adopted for the study is to apply Integrated Resource Planning (IRP) which has been developed by international practitioners for the comprehensive evaluation of demand- and supply alternatives. IRP has been described by Bauman, et al (1998), as follows:

The IRP approach integrates critical planning criteria and activities into one systematic planning process. It emphasises the least-cost principles of selecting alternatives in an attempt to minimise costs, while creating a flexible plan allowing for a changing economic environment. It involves the concurrent consideration of supply and demand options including both long-term and short-term alternatives. It is conducted using an

open and participatory planning process, and it emphasises the co-operation of the many institutions involved in water resource policy and planning. It also identifies and quantifies the external costs and benefits of an alternative, and incorporates careful consideration of the uncertainties inherent in each of the alternatives.

IRP methodologies are thus flexible and adaptable, rather than rigid, with each IRP process being unique to its particular context. It follows a systems approach in which all steps are inter-related and feedback mechanisms between steps are important. IRP is thus ideally suited to the water planning problems facing the CMC, and this approach will be adopted in this study as far as possible.

1.1 General

The WCSA indicated the combined yield of the Eerste and Lourens diversions to be approximately 29 million m³/a and that of the Cape Flats Aquifer, 18 million m³/a.

By comparison, urban water demand management could achieve savings of at least 30 million m³/a (10% savings level) and more likely closer to 60 million m³/a. The demand management options are likely to be more cost effective and will certainly be more environmentally friendly than the supply options. Furthermore, the development of further augmentation schemes is likely to result in significant opposition from certain sectors of the public.

The proposed study will therefore comprise two distinct elements, namely:

- Water resources planning
- Water demand management

From the above perspective it would be sensible to devote more effort and resources on the study, to demand management. This approach is proposed whilst still ensuring that sufficient information would be timeously available to take informed decisions on the supply options.

The study will be conducted in two phases. The current study will comprise the first phase which will consider water supply augmentation and water demand management/water conservation (WDM/WC) potential on a broad scale. This will ensure that the major issues are

recognised and addressed timeously. Thereafter, and when necessary, the second phase of the study will focus on investigating particular issues in more detail.

For this first phase study existing knowledge and investigations will provide the basic data required, and new investigations will only be initiated where it is clearly identified that additional information is required to resolve conflicts or to answer the questions raised.

In order to minimise the immediate short term exposure to the risk of water restrictions, emphasis needs to be placed on options which may be more speedily introduced.

1.2 Work Packages and Allocation

The study will largely be undertaken by the two Main Engineering and Environmental Consultants, Messrs Ninham Shand (NS) and Messrs Gibb Africa (GA). They will be assisted by a number of sub-consultants who will contribute a wide range of expertise to the project. The list of sub-consultants is provided in Appendix A.

The working arrangements will be as follows:

Ninham Shand will be the Lead Consultant and will be responsible for Project Management.

Generally each work package, or portions thereof, will be the prime responsibility of one of the main consultants with the other exercising a review role. In some cases there will be more interaction. While NS will “manage” the sub-consultants overall, each main consultant will interact directly with the relevant sub-consultants necessary for the packages of work for which they have prime responsibility.

This first phase study will comprise the following work packages, and as can be gleaned from the allocation of the budget between the work packages and consultants, as reflected in the table in Appendix B, the prime responsibilities will be allocated as follows:

| | | |
|---|--|--|
| 1 | Management, Synthesis and Main Report: | NS but with significant input from GA and sub-consultants. |
|---|--|--|

| | | |
|---|--------------------------|---|
| 2 | Public Involvement: | This is mainly sub-consultant work but will need contributions from the main consultants for the work packages for which they are responsible. |
| 3 | Eerste River Diversion: | NS prime responsibility and GA review. |
| 4 | Lourens River Diversion: | GA prime responsibility but NS undertake system modelling as part of the Western Cape system, and also a review. |
| 5 | Cape Flats Aquifer: | NS prime responsibility and GA review. |
| 6 | Water Demand Management: | This package will be split between NS and GA, with GA being responsible for all aspects other than the Water Loss Management Component. Each will also undertake a review function. |
| 7 | Water Reclamation: | NS prime responsibility and GA review. |

2 WORK PACKAGES

2.1 Management, Synthesis and Main Report

2.1.1 Administration

Management of the project will include all administrative matters and monthly management/progress meetings with the CMC.

The main part of this work package includes the synthesis of the various studies and parts of studies into the Main Report. It is intended that this aspect be workshopped with the CMC and relevant members of the consultant team.

While currently seven reports are proposed in order to cover the major components of the study, some aspects may be consolidated. The main reporting components are as follows:

- Terms of Reference
- Water Demand Management
- Water Reclamation
- Water Supply Options
- Environmental
- Integrated way forward (Main Report)
- Administrative Report

The synthesis or main report will bring all the components together and will also include the issue of timing (implementation dates) of possible development options in terms of:

- the likely effectiveness of water demand interventions;
- existing constraints to the implementation of water demand management;
- treatment capacity and implications at Faure WTW;
- the WCSA; and
- the potential growth in urban and agricultural demand.

A development programme will be compiled which includes the timing of all phases up to the implementation of the various schemes proposed in the strategy. This development programme will take cognisance of proposed water demand interventions and the impact thereof.

2.1.2 Multi-criteria Decision Making

Palmer Development Group (PDG) will facilitate a workshop to establish a set of common criteria with which to evaluate all demand and supply options. These criteria will be used to establish a multi-criteria decision making model. PDG will liaise with individual option evaluation teams to ensure that their outputs are in suitable formats.

PDG will run the multi-criteria decision making model to generate first order results, and will then facilitate a further workshop to refine thinking around the potential supply and demand-side interventions. If necessary, separate scenarios will be developed to assist decision-makers to make the necessary trade-offs.

PDG will also investigate possible financing and institutional arrangements, and make proposals accordingly.

2.2 Public Involvement

2.2.1 General

It is assumed that a full public participation process will be required in terms of the EIA process, but only during the second phase of the study. However, in order for study objectives and procedures to be fully compatible with and supportive of current policies and other guidelines by Government it is suggested that interested and affected parties should be involved at an early stage by means of a public participation process. This process must ensure that all role players are aware of the study process and have an opportunity to provide relevant input to the study.

The proposed public participation process can be defined in terms of four broad areas of work. These are :

- Announcement and publicity
- Scoping of water supply options
- Investigation of water demand management strategies
- Evaluation and determination of options

CMC's Public Relations Agency will be kept informed of the public involvement and use of their services will be made wherever possible.

2.2.2 Announcement and publicity

During this first phase of activity the objective would be to inform specific stakeholders, as well as the general public of the Cape Metropolitan Area, about the study. This will take the form of the production and dissemination of a background document, the organising of a media event where the exercise will be announced, as well as ongoing liaison with the public. The background document will provide an overview of the project as a whole, as well as provide details of all of its areas of focus. The document will be used both for general distribution, as well as in subsequent activities focussing on local stakeholders concerned with local schemes. These are discussed further below.

2.2.3 Scoping of water supply options

This dimension of the work will focus on the undertaking of preliminary scoping exercises on the Lourens River and Eerste River schemes, as well as an exercise of involving the Mitchells Plain community in the Cape Flats Aquifer proposals. Local interested and affected parties will be contacted and informed about the proposed possible schemes, and invited to a public meeting where they will have the opportunity to voice their concerns and raise issues for consideration.

In all of the cases, there will be advertising of the relevant events to the broader metropolitan community by means of adverts in daily newspapers. In addition, a targeted group of metropolitan stakeholders, such as governmental bodies, business and NGO's will also be informed and invited to participate.

2.2.4 Investigation of water demand management strategies

The primary focus of this area of work will be on technical investigation, with minimal involvement for the public. Nevertheless, there will be a need to make provision for a limited level of public input on water demand management later in the study once the results of the technical investigations are available.

2.2.5 Evaluation of options

It is proposed that the activity include the production of an accessible overview of the output of the technical exercises of the earlier studies, and the convening of an open day event where visual material in the form of posters will be presented to the public for feedback, as well as media reports and adverts.

It is considered that this level of public participation will not be adequate to be able to take firm decisions, but should be sufficient for this first phase. Phase 2 of the study would need to address the inclusion of stakeholders in a much more interactive and meaningful manner.

2.3 Eerste River Diversion

2.3.1 Objectives

The following objectives are envisaged for this study :

- To review the feasibility of the scheme from a technical perspective.
- To confirm, or revise, the configuration of the scheme.
- To update the cost estimates and determine the unit cost of water/unit reference values.
- To ascertain the water demand at which the scheme is economically viable to enable the optimum timing of implementation to be determined.
- To determine preliminary riverine instream flow requirements and estuary freshwater requirements.
- To determine the likely environmental impacts of the schemes .
- To inform the CMC of the nature and timing actions required to ensure that the scheme can be implemented at a later stage.

A brief description of the tasks envisaged to achieve these objectives is given below.

2.3.2 Scheme Conceptualisation

The WCSA proposals would be reviewed in the light of interim developments.

2.3.3 Hydrology and Yield Analysis

It is planned to use the existing hydrology available from the WCSA with only some minor review to confirm current applicability. Any new gauge data available will be used as a check of previous hydrological calibrations.

Should the proposed abstraction site be significantly altered for any diversion considered, a revised runoff sequence will be prepared, if possible/feasible, to take account of the revised catchment area.

Yields will take cognisance of the riverine and estuarine flow requirements and will be analysed using the Water Resources Yield Model that was recently configured for the combined Riviersonderend/ Palmiet/ Steenbras system.

2.3.4 In-stream Flow Requirements

The river will be visited in order to update the number of sites considered for the determination of ecological status and importance. A desktop assessment of the likely winter flow requirements for the reaches downstream of the proposed abstraction sites will be undertaken. If possible, the desktop planning estimate methodology being developed for the National Water Act will be adopted. However, since abstractions may be limited to the winter season, an alternative methodology such as the Montana method may be appropriate.

2.3.5 Estuarine Freshwater Requirements

This component will entail a desktop assessment of the present status and abiotic and biotic conditions of the estuary. It will also include an assessment of the relative ecological importance of the estuary on a local and regional scale. Arising out of this, a first estimate of the reserve for water quantity for the estuary will be provided as well as an assessment of the effects of abstraction. Lastly, recommendations for further work required for the next phase, focussing on the data and information requirements required for the determination of the reserve in terms of the National Water Act, will be provided.

2.3.6 Scheme Development

The engineering conceptual design and costing will be executed under this task. Having taken cognisance of existing and proposed water supply schemes and the influence of water demand management and conservation initiatives, concept designs at pre-feasibility level of detail will be prepared of the recommended development scenarios. This will include layout sketches of possible schemes and associated works such as pipelines, pump stations and balancing dams, etc.

No topographical field surveys will be undertaken for this first phase of scheme and site selection. Use will be made of 1:50 000 scale topographic maps, 1:10 000 scale orthophotos, and the larger scale CMC mapping as far as this is available. Unit reference values will be

calculated in accordance with the methodology used for previous similar studies and the Department of Water Affairs and Forestry's (DWAF) standard practice.

2.3.7 Water Quality

Flow in the lower Eerste River includes urban stormwater and purified sewage effluent, as well as runoff and return flow from fertilised and irrigated lands. As part of the investigation it is envisaged that CMC will make arrangements for the installation of an event driven sampler and will undertake the water quality analysis. (This cost is not included in the proposal).

A brief review of the fitness for use of the water will be executed to complement the work carried out in the WCSA and Mr Ian Morrison will advise on any implications regarding the treatment process and operations at the Faure Treatment Works.

2.3.8 Environmental Assessment

An initial environmental impact assessment of the potential biophysical and social implications of the scheme will be compiled. A combined public meeting will be held to inform stakeholders of the proposed Eerste and Lourens projects and to elicit issues and concerns.

This report will synthesise the instream and estuarine flow requirements and compare the impacts of the scheme. An assessment of the significance of potential impact on landuse, land ownership, terrestrial vegetation, and social aspects associated with the proposed weirs, pumps, balancing dams and pipelines will be provided at a preliminary level.

The public involvement proposed will solicit the preferences and concerns of the public and will provide input for any subsequent EIA if this option is included in a second phase study.

2.4 Lourens River Diversion

The objectives for the Lourens River will be similar to that adopted for the Eerste River.

2.4.1 Scheme conceptualisation

The proposed development of the AECI property will directly impact on the proposal for the Lourens River Diversion. This is because the proposed raising of the Paardevlei to create balancing storage may conflict with its use as a recreational asset in a residential environment.

This potential conflict needs to be explored as well as alternative means of exploiting the Lourens River. Some of the alternatives may be:

- creating the balancing storage by deepening rather than raising the Paardevlei.
- providing balancing storage by constructing a combined storage/detention dam at a site on the Lourens River upstream of Somerset West which would also serve to alleviate flooding currently being experienced in the town.
- pumping directly from the Lourens River into the Steenbras-Faure pipeline. In this case, the rate of abstraction would be limited to the rate of supply required by the Faure WTW and might be further limited by practical abstraction arrangements. It might be possible to pump additional water in reverse for storage in the lower dam of the Steenbras Pumped Storage Scheme, but even in this case, the yield of the scheme is likely to be substantially reduced compared with the original proposal.

These ideas and others would be explored and evaluated briefly, on both technical and environmental grounds.

2.4.2 All other aspects

The approach for all other aspects for the Lourens River will be similar to that adopted for the Eerste River.

2.5 Cape Flats Aquifer

The Cape Flats Aquifer has been well studied and further investigations are not considered necessary for the first phase of this study. However, there are uncertainties regarding its sustainability which are :

- uncertainty related to the potential difficulty of operating a large number of abstraction boreholes in a densely developed urban area,
- uncertainty regarding water quality and the possible need to include ozonation and activated carbon filtration in the treatment process. This is, however, considered unlikely, depending on the siting of the wellfield.

Present efforts will be directed towards the development of the aquifer by the planning of a pilot scheme which would be used to resolve the two uncertainties described above. For the preliminary layout and design of the full-scale groundwater abstraction scheme, and also the pilot scale wellfield, it is necessary to determine the optimum placement of pumping boreholes as well as monitoring boreholes to predict the impact of pumping on water-tables and on pollutant behaviour.

Professional judgement will be used for environmental impact predictions relating to :

- water table lowering effects such as reduced winter water-logging, increased recharge potential, and groundwater subsidence potential.
- groundwater vegetation interaction impacts.
- reduced groundwater outflows to sea.

The proposed outputs of the study would be:

- A proposed layout of the pilot scheme and a programme for its implementation, monitoring its operation, proposals for delivery of water abstracted from the well field, and its integration into the system.
- A preliminary layout of the proposed full abstraction well field.
- Proposals for preventing vandalism of the installation.

- Preliminary environmental impact assessment of both the pilot scheme and full scheme. The preliminary EIA would focus on the possible effects on vegetation and on the potential effects on the conservation status of wetland vlei systems in the vicinity.

2.6 Water Demand Management

2.6.1 Introduction

This first phase study will investigate and consider all water demand management options on a broad scale across the entire supply system. This will enable the options which can provide the maximum benefits in the least time to be identified so that appropriate demand management measures can be put in place as soon as possible. Thereafter, if necessary, the second phase of the study should focus on particular problem areas.

This broad based screening of water demand management issues would assess both the opportunities and constraints:

Opportunities:

- What is the water use related to each aspect and what level of savings can be achieved?
- What is the feasibility of each aspect and the possible time frame for achieving these savings?
- What costs are associated with this and what resources would need to be applied? For example, what are the institutional issues related to budgeting, who would bear the costs etc. will need to be taken into account.

Constraints:

- What current legal requirements in terms of water demand management measures are not being implemented?
- What are the barriers to implementation from an institutional and policy point of view, and what can be done to overcome these?
- What are the financial constraints?
- What resources are lacking?
- What technical and technological shortcomings exist?

Due to the extensiveness of the study area, and the constraints in the budget, the water demand management opportunities will be investigated on a sample basis for typical representative areas and the results will be extrapolated to the entire study area. Data will be largely provided from existing monitoring initiatives already underway by DWAF, CMC, and local government.

2.6.2 Evaluation of Current and Future Water Demand

Recent work undertaken for the Department of Water Affairs and Forestry by Palmer Development Group, the Institute for Futures Research and Ninham Shand examined the latest water use figures for the CMA and made an estimate of the future growth in urban demands. The results of a sensitivity testing exercise demonstrated that considerable scope exists for demand management interventions.

This work will be used as a basis to assess the sectoral water use pattern as far as possible. Given the available data, the water usage by each of the following sectors will be estimated:

Unaccounted for water, Domestic (in-house and gardening), Industrial (wet industries and other industries), Commercial, and Municipal.

The model developed as part of the abovementioned project will be used to generate demand forecasts, and for the evaluation of various demand management options.

2.6.3 Water Demand Management Issues to be Evaluated

The following issues, taken mainly from the briefing document, are proposed for evaluation. Water loss management and control

- evaluation of minimum night flows
- pressure control
- household leakage repair programme
- Water efficient use
 - replacement of automatic flushing urinals
 - use of dual flush mechanisms
 - use/replacement of toilet cisterns
 - low flow showerheads
 - use of hippo bags
 - effect of ongoing maintenance

For the purposes of this study it has been assumed that, if necessary, all work on valves and meters and loggers will be undertaken by the relevant responsible authority. In many cases, opening valves that have been closed for many years can lead to new leaks. It is therefore assumed that such actions will be carried out by the responsible authority and the project team will not be responsible for leaks resulting from such actions.

Water balances will be carried out in selected district areas. A detailed water requirement and actual consumption analyses for the selected districts will be undertaken in collaboration with relevant role players. Existing social and socio-economic profiles of the user groups within each of the selected supply districts may be consulted to confirm water use profiles. This water balance will involve a desk-study only using existing data and information obtained from completed studies or from the relevant authorities. The deliverable for this component will be average water consumption figures for each selected district compared with the average water consumption that has been obtained from the logging of night flows for each district.

2.6.4.2 Pressure Control

Some areas of the reticulation system experience excessive pressure, particularly at night, when water usage is low. Where leaks exist, the resulting wastage of water may be considerable and could be combated by reducing the pressure. It is proposed to investigate the scope for such action.

In addition to the WADISO model of the bulk water distribution system that was prepared by Ninham Shand/CLS, the MLC's have also commissioned investigations into their reticulation systems which has involved setting up WADISO models.

To determine the extent to which pressure control is feasible, it is proposed to use the WADISO models to map (on GIS) the minimum and maximum pressures occurring within the distribution system. Comparison with the unit water consumption rates would provide further insight into which zones might benefit most from reduced pressures. These zones would then be targeted and analysed using the detailed WADISO models and suitable locations for pressure reducing valves PRV's (or other suitable means) identified for installation to reduce the maximum (night time) pressure.

The relationship between water saving and pressure reduction is documented in the literature and these relationships would be used to ascertain the savings which would thereby be achieved.

The cost of installing the PRV's, or other measures introduced to reduce the average water pressure in the system, could then be compared to the likely water savings.

Recommendations would be prepared on a programme to progressively reduce water pressure, where appropriate, throughout the supply area.

2.6.4.3 Household Leakage Repair Programme

Subject to the agreement of the relevant authority, the current programmes underway in Ikapa would be evaluated to determine the volume of savings being achieved and the unit cost of these savings.

2.6.5 Water Efficient Fittings

The objective of this aspect of the study is to establish the water saving which could be achieved through the increased use of water efficient fittings. There are several facets to this issue :

- (a) From the domestic water use perspective, the range of fittings available include low flow showerheads, smaller toilet cisterns and dual flush toilet mechanisms. This range, together with hippo bags and other similar devices, needs to be considered as a package for installation in the homes of domestic consumers and also as individual fittings/devices to ascertain possible water savings.
- (b) The installation of such fittings in new houses is distinct from retrofitting in the existing homes.
- (c) The nature of inducement to consumers to encourage the installation and use of efficient fittings needs to be considered. This inducement may range from retrofit "give aways", to subsidies and promotions, or even to enforcement.
- (d) Water use in commercial and institutional buildings where large numbers of people make use of ablution facilities is another aspect, which includes the replacement of automatic flushing urinals.

- (e) Maintenance of user activated flushing devices (wc and urinal) is probably poor. The potential savings that could be achieved if regular maintenance were enforced will be investigated.
- (f) Hosing down of building forecourts and surrounding pavements appears to be on the increase. This practice will be investigated in order to obtain an estimate of the number of buildings involved, how often this takes place, and the volume of water used.

2.6.5.1 Estimate of current domestic water use

The approach taken will be to obtain estimates of current categories of domestic water use within the CMA from available information. For example the recent and proposed future initiatives undertaken in the CMA by DWAF and CMC, such as the proposed household monitoring programme planned for National Water Week 2000 (March 2000), surveys undertaken in schools by DWAF, etc. No surveys will be undertaken as part of this study. Some examples of the categories of use are:

- in-house domestic use eg toilet flushing, showers/baths, clothes washing, washbasins, etc.
- garden watering, swimming pools, hosing down of paved surfaces.

This information will serve as a basis of comparison against the possible savings that can be achieved by installing certain water efficient components within the CMA. Those areas which could possibly result in significant savings will be identified. This would be because a large proportion of the use can be saved, or that there is scope for a large number of smaller savings to be made.

The costs of installing water efficient fittings will be compared to the water savings achieved, and the cost-effectiveness of that particular measure determined. The sensitivity of the costing to changes in water savings will also be ascertained.

2.6.5.2 Replacement of automatic flushing urinals

The water used on automatic flushing urinals has been identified as a significant area for potential water saving within the CMA. Some sources suggest that there could be as many as

8 000 such devices still installed in the CMA, wasting as much as 2 per cent of the total daily annual average water supplied.

Automatic flushing urinals which operate too frequently and also at night times and weekends when buildings are unoccupied, is a wasteful use of water. These devices are installed in many places, for example schools, hotels, airports, pubs, restaurants, factories, universities and government buildings.

A postal survey of the number of automatic flushing urinals currently installed within the study area will be made in combination with available information from site surveys undertaken by the CMC and local authorities to provide a check on the accuracy of the responses. Relevant literature and the results of case studies will be referred to to obtain a range of potential savings that would be achieved by changing to user-activated systems, and an estimate of the overall potential for realising such savings will be made. This will be compared to the cost of implementing such changes in order to ascertain the cost effectiveness of this measure.

The results of this component of the work will be integrated with the results of the remainder of the study components in order to obtain overall recommendations for the study.

2.6.6 Promotion of Private Boreholes and Wellpoints

Much of the CMA is underlain by aquifers which could be exploited further, especially for garden watering purposes. Where the water table is less than 8 m below surface, wellpoints are an inexpensive option which can reduce a household's summer garden-water demand possibly of the order of 400 m³ per year (assuming a 600 m² garden). This option will be investigated and described in terms of design, feasibility, costing, and water-use reduction. Comment will also be made how promotion of wellpoints relates to the Water Law.

2.6.7 Water Audits of Large Consumers

Based on an analysis of the data related to large consumers, ie consumers utilising more than 100 kl/day, the total average daily water use of these consumers is about 120 000 ML/day, roughly 13% of the total for the CMA.

It is proposed to evaluate the potential savings which can be made by large water consumers by:

- Compiling the data on large consumers.
- Ranking the users by water consumption.
- Grouping users according to types of water use.
- Identifying at least one user in each significant group, one of which will be a local authority.
- Executing water audits of a number of large consumers to evaluate the potential for and likely cost of water saving.
- Extrapolating this data to the metropolitan scale.

Masters students from the Environmental and Geographical Science Department at the University of Cape Town will be conducting research in this field with the intent of reviewing and critiquing available literature, undertaking pilot studies and analysing results. The findings of this research will be utilised in this study where appropriate.

2.6.8 Price Elasticity of Water

Tariffs can play a major role in moderating demand and this influence is incorporated into the model developed by the Palmer Development Group (PDG) on behalf of the Water Research Commission in order to predict the growth of water demands. The model allows for the price elasticity of water to be inserted and can distinguish between high, medium and low income groups as well as industrial consumers.

In order to evaluate the impact of changes in water tariffs, some insight into consumer price elasticities is required. This is a difficult area of economic analysis, however, with little or no research having been undertaken on this topic in South Africa.

The results from the Cape Water demand project clearly indicate that future water demand is highly sensitive to price changes. The effect of the recent tariff increase on water consumption in the City of Cape Town will be evaluated. A constraint to this methodology is the limited relevance of historic data if future prices increases are to far exceed past price increases.

2.6.9 Constraints to Implementation

The constraints which may limit or hinder the implementation of each of the abovementioned measures will be summarised into one chapter in the water demand management report. In addition, the results of a more general review of possible constraints will be contained in this chapter. This will include examining the many organisations which are currently involved in water resource planning and water delivery, as well as an overview of the relevant legislation, in the form of by-laws and regulations. Existing by-laws and regulations that are currently not being enforced will also be highlighted. Potential funding mechanisms will also be explored.

2.7 Water Reclamation

This will be dealt with as two sub-tasks, namely use of grey-water, and use of treated sewage effluent. It should be noted that these two types of use compete with each other for the same source of water.

2.7.1 Use of Grey-water

This subject has been researched extensively in other countries, and different approaches have been adopted by, for example America, where reuse of grey-water above ground is not allowed because of the risk of Legionnaires disease, and the United Kingdom, where the above ground use is allowed. These different approaches, particularly with regard to the associated health risks, will be investigated. A literature search will be conducted and the salient points reported on.

In addition, the potential for the use of grey-water by recycling on consumers' premises in the study area will be determined. Details of the performance of installed systems in the CMA will be obtained from the suppliers and/or users. Costings will be done for both the approach where above ground reuse is allowed, as well as the approach where only below ground reuse is permitted.

2.7.2 Use of Treated Sewage Effluent

Treated sewage effluent is an important potential source of water for the CMA. Recent work undertaken for the Water Research Commission investigating the status ~~of~~ of water

reclamation in South Africa, and for the CMC by Ninham Shand and Abbott Grobicki developing a strategic guideline for water reclamation in the CMA will be incorporated into the study. This baseline information will be updated where new initiatives have been undertaken, and the results will be integrated into the multi-criteria decision making process.

Available information on the reclamation of treated sewage effluent to potable standard will be collated and the potential for this type of reclamation within the CMA will be reported on.

3 BUDGET

The overall study budget is R2,5 million, excluding VAT. A breakdown of the budget allocated to each work package is given in Appendix B.

4 STUDY PROGRAMME

The study will extend over 12 months, commencing in January 2000. A schedule showing the timing of the different tasks is given in Appendix C. As requested by DWAF (Water Conservation), all preliminary results of the water demand management investigation will be provided by April 2000.

APPENDIX A

LIST OF CONSULTANTS

MAIN CONSULTANTS

NS = Ninham Shand (Lead)
GA = Gibb Africa

SUB-CONSULTANTS

Private = Various individual consultants and overseas expert
PDG = Palmer Development Group
CSIRe = CSIR estuaries
UCT/UPE = Universities of Cape Town and PE
SW = Southern Waters
CGC = Common Ground Consulting
CSIR g = CSIR ground
Umvoto = Umvoto Africa
AG = Abbot Grobicki
GLS = Geusteyn Loubser Streicher
WRP = Water Resource Planning and Conservation

APPENDIX D: BUDGET

| | MS | QA | Total MS&QA | Private | PDO | CSIRs | UCT/PE | SW | COC | CSIR/Umvate | AO | QLSWRP | Total Sub consultants | Total Prof Fees | Disbursements | Allow for Contingencies | Total per work package | |
|---|---------------|---------------|----------------|--------------|---------------|--------------|--------------|--------------|--------------|--------------|--------------|---------------|-----------------------|-----------------|---------------|-------------------------|------------------------|---------------|
| Management and Synthesis | 303000 | 10000 | 313000 | | 118000 | | | | 8000 | | | | | 127000 | 527000 | 50000 | 57000 | 628000 |
| 1 Management | 120000 | 40000 | | | | | | | | | | | | | | | | |
| 2 Integration Phase | 150000 | 8000 | | | | | | | | | | | | | | | | |
| 3 Planning objectives and evaluation criteria | 85000 | 18000 | | | 43000 | | | | 9000 | | | | | | | | | |
| 4 Study Synthesis and report | 90000 | 18000 | | | 15000 | | | | | | | | | | | | | |
| Public Involvement | 36000 | 19000 | 55000 | | | | | | 83000 | 5000 | | | | 88000 | 123000 | 9000 | 13000 | 145000 |
| 1 Study Announcements | 11000 | 3000 | | | | | | | | | | | | | | | | |
| 2 Water Supply Options and TQM | 8000 | 5000 | | | | | | | 19000 | | | | | | | | | |
| 3 Synthesis and workshop results | 16000 | 13000 | | | | | | | 18000 | 7000 | | | | | | | | |
| | | | | | | | | | 7000 | 3000 | | | | | | | | |
| Esraia River Division | 141000 | 10000 | 151000 | 8000 | | 13000 | | 5000 | | 7000 | | | | 31000 | 162000 | 14000 | 19000 | 215000 |
| 1 Scheme conceptualisation | 11800 | | | | | | | | | | | | | | | | | |
| 2 Hydrology & field analysis | 24000 | | | | | | | | | | | | | | | | | |
| 3 Maximum flow requirements | 2000 | | | | | | | | | 7000 | | | | | | | | |
| 4 Hydraulic & structural requirements | 7000 | | | | | 13000 | | | | | | | | | | | | |
| 5 Scheme development | 33000 | | | | | | | | | | | | | | | | | |
| 6 Water quality | 11800 | | | 6000 | | | | | | | | | | | | | | |
| 7 Environmental impact assessment | 14000 | | | | | | | | | | | | | | | | | |
| 8 Report | 33000 | | | | | | | | | | | | | | | | | |
| Lourens Rivier Division | 27000 | 187000 | 224000 | 5000 | | 15000 | | 5000 | 18000 | | | | | 41000 | 245000 | 14000 | 28000 | 307000 |
| 1 Scheme conceptualisation | 4000 | 32000 | | | | | | | | | | | | | | | | |
| 2 Hydrology & field analysis | 23000 | 23000 | | | | | | | 7000 | | | | | | | | | |
| 3 Maximum flow requirements | 2000 | 2000 | | | | | | | | | | | | | | | | |
| 4 Hydraulic & structural requirements | 5000 | 5000 | | | | 15000 | | | 14000 | | | | | | | | | |
| 5 Scheme development | 15000 | 15000 | | | | | | | | | | | | | | | | |
| 6 Water quality | 14000 | 14000 | | 5000 | | | | | | | | | | | | | | |
| 7 Environmental impact assessment | 10000 | 10000 | | | | | | | | | | | | | | | | |
| 8 Report | 4000 | 4000 | | | | | | | | | | | | | | | | |
| Cape Flats Aquifer | 50000 | 8000 | 58000 | 5000 | | | | 3000 | | 55000 | | | | 83000 | 119000 | 9000 | 12000 | 140000 |
| 1 Preliminary layout of sub schemes | 21000 | | | 8000 | | | | | | 30000 | | | | | | | | |
| 2 Sub schemes | 15000 | | | | | | | 3000 | | 11000 | | | | | | | | |
| 3 Environmental Impact Assessment | 14000 | | | | | | | | | 9000 | | | | | | | | |
| Water Demand Management | 115000 | 343000 | 518000 | 28000 | 84000 | | | 2800 | | 14000 | | 135000 | 242000 | 281000 | 70000 | 86000 | 837000 | |
| 1 Management | 27000 | 23000 | | | | | | | | | | | | | | | | |
| 2 Water Use Management | 13000 | 9000 | | | 14000 | | | | | | | | | | | | | |
| 2.1 Minimum Tapoff Bore | 55000 | 8000 | | | | | | | | | | | | | | | | |
| 2.2 Pressure control | 30000 | 5000 | | | | | | | | | | | | | | | | |
| 2.3 Incentives to encourage programme | 30000 | 30000 | | | | | | | | | | | | | | | | |
| 2.4 IIA | 9000 | 9000 | | | | | | | | | | | | | | | | |
| 3 Water Efficient fittings | 110000 | 110000 | | 8000 | | | | | | | | | | | | | | |
| 4 Public Awareness | 10000 | 10000 | | | | | | | | | | | | | | | | |
| 5 Public audit of large consumers | 60000 | 60000 | | 5000 | | | | | | | | | | | | | | |
| 6 Public awareness of meter | 18000 | 18000 | | | | | | | | | | | | | | | | |
| 7 Intersect water use analysis & UAW | 14000 | 14000 | | | | | | | | | | | | | | | | |
| 8 Water conservation campaigns | 21000 | 21000 | | | | | | | | | | | | | | | | |
| 9 Report | 18000 | 18000 | | | | | | | | | | | | | | | | |
| Water Reclamation | 54000 | 13000 | 67000 | 7000 | | | | | | | 14000 | | | 21000 | 88000 | 9000 | 10000 | 107000 |
| 1 Use of Q13 water | 8000 | | | 4000 | | | | | | | | | | | | | | |
| 2 Use of treated sewage effluent | 15000 | | | 3000 | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | |
| Overseas report | | | | 18000 | | | | | | | | | | 18000 | 18000 | | 2600 | 28000 |
| Total (excluding VAT) | 818000 | 588000 | 1486000 | 89000 | 132000 | 28000 | 10000 | 28000 | 72000 | 74000 | 14000 | 135000 | 812000 | 2098000 | 175000 | 227000 | 2300000 | |

MAIN CONSULTANTS

- MS = Mott MacDonald (P&W)
- QA = Odebrecht

SUB CONSULTANTS

- Private = Various individual consultants and overseas expert
- PDO = Palmer Development Group
- CSIRs = CSIR activities
- UCT/PE = Universities of Cape Town and PE

- SW = Southern Waters
- COC = Cammer Ouband Consulting
- CSIR g = CSIR ground
- Umvate = Umvate Africa

- AO = Abbot Ouband
- QLS = Quality Leadership Solutions
- WFRP = Water Resource Planning and Conservation

APPENDIX C: STUDY PROGRAMME

| Task No. | Task | Month | | | | | | | | | | | | |
|----------|---|-------|---|---|---|---|---|---|---|---|---|----|----|----|
| | | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 |
| 1 | Management and synthesis | | | | | | | | | | | | | |
| | Management Committee Meetings | | | | | | | | | | | | | |
| | Inception phase | | | | | | | | | | | | | |
| | Planning objectives and evaluation criteria | | | | | | | | | | | | | |
| 2 | Public Involvement | | | | | | | | | | | | | |
| | Study announcement | | | | | | | | | | | | | |
| | Supply schemes | | | | | | | | | | | | | |
| | Workshopping of results | | | | | | | | | | | | | |
| 3 | Eerste and Lourens River Diversions | | | | | | | | | | | | | |
| | Scheme Conceptualisation | | | | | | | | | | | | | |
| | Hydrology and Yield Analysis | | | | | | | | | | | | | |
| | In stream flow requirements | | | | | | | | | | | | | |
| | Estuarine freshwater requirements | | | | | | | | | | | | | |
| | Scheme development | | | | | | | | | | | | | |
| | Water quality | | | | | | | | | | | | | |
| | EIA Report | | | | | | | | | | | | | |
| 4 | Cape Flats Aquifer | | | | | | | | | | | | | |
| | Full scheme layout | | | | | | | | | | | | | |
| | Pilot scheme | | | | | | | | | | | | | |
| | EIA Report | | | | | | | | | | | | | |
| 5 | Water Demand Management | | | | | | | | | | | | | |
| | Water loss management | | | | | | | | | | | | | |
| | Water efficient fittings | | | | | | | | | | | | | |
| | Private boreholes | | | | | | | | | | | | | |
| | Water audits of large consumers | | | | | | | | | | | | | |
| | Sectoral water use analysis | | | | | | | | | | | | | |
| 6 | Water Reclamation | | | | | | | | | | | | | |
| | Grey water | | | | | | | | | | | | | |
| | Use of treated sewage effluent | | | | | | | | | | | | | |

6

SCHEDULE 2
THE SERVICES CONTRACTED OUT

AN ASSESSMENT OF LARGE CONSUMERS' WATER USE WITHIN THE CAPE METROPOLITAN AREA

- TERMS OF REFERENCE

1. Background to the study

It has been predicted that the surface water resources of the Western Cape will only meet the demand until the year 2020. The traditional way to solve this problem is to increase the water supply by embarking on an expensive supply augmentation scheme, such as the proposed Skuifraam Dam. However, there are other less expensive, more environmentally sensitive options to ensure that existing supply meets the current and future demand, and the Department of Water Affairs and Forestry (DWAF) and the Cape Metropolitan Council (CMC) are exploring some of these options.

In order to study different options and propose viable recommendations for decision making the CMC launched a project titled "*Integrated Water Resource Planning Study*". Alternative options to meet the demand for water in the Cape Metropolitan Area (CMA) include water conservation efforts, water demand management techniques, integrated water resource planning and other administrative measures. As part of this project, four Masters students from the Department of Environmental and Geographical Science at the University of Cape Town (UCT) were commissioned to investigate various aspects of Water Demand Management (WDM) and more specifically to undertake Water Audits of selected large water users (organisations consuming more than 100 kilolitres of water per day) in the CMA.

2. Objectives of the University of Cape Town students' study

The UCT students will complete the following related to the Water Demand Management study:

- Conduct a comprehensive literature search of topics related to water demand management and water auditing.

- Establish an up to date list of the large water users (those using more than 100 kl/day) in the CMA. This list will only contain the names of top water users that have been provided to the UCT study group by Monday 10th July 2000.
- Each entry within the above mentioned list will be placed into its relevant sector according to the IC industry codes (Industry codes: 00-Basic Foods, 10-Refined Foods, 20-Textiles, 30-Leather, Rubber and Plastic, 40-Building & Construction, 50-Printing & Paper, 60-Chemicals, 70-Engineering, 80-Commercial and Public, 90-Residential and Institutions), provided sufficient information is gained from the questionnaires received before Monday 24th of July 2000.
- Use a questionnaire, to gather information about attitudes and perceptions of the large water users in the CMA. Questionnaire results received after Monday 24th July 2000 will not be evaluated/considered by the UCT study group.
- Conduct water audits on pre-determined organisations as agreed on 3rd July 2000.

3. Procedure of the students' study

3.1 Literature search

The literature search will cover all topics related to WDM, Water Conservation and Water Audits. The literature search will include media such as:

- Internet
- Books
- Journals
- Reports

Together with the literature, experts in the field will be consulted and interviewed. A list of the literature that was consulted will be placed in the final report.

3.2 List of top water users

Municipal Local Councils (MLCs) will be contacted via ARCUS GIBB and asked to supply a list of consumers using more than 100 kl/ day. The list of large water users received before Monday 10th July 2000 will be compiled from this information and

will include contact details, postal and physical addresses and a suitable contact person.

3.3 Attitude and perception questionnaire

The questionnaire will be designed, tested and will be distributed amongst various groups of people including academic staff, fellow students, specialists and other people working on the project. The questions will be revised and sent through numerous draft versions before being distributed to the large water users on the contact list. The results of the questionnaire received before the 24th of July 2000 will be assessed and presented in a report to ARCUS GIBB. Respondents' names, and organisations' they represent, will not be used in the analysis of the questionnaire results.

3.4 Water audits

The students will first audit selected organisations together with Mr Roy Donovan and Mr Heinrich Hess of ARCUS GIBB. Thereafter, the students will independently conduct audits on pre-determined organisations within the CMA. The results of these audits will be presented to ARCUS GIBB. Analysis of these audits is not the responsibility of the UCT study group.

4. Final report

The final report is to be presented to Mr Johan du Plessis of ARCUS GIBB on 31st July 2000. This report will include the following:

- The list of references collected during the project
- The list and contact details of the large water users in the CMA received before the 10th of July 2000
- An analysis of the results from the questionnaire received before 24th of July 2000.
- The results of the Water Audits conducted by the students

5. Budget

A maximum budget is attached herewith and is presented in two sections namely, the budget summary (one page) and the detailed budget (seven pages). The UCT Terms of Reference and Budget document is subject to approval by both ARCUS GIBB and ÚCT.

AN ASSESSMENT OF LARGE CONSUMERS' WATER USE WITHIN THE CAPE METROPOLITAN AREA – BUDGET

A detailed budget is presented below. This is followed by a budget summary, which lists all assumptions made.

DETAILED BUDGET

The costs associated with each of the specific objectives of the project, as listed in the 'Terms of Reference', are listed below.

(I) Comprehensive literature search

Photocopying:

Will need to photocopy relevant information from books, journals etc. As of 10th March 2000 we have used approximately 1200 copies. The literature search is still ongoing. Expect say 4000 copies at most.

$$4000 \times R 0-25 = R 1000-00$$

Printing:

From internet searches, files sent via e-mail to us and printing hard copy records of our literature search including reference list. As of 5th April 2000 we have printed 1050 pages. The literature search is ongoing and so we expect 3000 pages.

$$3000 \times R 0-35 = R 1050-00$$

Travel expenses:

Trips to the University of Stellenbosch libraries, research centres, other libraries and visits to the Cape Metropolitan Council (CMC). Assume 15 trips of 50 km @ 65c per kilometre.

$$15 \times 50 \times R 0-65 = R 487-50$$

Phone calls and faxes:

The phone bill for February and March of 2000 is not available at present.

Assume 100 local calls (5 min) @ 50c per 3 minutes:

$$100 \times R 1-00 = R 100-00$$

Assume 20 national calls (5 min) @ 150c per minute:

$$20 \times 5 \times R1-50 = R 150-00$$

Assume 20 mobile phone calls (5 min) @ 175c per minute:

$$20 \times 5 \times 175c = R 175-00$$

Faxes-outgoing: Assume 10, 5 page faxes with 5 minutes telephone time.

5 minutes phone time = R 1

5 page fax = R 5

$$10 \times R6-00 = R 60-00$$

(II) Develop an updated list of the large water users in the six Municipal Local Councils (MLCs) within the CMA

Correspondence (i.e. phone calls and faxes):

Phone calls (ARCUS GIBB and MLCs perhaps)

Assume 20 (5 min) local calls and 5 (5 min) cellular calls.

$$\begin{aligned} 20 \times R 1-00 &= R 20-00 \\ 5 \times 5 \text{ min} \times R 1-75 &= R 43-75 \end{aligned}$$

Phone calls to information (INFO) to find user addresses where these have not been supplied by the MLCs. Assume 150 calls at 5 minutes each.

$$150 \times R 1-00 = R 150-00$$

Assume 20 faxes (outgoing) of 5 pages in length for clarification of information provided by MLCs.

$$20 \times R 6-00 = R120-00$$

Photocopying:

Relevant documents from ARCUS GIBB/ MLCs. Assume 200 pages.

$$200 \times R 0-25 = R 50-00$$

Printing:

Preparing the database or report to document the top say 300* water users. Assume say 200 pages.

$$200 \times R 0-35 = R 70-00$$

* Subject to change depending on information from MLCs

Travel expenses:

May have to travel to municipalities to clear up any uncertainties or for further information. Assume 10 trips of 50km @ 65c per kilometre.

$$10 \times 50 \times R\ 0-65 = R325-00$$

(III) Questionnaire (Attitudes and perceptions)

Printing:

Assume 10 page questionnaire + cover page + background letter (ie 12 pages at most).

Assume 15 drafts of 7 copies- 1260 copies.

$$1260 \times 35c = R441-00$$

Assume 300* large water users to whom the initial questionnaire will be delivered. The questionnaire will be printed on blue paper costing 40c a page.

$$300* \times 12 = 3600 \times R\ 0-40 = R1440-00$$

Photocopying:

Limited amount, photocopying other questionnaires from the library etc. Assume 200 pages.

$$200 \times R\ 0-25c = R50-00$$

Phone calls:

Per organisation (of which there are 300*):

Introducing ourselves and identifying key contact person

Assume 5 minute local phone call = R1-00

Contact key person and tell them about the questionnaire. This will take a little longer than a regular phone call. Assume 10 minute call with a possibility of contacting them via cell phone.

With a 10 minute local call = R 2-00

With a 10 minute cell phone call = R17-50

Assume 40% of these phone calls will be made to cellular phones.

Follow up call- Have they received the questionnaire? Assume 5 minute local call.

With a 5 minute local call = R 1-00

Chase up call- Why have we not received the questionnaire back? Could consist of a 5 minute local call or 5 minute cell phone call.

With a 5 minute local call = R 1-00

With a 5 minute cell phone call = R8-75

Assume 40% of these phone calls will be made to cellular phones.

Average total telephone call cost per organisation = R1-00 + R2-00×0.6 + R17-50×0.4 +
R1-00 + R1-00×0.6 + R8-75×0.4 = R14-30

For all the organisations:

$$300^* \times R 14-30 = R4290-00$$

Postage:

Per organisation: Assume 2 stamps on envelope. Stamp cost = R1-30.

$$2 \times R1-30 = R2-60$$

$$300^* \times R 2-60 = R 780-00$$

Envelopes:

1 per organisation. 25 envelopes(A5) cost R15-00

$$300^*/25 \times R15-00 = R 180-00$$

Transport:

Assume 10% of companies request a personal interview or require that we fetch the completed questionnaire document. 10% of 300* organisations = 30. Assume 30 trips of approx. 50km.

$$30 \text{ trips} \times 50\text{km} \times R 0-65 = R 975-50$$

Fax- incoming:

We have asked all recipients to fax back the questionnaire. Assuming 50% response rate, we can expect about 1500 pages of fax. The Environmental and Geographical Science Department will charge us for 3 rolls of fax paper and half the cost of a new toner.

$$3 \times R 25-00 = R 75-00$$

$$\frac{1}{2} \text{ Toner} = R 450-00$$

(IV) Analysing information gained from Questionnaire

Printing:

Preparing a summary of the information obtained. Representing some of the appropriate information statistically. Assume 500 pages.

$$500 \times R 0-35 = R 175-00$$

Phone calls:

Assume 20 local phone calls (5 min) and 10 cellular phone calls (5min) to clarify information presented in Questionnaires.

$$\begin{aligned} 20 \times R 1-00 &= R 20-00 \\ 10 \times 5 \times R 1-75 &= R 87-50 \end{aligned}$$

Faxing:

Faxing some of the summarised results to ARCUS GIBB for comment. Assume 5 faxes of 5 pages in length.

$$5 \times R 6-00 = R 30-00$$

(V) Practical water audit course with Mr Roy Donovan and Mr Heinrich Hess

Photocopying:

Assume 200 pages for photocopying documentation provided by Roy for each of the group members.

$$200 \times R 0-25 = R 50-00$$

Transport:

Assume 2 trips of 50km each.

$$100\text{km} \times R 0-65 = R 65-00$$

(VI) Student Audits to be conducted independently

Printing:

Assume 500 pages to prepare a summary of the audit results.

$$500 \times R 0-35 = R 175-00$$

Photocopying:

Assume 200 pages of photocopying auditing tool from Mr Roy Donovan and Mr Heinrich Hess.

$$200 \times R 0-25 = R 50-00$$

Travel:

Maximum of 16 trips of 50km each. These trips will be to the various audit destinations as determined by Mr Roy Donovan and Mr Heinrich Hess.

$$16 \times 50 \times R 0-65 = R 520-00$$

(VI) Preparation of report

Assume report is 100 pages long. Assume 3 drafts of 6 copies (Group of four + Kevin Winter + ARCUS GIBB)

$$3 \times 6 \times 100 = 1800 \text{ pages} \times R 0.35 = R 630.00$$

Assume 7 copies for final review (two copies for ARCUS GIBB)

$$7 \times 100 \times R 0.35 = R 245.00$$

Assume 6 final copies

$$6 \times 100 \times R 0.35 = R 210.00$$

Binding:

$$31 \text{ copies} \times R 5.00 = R 155.00$$

STATIONARY

Files:

2 files for General info; 1 file for water audit documents; 1 file for Demand Management documents; 1 file for Public government documents on water issues; 1 file for Faxes/letters/ e-mails; 1 file for case studies; 1 file for meeting minutes; 2 files for MLC data; 2 files for questionnaire results; 1 file for photocopied documents of relevance and 1 file for the bibliography.

$$14 \text{ files} \times R 15.00 = R 210.00$$

High lighter pens:

$$1 \text{ pack} : R 20.00$$

Marker pens:

$$5 \text{ no. marker pens (@) } R 10.00 \text{ each} = R 50.00$$

Stiffy discs:

$$2 \text{ boxes} \times R 45.00 = R 90.00$$

SUMMARY OF COSTS

Comprehensive literature search:

$$\begin{aligned} & \text{R } 1000-00 + \text{R } 1050-00 + \text{R } 487-50 + \text{R } 100-00 + \text{R } 150-00 + \\ & \text{R } 175-00 + \text{R } 60-00 = \mathbf{R } 3022-50 \end{aligned}$$

Develop an updated list of the top water users in the six Municipal Local Councils (MLCs):

$$\begin{aligned} & \text{R } 20-00 + \text{R } 43-75 + \text{R } 150-00 + \text{R } 120-00 + \text{R } 50-00 + \\ & \text{R } 70-00 + \text{R } 325-00 = \mathbf{R } 778-75 \end{aligned}$$

Questionnaire (Attitudes and perceptions):

$$\begin{aligned} & \text{R } 441-00 + \text{R } 1440-00 + \text{R } 50-00 + \text{R } 4290-00 + \text{R } 780-00 + \\ & \text{R } 180-00 + \text{R } 975-50 + \text{R } 75-00 + \text{R } 450-00 = \mathbf{R } 8681-50 \end{aligned}$$

Analysing information gained from Questionnaire:

$$\text{R } 175-00 + \text{R } 20-00 + \text{R } 87-50 + \text{R } 30-00 = \mathbf{R } 312-50$$

Water audit course with Roy Donovan and Mr Heinrich Hess (ARCUS GIBB):

$$\text{R } 50-00 + \text{R } 65-00 = \mathbf{R } 115-00$$

Student audits conducted independently:

$$\text{R } 175-00 + \text{R } 50-00 + \text{R } 520-00 = \mathbf{R } 745-00$$

Preparation of report:

$$\text{R } 630-00 + \text{R } 245-00 + \text{R } 210-00 + \text{R } 155-00 = \mathbf{R } 1240-00$$

Stationary:

$$\text{R } 210-00 + \text{R } 20-00 + \text{R } 50-00 + \text{R } 90-00 = \mathbf{R } 370-00$$

$$\begin{aligned} \mathbf{\underline{\text{Total cost}}} &= \mathbf{\underline{\text{R } 15\,265-25}} + 10\% \text{ contingency} \\ &= \mathbf{\underline{\text{R } 15\,265-25}} + \mathbf{\underline{\text{R } 1\,526-53}} \\ &= \mathbf{\underline{\text{R } 16\,791-78}} \text{ (excluding VAT)} \end{aligned}$$

BUDGET SUMMARY

| | Cost (Rands) |
|---|-----------------|
| Comprehensive Literature Search | |
| Photocopying: | 1000.00 |
| Printing: | 1050.00 |
| Travel expenses: | 487.50 |
| Phone calls and faxes | 485.00 |
| Subtotal: | 3022.50 |
| Develop an updated list of the large water users in the six Municipal Local Councils | |
| Phone calls and faxes | 333.75 |
| Photocopying: | 50.00 |
| Printing: | 70.00 |
| Travel expenses: | 325.00 |
| Subtotal: | 778.75 |
| Initial Questionnaire (Attitudes and perceptions) | |
| Printing: | 1881.00 |
| Photocopying: | 50.00 |
| Phone calls: | 4290.00 |
| Postage: | 780.00 |
| Envelopes: | 180.00 |
| Transport: | 975.50 |
| Faxes- incoming | 525.00 |
| Subtotal: | 8681.50 |
| Analysing information gained from initial questionnaire | |
| Printing: | 175.00 |
| Phone calls: | 107.50 |
| Faxing: | 30.00 |
| Subtotal: | 312.50 |
| Water audit course | |
| Photocopying: | 50.00 |
| Transport: | 65.00 |
| Subtotal: | 115.00 |
| Independent student audits | |
| Printing | 175.00 |
| Photocopying | 50.00 |
| Travel | 520.00 |
| Subtotal: | 745.00 |
| Preparation of final report | |
| Draft copies incl. Final | 1085.00 |
| Binding: | 155.00 |
| Subtotal: | 1240.00 |
| Stationary | |
| Files: | 210.00 |
| High lighter pens: | 20.00 |
| Marker pens: | 50.00 |
| Stiffy discs: | 90.00 |
| Subtotal: | 370.00 |
| TOTAL: | 15265.25 |
| 10% Contingency: | 1526.53 |
| Grand Total (excluding VAT): | 16791.78 |

SCHEDULE 3
TERMS OF PAYMENT

Terms of Payment

GIBB will pay the Sub-Consultant within 30 days after payment of our invoices by the Cape Metropolitan Council.

The Sub-Consultant should forward invoices to GIBB before the 15th of each month in order to include the sub-consultant costs in our invoices.

SCHEDULE 4
TIME FOR COMPLETION

Time for Completion

The time for completion for the services contracted out are as per study programme which is to be finalised with the Cape Metropolitan Council.

APPENDIX II: Project Terms of Reference

University of Cape Town

AN ASSESSMENT OF LARGE CONSUMERS' WATER USE WITHIN THE CAPE METROPOLITAN AREA

- TERMS OF REFERENCE

1. Background to the study

It has been predicted that the surface water resources of the Western Cape will only meet the demand until the year 2020. The traditional way to solve this problem is to increase the water supply by embarking on an expensive supply augmentation scheme, such as the proposed Skuifraam Dam. However, there are other less expensive, more environmentally sensitive options to ensure that existing supply meets the current and future demand, and the Department of Water Affairs and Forestry (DWAF) and the Cape Metropolitan Council (CMC) are exploring some of these options.

In order to study different options and propose viable recommendations for decision making the CMC launched a project titled "*Integrated Water Resource Planning Study*". Alternative options to meet the demand for water in the Cape Metropolitan Area (CMA) include water conservation efforts, water demand management techniques, integrated water resource planning and other administrative measures. As part of this project, four Masters students from the Department of Environmental and Geographical Science at the University of Cape Town (UCT) were commissioned to investigate various aspects of Water Demand Management (WDM) and more specifically to undertake Water Audits of selected large water users (organisations consuming more than 100 kilolitres of water per day) in the CMA.

2. Objectives of the University of Cape Town students' study

The UCT students will complete the following related to the Water Demand Management study:

- Conduct a comprehensive literature search of topics related to water demand management and water auditing.
- Establish an up to date list of the large water users (those using more than 100 kl/day) in the CMA. This list will only contain the names of top water users that have been provided to the UCT study group by Monday 10th July 2000.
- Each entry within the above mentioned list will be placed into its relevant sector according to the 10 industry codes (Industry codes: 00-Basic Foods, 10-Refined Foods, 20-Textiles, 30-Leather, Rubber and Plastic, 40-Building & Construction, 50-Printing & Paper, 60-Chemicals, 70-Engineering, 80-Commercial and Public, 90-Residential and Institutions), provided sufficient information is gained from the questionnaires received before Monday 24th of July 2000.
- Use a questionnaire, to gather information about attitudes and perceptions of the large water users in the CMA. Questionnaire results received after Monday 24th July 2000 will not be evaluated/considered by the UCT study group.
- Conduct water audits on pre-determined organisations as agreed on 3rd July 2000.

3. Procedure of the students' study

3.1 Literature search

The literature search will cover all topics related to WDM, Water Conservation and Water Audits. The literature search will include media such as:

- Internet
- Books
- Journals
- Reports

Together with the literature, experts in the field will be consulted and interviewed. A list of the literature that was consulted will be placed in the final report.

3.2 List of top water users

Municipal Local Councils (MLCs) will be contacted via ARCUS GIBB and asked to supply a list of consumers using more than 100 kl/ day. The list of large water users received before Monday 10th July 2000 will be compiled from this information and will include contact details, postal and physical addresses and a suitable contact person.

3.3 Attitude and perception questionnaire

The questionnaire will be designed, tested and will be distributed amongst various groups of people including academic staff, fellow students, specialists and other people working on the project. The questions will be revised and sent through numerous draft versions before being distributed to the large water users on the contact list. The results of the questionnaire received before the 24th of July 2000 will be assessed and presented in a report to ARCUS GIBB. Respondents' names, and organisations' they represent, will not be used in the analysis of the questionnaire results.

3.4 Water audits

The students will first audit selected organisations together with Mr Roy Donovan and Mr Heinrich Hess of ARCUS GIBB. Thereafter, the students will independently conduct audits on pre-determined organisations within the CMA. The results of these audits will be presented to ARCUS GIBB. Analysis of these audits is not the responsibility of the UCT study group.

4. Final report

The final report is to be presented to Mr Johan du Plessis of ARCUS GIBB on 31st July 2000. This report will include the following:

- The list of references collected during the project

- The list and contact details of the large water users in the CMA received before the 10th of July 2000
- An analysis of the results from the questionnaire received before 24th of July 2000.
- The results of the Water Audits conducted by the students

5. Budget

A maximum budget is attached herewith and is presented in two sections namely, the budget summary (one page) and the detailed budget (seven pages). The UCT Terms of Reference and Budget document is subject to approval by both ARCUS GIBB and UCT.

University of Cape Town

APPENDIX III: List of relevant persons consulted

University of Cape Town

| 4. Contact List | | | |
|--|-----------------------------------|-------------------|-----------------------------|
| The following names and numbers are of people who helped during the project. These numbers were gathered during the project. | | | |
| Name | Organisation (occupation) | Tel Number | E-mail Address |
| Bailey, Reg | Durban Metro, KwaZulu Natal | 031 302 4743 | regb@dmws.durban.gov.za |
| Bakkel, Hannes | Rand Water Board, Gauteng | 011 682 0814 | |
| Burger, Lynton | Consultant, Private | | |
| Butcher, Shirley | EGS Department, UCT | 650 2873 | |
| Bystron, Anna | SIDA, Sweden | | anna.bystrom@sida.se |
| Chapman, Charles | CMC, Water and Waste | | |
| Davies, Helen | CMC, Information Services Dept | 487 2831 | |
| De Villiers-Leach, Sarah | Rand Water Board, Gauteng | 011 682 0814 | |
| Dewar, Neil, Dr | EGS Department, UCT | 650 2880 | |
| Dingley, Charles | Electrical Engineer, UCT | 650 2793 | |
| Donovan, Roy | Consultant, Tweeddale Consulting | 082 789 7769 | |
| Drury, Nigel | Water Matters | 674 1932 | |
| du Plessis, Johan | ARCUS GIBB, Bellville | 914 5550 | |
| Duncan-Smith, Basil | Maintenance Engineer, UCT | 650 3145 | |
| Eklund, Lars | SIDA, Sweden | | lars.eklund@sida.se |
| Fuggle, Richard, Prof | EGS Department, UCT | 650 2873 | |
| Goody, George | Ninham Shand, Cape Town | 424 5544 | |
| Haynes, Michael | Umgeni Water Board, KwaZulu Natal | | michael.haynes@umgeni.co.za |
| Hess, Heinrich | ARCUS GIBB | 469 9100 | |
| Hill, Richard | EGS Department, UCT | 650 2874 | |

| Name | Organisation (occupation) | Tel Number | E-mail Address |
|---------------------|----------------------------------|------------|-------------------------|
| Larson, Joy | Ninham Shand, Cape Town | 424 5544 | |
| Le Grange, Aldu, Dr | ARCUS GIBB | 914 5550 | |
| Luger, Mike | Ninham Shand, Cape Town | 424 5544 | |
| Matora, Simba | Student, UCT | | |
| Mazeema, Hamied | CMC, Scientific Services Dept | 637 9117 | |
| McQueen, Carol | Working for Water, Cape Town | 405 2200 | |
| Moorgas, Sean | Stellenbosch Municipality | | |
| Morilly, Louis | South Peninsula Water Inspectors | 797 0711 | |
| Pinkerton, Roy | Durban Metro, KwaZulu Natal | | royp@dmws.durban.gov.za |
| Pithey, Sonya | CMC, Catchment Management | 487 2221 | |
| Preston, Guy, Dr | Working for Water, Cape Town | 405 2200 | |
| Price, Penny | Oceangraphy Department, UCT | | |
| Reynecke, Mark | South Atlantic Plastics | 551 8817 | |
| Shippey, Karen | EGS Department, UCT | 650 2873 | |
| Stone, Deon | Aquasmart | 855 2632 | |
| Wallpole, Keith | CMC, Scientific Services Dept | 637 9117 | |
| Wright, Mervin | CMC, Water Supply | 487 2206 | |

APPENDIX IV: List of Large water users in the CMA

University of Cape Town

LIST OF WATER USERS IN THE CAPE METROPOLITAN AREA THAT CONSUME MORE THAN 100 KILO-LITRES OF POTABLE WATER PER DAY

| Consumption (kl/ day) | Organisation | Activity as provided in questionnaire returns | Municipality | Erf or Stand No. | Postal Address | Postal Code | Physical Address (if known) | Fax | Tel no | Contact Person/s |
|-----------------------|---|---|-------------------|------------------|---|-------------|--|-----------|-----------------|--------------------------------|
| 25011 | AECI Pen. Fund & CM Centre | Provision of services on site | Helderberg | Not provided | Private Bag X101, Somerset west | 7129 | 23 School Street | 852- 1901 | 852- 1111 | Mr M Traut |
| 12965 | Advanced Medical Technologies (PTY) LTD | | Helderberg | Not provided | P O Box 1225, Somerset West | 7129 | 23 School Street | | 852- 7333 | George Dendas/ Piet Delpoit |
| 4548 | Caltex Africa Limited | | Blaauwberg | Erf 936 | PO Box 13, Milnerton | 7435 | 0 Platteklouf Road, Killarney (SFF Tanks Only) | 551-1975 | 508- 3911/3464 | Ron Eastes/ Gordon Povey |
| 4196 | CGC | | City of Cape Town | Not Provided | Not Provided | | | | | |
| 5663 | Parks and Forests | | City of Cape Town | Not Provided | Not Provided | | | | 400- 3823 | Mr Desaar |
| 3434 | Department of Public Works | Prison services- Code 80* | South Peninsula | Stand 4659 | Private Bag X4, Tokal | 7949 | Pollsmoor | 701- 5445 | 700- 1266 | Anthony James |
| 2757 | Total South Africa (PTY) LTD | | Helderberg | Not provided | P O Box 81, Somerset West | 8000 | Prima Service Station, 23 School Street | | 852- 5941 | Wayne Williams |
| 2549 | Eskom Koeberg | | Blaauwberg | Erf 34 | Private Bag X10, Kernkrag | 7441 | 0 West Coast Road | 550- 5100 | 550- 4911 | P. Prozesky |
| 1747 | Kynoch Fertilizer LTD | Fertilizer manufacture and blending | Blaauwberg | Erf 10778 | PO Box 88, Milnerton | 7435 | 0 Platteklouf Road, Milnerton | 551- 1238 | 550- 2200 | Mark White |
| 1691 | University of the Western Cape | Educational Institution- Code 90* | City of Tygerberg | Erf 31229 | Technical Services, Privaatsak X17, Bellville | 7535 | UWC Main Campus, Modderdam Street | 959- 2886 | 959- 3383 | Robert Quinn |
| 1687 | Portnet | | City of Cape Town | Not Provided | PO Box 4245, Cape Town | 8000 | | | 449- 3405 | The Chief Birthing Manager |
| 1687 | Granger Bay Trust | | City of Cape Town | Not Provided | | | | | | |
| 1490 | Portnet | | City of Cape Town | Not Provided | PO Box 4245, Cape Town | 8000 | | | 449- 3405 | The Chief Birthing Manager |
| 1375 | Ntabeni Ontwikkelings Gebied | | South Peninsula | Stand 945 | SPM, Private Bag X5, Plumstead | 7801 | Site 5 | | 712- 9364 | Dave Jenliffe |
| 1366 | Caltex Africa Limited | | Blaauwberg | Erf 936 | PO Box 13, Milnerton | 7435 | 0 Platteklouf Road, Killarney | 551-1975 | 508- 3911 | Ron Eastes/ Gordon Povey |
| 1333 | County Fair Foods PTY LTD | | Oostenberg | Not provided | PO Box 94, EPPINDUST | 7475 | Merchants Bafors Circle | 534- 4756 | 534- 4211 | Stuart McFarlane |
| 1311 | NAMPAK Paper | Manufacture of paper products- Code 50* | City of Tygerberg | Erf 25158 | P/A Nampak Tissue (Pty), PO Box 157, Sanlamhof, Bellville | 7530 | Marvellostreet | 959- 5222 | 959- 5111/ 5246 | L Loubser |

| | | | | | | | | | | |
|------|-------------------------------------|---|-------------------|--------------|---|------|--|-----------|-----------------|-------------------|
| 1282 | V & A Waterfront | | City of Cape Town | Not Provided | V&A Waterfront, PO Box 50001, Waterfront | 8002 | | | 418- 2350 | Mr Steven Bentley |
| 1244 | Tygerberg Hospital | | City of Tygerberg | Erf 15350 | Tygerberg Hospital, Privaatsak X3, Tygerberg | 7505 | Francie van Zyl Drive | 932- 6009 | 938- 4911 | Mr Bowen |
| 1215 | Parks and Forests | | City of Cape Town | Not Provided | Not Provided | | | | 400- 3823 | Mr Desaar |
| 1171 | MC Donalds South Africa | Restaurant- Code 80* | Helderberg | Not provided | | 7599 | No 9, Picketstg, Jonkerspark, Stellenbosch | 852- 9014 | 855- 0906 | Tracy Conradie |
| 1064 | CCC | | City of Cape Town | Not Provided | Not Provided | | | | | |
| 1048 | Petz Estates (PTY) LTD | | City of Cape Town | Not Provided | | | | | | |
| 1043 | Harbour Island Slipway CC | | Helderberg | Not provided | P O Box 152, Gordon's Bay | 7151 | Harbour Island | 856- 6040 | 856- 2141 | Tony Delafonte |
| 1023 | Trident Press (PTY) LTD | | City of Cape Town | Not Provided | PO Box 4996, Cape Town | 8000 | Old Marine Rd, CBD, off Herzog Blvd | 419- 7338 | 419- 6630 | Kevin Lotz |
| 1004 | Castle Street Properties LTD | | City of Cape Town | Not Provided | | | | | | |
| 853 | Technikon Skiereiland | | City of Tygerberg | Erf 14793 | PO Box 1906, Bellville | 7535 | Bellville South Peninsula Technikon | | 959- 6911/ 6247 | Desmond Kensley |
| 849 | SBH Cotton Mills (PTY) LTD | | City of Cape Town | Not Provided | PO Box 25, Cape Town | 8000 | | | 534- 4431 | Eurico Enelli |
| 803 | Irvin & Johnson LTD | Fish processing- Code 00* | City of Cape Town | Not Provided | PO Box 4804, Cape Town | 8000 | 57 Auckland St, Paardeneiland | 510- 3107 | 511- 1411 | JL Waite |
| 795 | SA Vleisprodusente BPK | Abattoir and meat processing- Code 00* | City of Tygerberg | Erf 13555 | PO Box 121, Bellville | 7535 | La Belle Road | 946- 4275 | 948- 1821 | H Fischer |
| 779 | SAPPI Manufacturing (PTY) LTD | | Blaauwberg | Erf 1754 | PO Box 185, Milnerton | 7435 | | 552- 2152 | 552- 2127 | Simon Clark |
| 778 | FNX Landsdowne Properties | | City of Cape Town | Not Provided | | | | | | |
| 765 | NAMPAK Paper | Manufacture of paper products- Code 50* | City of Tygerberg | Erf 25158 | P/A Nampak Tissue (Pty), PO Box 157, Sanlamhof, Bellville | 7530 | Marvellostreet | 959- 5222 | 959- 5111/ 5246 | L Loubser |
| 761 | Tiencor | | City of Cape Town | Not Provided | | | | | | |
| 721 | Tongaat-Hulett Group LTD | Glucose and starch (AFPROD)- Code 10* | City of Tygerberg | Erf 21656 | C/o AFPROD Properties (Bell) Ltd, PO Box 123, Bellville | 7535 | Glucose Road | 959- 8001 | 959- 8000 | Robert Allen |
| 688 | Reckitt & Benckiser SA (PTY) LTD | | City of Cape Town | Not Provided | Unit A, Omu Park, PO Box 54, Eppindust | 7475 | Elliot Ave, Epping Industrial | 534- 8266 | 507- 6000 | Mr A Kinlock |
| 636 | Mrs VG Ntunzi | | City of Tygerberg | Erf 37261 | | 7784 | 14 Pear Circle, Thembani, Khayelitsha | | 387- 4869 | Mrs VG Ntunzi |
| 635 | RISA Manufacturers (PTY) LTD | | City of Cape Town | Not Provided | | | | | | |
| 616 | Beaconvale Development CO (PTY) LTD | | City of Tygerberg | Erf 22461 | C/o Fintex (Pty) Ltd, PO Box 20, Parow | 7499 | Van der Stel Street | | | |
| 603 | Groote Schuur Hospital | | City of Cape Town | Not Provided | Groote Schuur Hospital, Observatory | | | 404- 3260 | 404- 9111 | Malcolm Smith |

| | | | | | | | | | | |
|-----|---------------------------------------|-------------------------------------|-------------------|---------------|---|------|--|-----------|-----------|-------------------|
| 587 | Regional Representatives PWD | | City of Cape Town | Not Provided | | | | | | |
| 586 | CMC | | City of Cape Town | Not Provided | PO Box 3052, Cape Town | 8000 | | 487- 2592 | 487- 2590 | Mr Davidson |
| 575 | Texies Fish and Chips Saloon | | City of Cape Town | Not Provided | | 8000 | Texies Fish & Chips, Cnr. Plein and Darling, Cape Town | | 461- 4817 | Joe Telxela |
| 574 | Sans Fibres (PTY) LTD | The production of fibres-Code 20* | City of Tygerberg | Erf 24034 | PO Box 272, Bellville | 7523 | Sacks Circle, Bellville | 959- 4621 | 959- 4911 | Mr P Kulentic |
| 574 | Sans Fibres (PTY) LTD | The production of fibres-Code 20* | City of Tygerberg | Erf 24034 | PO Box 272, Bellville | 7523 | Sacks Circle, Bellville | 959- 4621 | 959- 4911 | Mr P Kulentic |
| 571 | Italtile Ceramics (PTY) LTD | | Helderberg | Not provided | PO Box 36860, Chempet | 7130 | 23 School Street | | 851- 2170 | Paul Fowler |
| 567 | Wallacedene Squatters Camp | | Oostenberg | Not provided | Private Bag X16, Kuilsrivier | 7579 | Wallacedene | | 487- 2911 | Mr E Albertyn |
| 547 | Dept. of Community Development | | South Peninsula | Stand 66047 | Private Bag X9027, Cape Town | | Waterloo Road | | | Mr Engelke |
| 547 | Spoonnet | | City of Cape Town | Not Provided | Property Management, PO Box 36, Cape Town | 8000 | | | 449- 4036 | Ms Young |
| 536 | Sans Fibres (PTY) LTD | The production of fibres-Code 20* | City of Tygerberg | Erf 24034 | PO Box 272, Bellville | 7523 | Sacks Circle, Bellville | 959- 4621 | 959- 4911 | Mr P Kulentic |
| 521 | Streek Verteenwoordiger | | South Peninsula | Stand 90477 | Private Bag X9027, Cape Town | | Youngsfield, Prince George Drive | | | Mr Engelke |
| 517 | Duro Brick Co | | Oostenberg | Not provided | PO Box 26, Brackenfell | 7561 | Krulsfontein, Everite | | | |
| 513 | Sans Fibres (PTY) LTD | The production of fibres-Code 20* | City of Tygerberg | Erf 24034 | PO Box 272, Bellville | 7523 | Sacks Circle, Bellville | 959- 4621 | 959- 4911 | Mr P Kulentic |
| 500 | Cisco Steel Sales Co. (PTY) LTD | | Oostenberg | Not provided | PO Box 121, Kuilsrivier | 7579 | | | 903- 2141 | Barry Laing |
| 499 | Rustop WP (PTY) LTD | | City of Cape Town | Not Provided | | | 165 Newmarket Street, Woodstock | | | |
| 498 | SA Naval Headquarters | | South Peninsula | Stand 9999991 | Private Bag X1, Simonstown | 7995 | | | 787- 3911 | Captain Roodt |
| 490 | Kynoch Fertilizer LTD | Fertilizer manufacture and blending | Blaauwberg | Erf 10778 | PO Box 88, Milnerton | 7435 | 0 Platteklouf Road, Milnerton | 551- 1238 | 550- 2200 | Mark White |
| 474 | Metal Box SA (PTY) LTD | | City of Tygerberg | Erf 2598 | T/A Bevcan, PO Box 244, Eppindust | 7475 | Goodenough Avenue | | | |
| 473 | Peninsula Beverage Prop (PTY) LTD | Carbonated Softdrinks-Code 10* | City of Tygerberg | Erf 22304 | PO Box 2056, Parowvallei | 7503 | 57 Industria Ring Road, Parow Industria | 931- 2412 | 937- 2100 | Mr A Cloete |
| 454 | Tyger Valley Shopping Centre | Retail Shopping Centre-Code 80* | City of Tygerberg | Erf 21753 | Metropolitan Homes Trust Life Ltd, PO Box 2212, Bellville | 7530 | Willie van Schoor Ave. | 914- 1318 | 914- 1822 | Mr H van der Vegt |
| 451 | CPA Central Laundry, Provincial Admin | | City of Cape Town | Not Provided | | | | | | |
| 447 | Petz Estates (PTY) LTD | | City of Cape Town | Not Provided | | | | | | |
| 441 | Berkatsil (PTY) LTD | | City of Tygerberg | Erf 4147 | C/o Coke Cola Beverage Canners, Po Box 213, EppIndust | 7475 | Kinghall Avenue | 534- 6720 | 534- 3381 | Keith Topley |

| | | | | | | | | | | |
|-----|-----------------------------------|---|-------------------|--------------|--|------|---|-----------|----------------|---------------------|
| 436 | UKW Propertles (PTY) LTD | | Blaauwberg | Erf 1183 | PO Box 88, Maitland | 7405 | 0 Charel Uys Drive | | | |
| 424 | University of Cape Town | | City of Cape Town | Not Provided | | | Main Campus, | | 650- 9111 | Mr Sedick Samodien |
| 418 | V & A Waterfront | | City of Cape Town | Not Provided | V&A Waterfront, PO Box 50001, Waterfront | 8002 | | | 418- 2350 | Mr Steven Bentley |
| 415 | Peninsula Beverage Prop (PTY) LTD | Carbonated Softdrinks- Code 10* | City of Tygerberg | Erf 99999 | PO Box 2056, Parowvallei | 7503 | 57 Industria Ring Road, Parow Industria | 931- 2412 | 937- 2100 | Mr A Cloete |
| 415 | Richard Kane and Co. | | City of Cape Town | Not Provided | PO Box 222, Maitland | 7404 | 11 Evans Ave, Eppindust | 535- 2244 | 535- 1122 | Mr Swart |
| 405 | University of Stellenbosch | | City of Tygerberg | Erf 14299 | Property Management & Debtors, Private Bag X1, Matieland | 7602 | Parkdene Street | | 808- 4599 | Pleter van der Pool |
| 397 | CMC | | City of Cape Town | Not Provided | PO Box 3052, Cape Town | 8000 | | 487- 2592 | 487- 2590 | Mr Davidson |
| 391 | Metropolitan Homes Trust | | City of Tygerberg | Erf 23975 | Metropolitan Properties, PO Box 2212, Bellville | 7535 | Hume Terrein | 940- 6070 | 940- 5911 | Audrey Appollis |
| 390 | Tiger Food Industries LTD | | City of Cape Town | Not Provided | | | | | 011- 3200- 111 | |
| 383 | Atlantis Manufacturing LTD | | Blaauwberg | Erf 1183 | PO Box 1222, Cape Town | 8000 | 0 William Gourlay Street | 573- 8600 | 573- 8911 | Dave Petrie |
| 382 | ICS Group LTD | | City of Cape Town | Not Provided | | | | | | |
| 360 | Baxter Theatre | | City of Cape Town | Not Provided | PO Box 297, Rondebosch | | | 689- 1880 | 685- 7880 | Mr Abrahams |
| 356 | Rotex Fabrics (PTY) LTD | Textiles-knitting, dyeing and finishing- Code 20* | Blaauwberg | Erf 1183 | PO Box 1465, Dassenberg | 7350 | 0 Johan Heyns Road, Atlantis | 577- 1640 | 577- 1777 | Danny Howells |
| 351 | Mamre Management Board | | Blaauwberg | Erf 739 | Blaauwberg Municipality, PO Box 35, Milnerton | 7441 | 0 Enon Street | 552- 2835 | 550- 1062 | C Moller |
| 339 | Dairysells (PTY) LTD | | City of Cape Town | Not Provided | | | | | | |
| 338 | Director Scientific Services | | City of Cape Town | Not Provided | | | | | | |
| 333 | CMC- Ammentiles Blaauwberg | | Blaauwberg | Erf 44002 | | | D Alacrity | | 577- 3154 | |
| 330 | UKW Propertles (PTY) LTD | | Blaauwberg | Erf 1183 | PO Box 88, Maitland | 7405 | 0 Charel Uys Drive | | | |
| 330 | MR. R Southin | | Helderberg | Not provided | 9 Rosecombe Estate, Somerset West | 7130 | 9 Rosecombe Estate, Af. Berghoewe Weg | | 851- 5962 | |
| 324 | Blaauwberg Municipality | | Blaauwberg | Erf 153 | | | 0 Frankdala Road | 552- 2835 | 550- 1111 | |
| 322 | VI Moosa & Partner | | City of Cape Town | Not Provided | | | | | | |
| 316 | Atlantis Manufacturing LTD | | Blaauwberg | Erf 1183 | PO Box 1222, Cape Town | 8000 | 0 William Gourlay Street | 573- 8600 | 573- 8911 | Dave Petrie |
| 315 | Serina Kaolin (PTY) LTD | Mining & processing of Kaolin | South Peninsula | Stand 13808 | PO Box 37700, Vallyland | 7978 | | 785- 2863 | 785- 2081 | Mr AC Viljoen |

| | | | | | | | | | | |
|-----|--|-------------------------------|-------------------|--------------|--|------|--|-----------|----------------|-----------------|
| 312 | Stigting Vir Navorsingontw | | Oostenberg | Not provided | PO Box 72, Faure | 7131 | Ou Nasionale Weg, Faure | | 421- 6647 | Johan Steyl |
| 311 | Parin Park Properties (PTY) LTD | | City of Tygerberg | Erf 99999 | C/o Homstead Industrial Dairy, PO Box 579, Parow | 7499 | Industria Ring Road | | 705- 8380 | |
| 307 | High Cape 2 Body Corporate (SUREPROP) | Property Management- Code 90* | City of Cape Town | Not Provided | | | Developers- Tokal Business Park, Keyser River Drive, Tokal | 713- 1040 | 713- 0600 | Nigel Anderson |
| 306 | Pets Products (PTY) LTD | | City of Cape Town | Not Provided | Operations Director, PO Box 749, Howard Place | 7450 | | | 507- 7100 | Mark De Bruin |
| 305 | City PARK Medical Centre | | City of Cape Town | Not Provided | PO Box 15364, Vlaeberg | 8018 | 181 Long Market St | | 480- 6111 | Mr Lombard |
| 304 | CMC | | City of Cape Town | Not Provided | PO Box 3052, Cape Town | 8000 | | 487- 2592 | 487- 2590 | Mr Davidson |
| 299 | Southern Sun (Cape Sun) | | City of Cape Town | Not Provided | Southern Sun Group, Strand St, PO Box 4532 | | Strand Street, Cape Town | 432- 8875 | 488- 5100 | Johan Coetze |
| 298 | National Brands Limited-WILLARDS | | City of Tygerberg | Erf 88888 | PO Box 218, Parow Industrial | 7500 | Industria Ring Road | 934- 9009 | 934- 9005 | Salwha Nordien |
| 298 | CCC | | City of Cape Town | Not Provided | Not Provided | | | | | |
| 296 | Romatex Limited | Textiles- Code 20* | City of Tygerberg | Erf 19339 | Romatex Limited, PO Box 91, Goodwood | 7459 | Epping Avenue, Elsies River | 933- 1223 | 933- 5200 | Mr A Lucy |
| 295 | Belgotex (PTY) LTD | | Helderberg | Not provided | PO Box 3002, Somerset west | 7129 | Crompton Street | 854- 5202 | 853- 8666 | Mike Scott |
| 294 | Dietrich Street & Partners, Medical Centre | | City of Cape Town | Not Provided | PO Box 7353, Roggebaai | | City Park Medi-Clinic | 423- 5675 | 410- 3108 | Piet Kwak |
| 294 | Dr Orman and Partners | | City of Cape Town | Not Provided | | 8001 | 210 Fountain Medical Centre, Foreshore | 424- 7903 | 424- 8090 | Mrs R Irwin |
| 291 | Trading and Investment Corporation | | Blaauwberg | Erf 256 | | | 0 Popham Street | | | |
| 285 | Parks and Forests | | City of Cape Town | Not Provided | Not Provided | | | | 400- 3823 | Mr Desaar |
| 284 | Dunlop Heywood | | City of Cape Town | Not Provided | | | 25 Riley Street Beaconvale | | 932- 9171 | |
| 283 | Municipality | | Helderberg | Not provided | P O Box 19, Somerset West | 7130 | Hillcrest Road | | 850- 4000 | Tony Burkett |
| 283 | Millsprop Investments (PTY) LTD | | City of Cape Town | Not Provided | | | | | | |
| 280 | Krasnapolsky Hotels (The Lord Charles) | | Helderberg | Not provided | P O Box 5151, Somerset West | 7135 | | | 855- 1040 | Eric Aarts |
| 279 | Tiger Food Industries LTD | | City of Cape Town | Not Provided | | | | | 011- 3200- 111 | |
| 278 | Department of Public Works (Hse Reps) | | Blaauwberg | Erf 710 | Room 823, Dept. Public Works, Private Bag X9027, Cape Town | 8000 | 0 Grosvenor Avenue | | | B Blight |
| 277 | Body Corporate Woodbridge Island | | Blaauwberg | Erf 4 | PO Box 510, Milnerton | 7441 | | 551- 3116 | 551- 4598 | Mr van Rensberg |
| 277 | Cape Technikon | | City of Cape Town | Not Provided | PO Box 652, Cape Town | 8000 | Main Campus, Kelzergracht St, District Six | | 460- 3911 | Clive Tobin |

| | | | | | | | | | | |
|-----|---|------------------------------|-------------------|--------------|--|------|------------------------------------|-----------|-----------------|------------------|
| 276 | Pinewood Retirement Village | Retirement Complex- Code 90* | City of Cape Town | Not Provided | PO Box 600, Howard Place | 7450 | University Drive, Rondebosch | 531- 5485 | 531- 3249 | Mr H Winearls |
| 275 | Parks and Forests | | City of Cape Town | Not Provided | Not Provided | | | | 400- 3823 | Mr Desaar |
| 273 | Sanlam Properties, Sanlamhof | Insurance- Code 80* | City of Tygerberg | Erf 31622 | Sanlam Head Off, PO Box 790, Sanlamhof | 7532 | 2 Strand Road, Bellville | 947- 3422 | 947- 9111/ 4530 | Piet van Zyl |
| 268 | The Town Clerk | | City of Cape Town | Not Provided | | | | | | |
| 265 | Kennilworth Centre (PTY) LTD | | City of Cape Town | Not Provided | PO Box 36138, Glossderry | 7700 | Cnr Doncaster/Koch Rd, Claremont | | 671- 5054 | Mr Pollock |
| 262 | Silverhurst Estate- Home owners Association | Housing Estate- Code 90* | South Peninsula | Stand 10269 | PO Box 23095, Claremont | 7806 | Constantia Main Road | 794- 3699 | 794- 3699 | Mr A Butcher |
| 261 | Nestle SA (PTY) LTD | | City of Tygerberg | Erf 24434 | Nestle SA (PTY) LTD, PO Box 110, Bellville South | 7535 | Kassels Vlei Road | 951- 4161 | 951- 2201 | Sean Weavill |
| 258 | Medi Clinic LTD | | South Peninsula | Stand 111526 | PO Box 179 Plumstead | 7800 | 65 Burnham Road, Plumstead | | 799- 2911 | Rudolf Burger |
| 258 | Medi Clinic Corporation LTD | | City of Cape Town | Not Provided | | | | | | |
| 249 | CCC | | City of Cape Town | Not Provided | Not Provided | | | | | |
| 247 | KPA | | South Peninsula | Stand 2848 | Immizanu Yethu Estate, C/o A.D du Toit | | | | | |
| 243 | Dept. of Public Works | | South Peninsula | Stand 674 | Private Bag X9027, Cape Town | 8000 | 13 Buck Road | | 402- 2157 | Mr Deon Gardener |
| 243 | Municipal Abattoir | | City of Cape Town | Not Provided | PO Box 11, Maitland | 7405 | | | 511- 2041 | Mr Botha |
| 243 | Montago Bay Body Corp. | | Helderberg | Not provided | P O Box 638, Strand | 7139 | Montagobaal | | | |
| 242 | Atlantis Manufacturing LTD | | Blaauwberg | Erf 1183 | PO Box 1222, Cape Town | 8000 | 0 William Gourlay Street | 573- 8600 | 573- 8911 | Dave Petrie |
| 238 | S W Society of the Aged (Vonkelhuis) | | Helderberg | Not provided | P O Box 55, Somerset West | 7129 | Lourensford Road | | 852- 5130 | Jackie Blundell |
| 237 | SA Astronomical Observatory | | City of Cape Town | Not Provided | PO Box 9, Observatory | 7925 | Near Lwr Main and Bishop | | 447- 0025 | Mr Meyers |
| 237 | DFE Steen | | City of Cape Town | Not Provided | | | Mill St, Cnr Bultenkant, Vredehoek | | | |
| 237 | Speedi-Wash (Gardens) | | City of Cape Town | Not Provided | | | Gardens Centre, Mill St | | 465- 5826 | Elton |
| 237 | SA Astronomical Observatory | | City of Cape Town | Not Provided | PO BOX 9, Observatory | 7925 | | 447- 3639 | 447- 0025 | Mr Meyers |
| 237 | Ralth Gourmet | | City of Cape Town | Not Provided | | | 38 Gardens Centre, Mill St | 461- 8293 | 465- 2729 | Mrs Weyers |
| 237 | Pick n Pay Reatlilers (PTY) LTD | | City of Cape Town | Not Provided | | | Gardens Centre, Mill Str., | | 461- 1046/ 1047 | Dirk Coetsee |
| 237 | Trust Centre | | City of Cape Town | Not Provided | | | | | | |

| | | | | | | | | | | |
|-----|--------------------------------|--|-------------------|---------------|---|------|---|-----------------|-----------------|-------------------|
| 235 | KPA | | South Peninsula | Stand 2848 | Immizanu Yethu Estate, C/o A.D du Toit | | | | | |
| 234 | Wetton Park CC | | South Peninsula | Stand 592 | C/o Golding Commercial Properties, PO Box 2398, Cape Town | 8000 | 11 Dolphin way | | 418- 4444 | Mr G van Blerk |
| 232 | South Peninsula Municipality | | South Peninsula | Stand 5001271 | Private Bag X8, Plumstead | | Abemby Sports | | | |
| 231 | Boston Laundry | | City of Tygerberg | Erf 99971 | Boston Laundry, PO Box 1036, Eppindust II | 7475 | 12 Nourse Avenue | 535- 2813 | 535- 2866 | Derrick Willey |
| 231 | Blue Route Centre (PTY) LTD | Retail Shopping Centre- Code 80* | South Peninsula | Stand 9877 | PO Box 30143, Tokal | 7967 | Tokal Road, Tokal | 712- 2653 | 713- 2360 | Ben Forrer |
| 230 | University of Cape Town | | City of Cape Town | Not Provided | | | Medical School, Cadboll House, Mowbray | | 650- 3156 | Ferdi Andreucci |
| 228 | Standard Bank of South Africa | Financial- Code 80* | City of Cape Town | Not Provided | PO Box 6931, Roggebaal | 8012 | | 425- 2339 | 401- 2861 | Mr HP Jacobs |
| 226 | Cape Oil Products LTD | | City of Cape Town | Not Provided | PO Box 16, Maltland | 7404 | 45 Berkley Rd, Maltland Ndabeni | | 507- 5511 | Mr Mawethu Mabaso |
| 226 | The Campridge Trust | | City of Cape Town | Not Provided | | | | | 892- 2652 | |
| 225 | SA Mutual Life Assurers | Financial- Code 80* | City of Cape Town | Not Provided | PO Box 327 | | Jan Smuts Drive, Pinelands | 509- 4170 | 509- 3266 | Mr CW Schnehage |
| 223 | Auto Prism | | City of Cape Town | Not Provided | | | 5 Beachwood Centre, Woodstock | | 448- 6017 | A. Slater |
| 223 | Protchem CC | | City of Cape Town | Not Provided | Chemical Manufacturers/Distrib, PO BOX 36118, Glosderry | | Beach Rd, Woodstock | 447- 7040 | 447- 7077 | |
| 223 | Quality Services | | City of Cape Town | Not Provided | Commercial/Industrial | 7925 | Unit 17, Railway Street, Woodstock | | 448- 0351 | Ms Forsberg |
| 223 | Print Superb (Textiles) | | City of Cape Town | Not Provided | | 7405 | No. 1, Perth Road, Atlantic House, Maltland | | 510- 7665 | N. McCauley |
| 220 | Dept. of Education and Culture | | South Peninsula | Stand 124297 | C/o Mr K Stander, Private Bag X9160, Zorilda Park Primary | | 23 Spoonbill | | 701- 9824 | Mr K Stander |
| 217 | Orlon/Dawn Training Centre | | Blaauwberg | Erf 5903 | PO Box 3119, Reygersdal | 7352 | 0 Montreal Drive | 572- 8426 | 572- 4359/ 4347 | |
| 214 | Jan Kriel School | | Oostenberg | Not provided | PO Box 17, Kullsrivier | 7579 | | 903- 0434/ 1220 | 903- 1108/ 0434 | Marius Burger |
| 213 | Gardens Centre Body Corporate | | City of Cape Town | Not Provided | | | | | 447- 2010 | Dale Schroeder |
| 212 | Dytek | Dyeing and finishing of garments- Code 20* | City of Cape Town | Not Provided | Dytek, PO Box 133, Observatory | 7935 | | 696- 0259 | 448- 2692 | Mr A Arnold |
| 211 | Parks and Forests | | City of Cape Town | Not Provided | Not Provided | | | | 400- 3823 | Mr Desaar |
| 210 | Plastamid (PTY) LTD | | City of Tygerberg | Erf 13459 | MR Plastamid PTY LTD, PO Box 59, Elsies River | 7480 | 0 Coleman Road | 592- 1409 | 592- 1200 | Pierre van Zyl |
| 209 | Nasionale Media Beperk | Printing- Code 50* | Blaauwberg | Erf 20986 | Nasionale Tydskrifte-Drukk, PO Box 37014, Chempat | 7442 | Freedom Road, Marconi Beam, Millnerton | 550- 2488 | 550- 2400/ 2423 | Mr Venecourt |
| 209 | CMC | | City of Cape Town | Not Provided | PO Box 3052, Cape Town | 8000 | | 487- 2592 | 487- 2590 | Mr Davidson |

| | | | | | | | | | | |
|-----|--|--------------------------------------|-------------------|--------------|--|------|--|-----------|-----------|---------------------|
| 206 | Eurosaf Holdings (PTY) LTD | | Blaauwberg | Erf 1652 | PO Box 37099, Chempet | 7442 | 23 Bolt Avenue | | 551- 5650 | Herman Redelinghuis |
| 206 | Carl Bremner Hospital | | City of Tygerberg | Erf 10777 | Cape Prov. Admin.-Carl Bremner Hospital, Finance, Private Bag X1 | 7535 | 0 Mike Pienaar Boulevard | | 918- 1911 | Mr De Bruin |
| 205 | Municipality of Bellville | Municipality- Code 80* | City of Tygerberg | Erf 7848 | PO Box 2, Bellville | 7530 | Smalstraat (Park) | | 918- 2911 | Mr Alfred Mbewe |
| 204 | Todays Frozen Foods | Food- Code 00* | Blaauwberg | Erf 1183 | PO Box 1529, Dassenberg | 7350 | 0 Charles Piers Street | | 557- 1434 | Alan Momberg |
| 204 | Spoornet | | City of Cape Town | Not Provided | Property Management, PO Box 36, Cape Town | 8000 | | | 449- 4036 | Ms Young |
| 203 | Body Corporate the River Hamlet | | Blaauwberg | Erf 20409 | PO Box 18446, Wynberg | 7824 | 0 Gle Road | | | |
| 203 | SA Police College Bishop Lavis | | City of Tygerberg | Erf 1474 | Dept. of Public Works, Private Bag X9027 | 8000 | 0 Myrtle Road | 934- 0556 | 934- 1033 | Inspector Nolan |
| 200 | City Electrical Engineer-Photo Lab | | City of Cape Town | Not Provided | | | Civic Centre | | 465- 4888 | |
| 200 | Directorate Surveys and Land Info- Photo Lab | | City of Cape Town | Not Provided | PO Box 13, Mowbray | | Civic Centre | | 685- 4070 | Mike Hawkins |
| 200 | South African Fine Worsteds | | City of Cape Town | Not Provided | PO Box 88, Maitland | 7405 | | | 593- 9100 | Shaun Lashley |
| 198 | De Goede Hoop Farmstead | Property dev. & Manag.- Code 80/ 90* | South Peninsula | Stand 267 | PO Box 175, Noordhoek | 7985 | | 789- 1318 | 789- 1317 | Mr J Wiley |
| 198 | Sasko (Eindoms) Beperk | | Blaauwberg | Erf 1183 | PO Box 319, Eppindust | 7475 | 0 Charles Piers Street | 577- 3553 | 577- 1040 | Mr Vermaak |
| 197 | Roggebaai Centre (PTY) LTD | | City of Cape Town | Not Provided | | | | | 419- 5081 | |
| 196 | Red Cross War Memorial | | City of Cape Town | Not Provided | | 7700 | Klipfontein Way, Rondebosch | | 658- 5111 | Kelth Johnson |
| 196 | Towels Edgar Jacobs (PTY) LTD | | South Peninsula | Stand 110597 | PO Box 1, Steenberg | | 2 Bark Street | | 701- 1200 | Mr Andre Robinson |
| 193 | Department of Public Works | | South Peninsula | Stand 8 | Private Bag X9027, Cape Town | | Westlake Avenue | | | |
| 193 | CCC | | City of Cape Town | Not Provided | Not Provided | | | | | |
| 192 | Reddam Property (PTY) LTD | | South Peninsula | Stand 11558 | Reddam House, Steenberg Road, Tokai | | | | 702- 2322 | |
| 190 | Dept. of Community Development | | South Peninsula | Stand 8 | Private Bag X9019, Cape Town | | Silvermine Naval Base, Westlake Avenue | | | |
| 189 | N1 City Mall | Shopping Mall- Code 80* | City of Tygerberg | Erf 32491 | N1 City Mall, Domain Properties, PO Box 12 300, N1 City | 7463 | 0 N1 City Substation | 595- 1173 | 595- 1170 | |
| 188 | Fine Chemicals Corporation | | City of Cape Town | Not Provided | PO Box 253, Eppindust | 7475 | Hawkins Ave, Epping Industrial | | 531 -6421 | Arno McCloud |
| 188 | Conradie Hospital Pinelands | | City of Cape Town | Not Provided | Private Bag X4, Howard | 7450 | | | 531- 1311 | Dr N Maharaj |
| 187 | Brian Porter Motors (Claremont) | | City of Cape Town | Not Provided | PO Box 51, Rondebosch | 7700 | | | 689- 4711 | Mr Stoy |

| | | | | | | | | | | |
|-----|-----------------------------------|---------------------------|-------------------|--------------|---|------|--|-----------|-----------|-------------------------------|
| 187 | Wash n' Stop (Hanibals) | | City of Cape Town | Not Provided | | | Inside the Cavendish Centre, Claremont | | | |
| 187 | Audiolens | | City of Cape Town | Not Provided | PO Box 32, Eppindust | 7475 | | | 535- 1240 | Mohammed Isaacs |
| 187 | Old Mutual Properties | Financial- Code 80* | City of Cape Town | Not Provided | PO Box 327 | | Jan Smuts Drive, Pinelands | 509- 4170 | 509- 3266 | Mr CW Schnehage |
| 186 | University of Cape Town | | City of Cape Town | Not Provided | | | Main Campus, | | 650- 9111 | Mr Sedick Samodien |
| 183 | Regional Representative PWD | | City of Cape Town | Not Provided | | | Mowbray | | | Belinda Blight |
| 182 | Plaaslike Bestuur van Landbou | | South Peninsula | Stand 3341 | C/o The Principal, The Porter School, Private Bag X2, Tokai | | Firgrove Way | | | |
| 181 | Imperial Car Rental (PTY) LTD | | City of Cape Town | Not Provided | PO Box 4509, Cape Town | 8000 | 179 Albert Rd, Woodstock | 448- 5837 | 448- 5608 | Angela Langston |
| 181 | Hannibals Auto Care Centre | | City of Cape Town | Not Provided | | | Kenilworth Shopping Centre complex, Kenilworth | | 683- 5088 | Mr McCloud |
| 181 | Millenium Expotainment (PTY) LTD | | City of Cape Town | Not Provided | PO Box 51092, Waterfront | 8002 | BMW Pavillion, V & A, Beach Rd | 419- 7791 | 419- 7365 | Mrs J ILLMAN |
| 181 | The Washworks CC | | City of Cape Town | Not Provided | PO Box 51697, Waterfront | 8002 | | | 421- 4935 | Mr N Stewart |
| 180 | Swartklip Products (PTY) LTD | Pyrotechnics | City of Tygerberg | Erf 799 | Swartklip Products PTY LTD, PO Box 977, Cape Town | 8000 | 0 Swartklip Road Phillipi (Mitchells Plain) | 378- 1295 | 378- 1100 | Keith Greeve/ Hannes Carstens |
| 180 | Continental China (PTY) LTD | | Oostenberg | Not provided | PO Box 8, Blackheath | 7581 | Range Road, Blackheath | 905- 1811 | 905- 1120 | Clive Mitchell |
| 180 | Strand Municipality | | Helderberg | Not provided | PO Box 19, Somerset West | 7130 | | | 850- 4000 | Helderberg Municipality |
| 179 | Southbell Property Investments CC | | City of Tygerberg | Erf 14845 | PO Box 277, Bellville | 7535 | Sacks Circle | | | |
| 179 | Gallis Ice Cream | | City of Cape Town | Not Provided | | | Lansdowne | | 691- 9930 | |
| 177 | Twistex Properties (PTY) LTD | | City of Tygerberg | Erf 25137 | C/O H Althaud, Frans Falke Textiles, PO Box 226, Goodwood | 7459 | Fabriekstraat | 951- 2218 | 951- 2137 | Karen Wild |
| 174 | Alexander Hospital, Malland | | City of Cape Town | Not Provided | | | | | 511- 2141 | |
| 173 | Irvin and Johnson LTD | Fish processing- Code 00* | Blaauwberg | Erf 17784 | PO Box 4804, Cape Town | 8000 | 57 Auckland Street, Paarden Eiland | 510- 3107 | 511- 1411 | John Walte |
| 173 | McCarthy Motors Holdings | | City of Cape Town | Not Provided | | 7700 | Cnr Main and Protea Road, Claremont | | 674- 4150 | Peter Kruger |
| 173 | Sea Den Fisheries | | City of Cape Town | Not Provided | | | Shop 42 Kenilworth Centre | | | J.S. Telo |
| 173 | Western Cape Regional Services | | City of Cape Town | Not Provided | | | | | | Belinda Blight |
| 172 | GCC | | City of Cape Town | Not Provided | Not Provided | | | | | |
| 172 | Migra Textiles | | City of Cape Town | Not Provided | Maintenance Manager, PO BOX 278, Eppindust | 7475 | | | 534- 5467 | Johan Houwer |

| | | | | | | | | | | |
|-----|---|--------------------------|-------------------|--------------|---|------|---|-----------|-----------|----------------------------|
| 170 | Body Corporate Heron Cove | | Blaauwberg | Erf 20845 | C/o Controlling Body First floor , 3 Viola Road | 7441 | 0 Gie Road | | | |
| 168 | SA Blas Binding Manufacturing (PTY) LTD | | City of Cape Town | Not Provided | | | 9th Street, Maitland | | 590- 1100 | Mr Ian Dorrington |
| 168 | Premier Wire Homberg | | City of Cape Town | Not Provided | BOX 416, Eppindust | | COMPANY HAS BEEN LIQUIDATED | | 534- 2371 | |
| 167 | Maxmore Invest (PTY) LTD | | City of Tygerberg | Erf 42533 | Maxmore Knitting Mill, PO Box 226, Goodwood | 7459 | Bofors Circle | 534- 1800 | 535- 2391 | Jeff Kahn |
| 167 | CCC | | City of Cape Town | Not Provided | Not Provided | | | | | |
| 166 | Klein Sout Rivier Park BK | | Blaauwberg | Erf 1057 | PO Box 13, Melkbosstrand | 7437 | 0 Mongoose Street | | | |
| 166 | City Administrator | | City of Cape Town | Not Provided | | | Eastridge Swimming Pool, Cnr Buffalo/elephant St, Eastridge | | | |
| 161 | Finlar Foods (PTY) LTD | | City of Tygerberg | Erf 24503 | PO Box 458, Kulls River | 7579 | Danie Uys Straat | 946- 1795 | 948- 0624 | Ms Elma Pieterson |
| 161 | Parmalat (PTY) LTD | | City of Tygerberg | Erf 88888 | PO Box 305, Parow | 7499 | Industria Ring Road | 931- 2804 | 937- 3608 | Jan Nothnagel |
| 161 | Karaat Beleggings (PTY) LTD | | City of Cape Town | Not Provided | | 8000 | Waterfront Service Station, Dock Rd Boulevard, V&A Waterfront | | 419- 4830 | Mr Burros |
| 160 | University of Cape Town | | City of Cape Town | Not Provided | | | Main Campus, | | 650- 9111 | Mr Sedick Samodien |
| 158 | BMD Textiles | | South Peninsula | Stand 160754 | PO Box 72, Plumstead | 7801 | Leo Road | | 700- 2000 | Mr du Plessis/ Shaun Brown |
| 157 | SAS Ouersorg | | City of Tygerberg | Erf 1472 | Panorama Oord, Posbus 15072, Panorama | 7506 | Hendrik Verwoerd Ryln. | | 914- 7751 | |
| 157 | BMD Textiles | | South Peninsula | Stand 142504 | PO Box 72, Plumstead | 7801 | 108 De Waal Road | | 700- 2000 | Mr du Plessis/ Shaun Brown |
| 156 | Body Corporate Dolphin Beach | | Blaauwberg | Erf 15584 | C/o Sandak-Lewin Tru, PO Box 2624, Cape Town | 8000 | 0 Beach Road | | | |
| 156 | Plating Services (PTY) LTD | Electroplating- Code 70* | City of Cape Town | Not Provided | PO Box 186, Eppindust | 7475 | Electroplating/Galvanising, Losack Ave, Epping 2 | 534- 4765 | 535- 1024 | Adrian Labuschagne |
| 155 | Gadrom Properties (PTY) LTD | | City of Tygerberg | Erf 12733 | PO Box 17, Parow | 7499 | Stellenberg Road | | | |
| 154 | Faure Skool Vir Meisles | | Oostenberg | Not provided | Private Bag X2, Faure | 7131 | | 904- 5507 | 904- 5306 | Mr K Steenkamp |
| 154 | Parks and Forests | | City of Cape Town | Not Provided | Not Provided | | | | 400- 3823 | Mr Desaar |
| 154 | SASKO Enterprise Enterprise | | City of Cape Town | Not Provided | PO Box 23007, Clareinch | 7735 | | | 671- 3070 | Mr K Rutgers |
| 153 | Noordhoek Development Trust | | South Peninsula | Stand 1403 | Private Bag X1 Noordhoek | | | | | |
| 153 | Steenberg | | South Peninsula | Stand 3663 | Steenberg Vineyards, PO Box 154, Steenberg | 7945 | Zwanswyk Road | | 713- 2233 | Wayne Thompson |
| 152 | WP Yarn Dyers | Yarn dyeing- Code 20* | Oostenberg | Not provided | PO Box 1201, Brakenfell | 7561 | 6 Ferrous Crescent, Brackenfell | 981- 8865 | 981- 3215 | Mr E Schmidt |

| | | | | | | | | | | |
|-----|--------------------------------------|----------------------|-------------------|---------------|---|------|---|-----------|-----------|--------------------|
| 152 | Body Corporate Rietvli Park | | City of Cape Town | Not Provided | | | | | | |
| 151 | Biopolymers (PTY) LTD | | Blaauwberg | Erf 1183 | PO Box 344, Paarl | 7620 | 0 Neil Hare Road | | | |
| 151 | Goodhope Bakery | | City of Tygerberg | Erf 20918 | PO Box 248, Sacks Circle, Bellville South | 7530 | Sacks Circle | | 951- 1201 | Theo van der Merwe |
| 149 | Stocks and Stocks Properties | | South Peninsula | Stand 4382 | C/o Ruyterplaats Homeowners Ass., Victoria Avenue, Hout Bay | 7806 | | | 790- 2570 | Charles Digley |
| 148 | Mattex (PTY) LTD | | City of Tygerberg | Erf 19341 | PO Box 113, Elsies River | 7480 | Coleman Road | 591- 3618 | 592- 1420 | Mr Erasmus |
| 146 | Caltex Africa Limited | | Blaauwberg | Erf 936 | PO Box 13, Milnerton | 7435 | 0 Plattekloof Road, Killarney | 551- 1975 | 508- 3912 | |
| 146 | CCC | | South Peninsula | Stand 5001357 | The Bathing Amenities Branch, City Administration Dept | | | | | |
| 144 | Dept of Public Works (Proteus) | | Blaauwberg | Erf 4768 | Room 823, Dept. Public Works, Private Bag X9027, Cape Town | 8000 | 0 Violet Avenue | | 577- 1084 | |
| 144 | University of Cape Town | | City of Cape Town | Not Provided | | | Main Campus, | | 650- 9111 | Mr Sedick Samodien |
| 144 | Mattern | | City of Cape Town | Not Provided | | | | | | |
| 144 | Golden Acre (PTY) LTD | | City of Cape Town | Not Provided | Golden Acre (PTY) LTD, PO Box 4406, Cape Town | 8000 | | | 419- 4190 | Johan Engelbrecht |
| 143 | CMC- Housing South Peninsula | | South Peninsula | Stand 2661 | PO Box 1073, Cape Town | | Sixth Avenue | | | |
| 143 | Body Corporate Heron Cove | | Blaauwberg | Erf 20845 | PO Box 18446, Wynberg | 7824 | 0 Gle Road | | | |
| 143 | Klein Leeukop Homeowners Association | | South Peninsula | Stand 2063 | PO Box 26769, Hout Bay | | Victoria Avenue | | | |
| 142 | Borchards Quarry/ Sewerage Works | | City of Tygerberg | Erf 12681 | CMC Krediteure, Posbus 15899, Vlaeberg | 8018 | Borchards Quarry sewer | | 934- 6136 | Ivan Lombard |
| 142 | Department of Internal Affairs | | City of Cape Town | Not Provided | | | In the Foretrust Building | | 788- 9295 | |
| 142 | Cape Laboratory Services | | City of Cape Town | Not Provided | PO Box 16649, Vlaeberg | | 7 Assegal Ave, Vlaeberg | | 534- 6073 | |
| 142 | Hirt & Carter (PTY) LTD | | City of Cape Town | Not Provided | PO Box 6488, Roggebaai | 8012 | | 425- 1659 | 410- 8100 | Harry Matherbe |
| 142 | DEAT | | City of Cape Town | Not Provided | | | | | 485- 7240 | |
| 142 | RMBT | | City of Cape Town | Not Provided | | | | | | |
| 138 | Sam Bortling (PTY) LTD | | City of Tygerberg | Erf 11989 | PO Box 206, Kasselsvlei | 7533 | Kasselsvlei Road | 951- 4523 | 951- 2210 | Mr Abrahams |
| 136 | Church Moravian (Pella) | | Blaauwberg | Erf 7 | PO Box 2, Katzenberg | 7348 | 0 Saxonwold Drive | | 572- 2184 | Rev. Wynand |
| 135 | Tubs Laundry Services CC | Laundrette- Code 20* | City of Cape Town | Not Provided | PO Box 2302, Clarelnch | 7740 | Stanhope Building, 227 Main Rd, Claremont | 674- 1533 | 671- 7502 | Mr A Davies |

| | | | | | | | | | | |
|-----|---|------------------------------|-------------------|--------------|--|------|----------------------------------|-----------|----------------|--------------------|
| 134 | Body Corporate Heron Waters | | Blaauwberg | Erf 12068 | 3 Viola Road, Bloubergrant | 7441 | 105A Hopley Road | | | |
| 134 | The Guy | | Blaauwberg | Erf 12585 | The Turf Club, PO Box 52073, Kenilworth | 7745 | 8 Turf Club Drive | | | |
| 133 | Pick n Pay Centre- Forest Drive | | Oostenberg | Not provided | | | Forest Drive, Eerste River | 904- 6331 | 904- 6330 | Mr Oliver |
| 133 | EWB Buhr | | Oostenberg | Not provided | PO Box 236, Kraaifontein | 7569 | | | 082- 822- 4012 | Rudi Engelke |
| 132 | Hortors & C T P (Cape) (PTY) LTD | Printing- Code 50* | City of Tygerberg | Erf 15655 | PO Box 6060, Parow East | 7501 | Caxton Street | 939- 8671 | 939- 1070 | Ron Smith |
| 131 | Distillers Corporation LTD | Bottling of liquor- Code 10* | City of Tygerberg | Erf 1510 | PO Box 306, Epping Industrial | 7475 | Bofor Circle, Epping Industria 2 | 534- 3347 | 530- 2200 | Axel Mandix |
| 131 | Controlling Body of the La Provence | Retirement village- Code 90* | City of Tygerberg | Erf 20695 | Building No 37/ 1989, Granlet Close, Welgelegen, Parow | 7500 | Granlet Close, Welgelegen | 558- 5653 | 559- 1453 | Brian Loxton |
| 131 | Parks and Forests | | City of Cape Town | Not Provided | Not Provided | | | | 400- 3823 | Mr Desaar |
| 130 | Zevenwacht Home Owners | | Oostenberg | Not provided | PO Box 609, Kullsrivier | 7579 | | | 903- 6843 | Mr P Le Roux |
| 130 | Cape Metropolitan Council, Creditors | | Helderberg | Not provided | PO Box 15899, Vlaeberg | 8018 | Beach Road | | 840- 03383 | Rosafind Fullard |
| 130 | Erf 13100 GWD (PTY) LTD | | City of Tygerberg | Erf 13100 | C/O Broll Real Estate, PO Box 3052, Cape Town | 8000 | Epping Avenue | | | |
| 130 | Table Bay Cold Storage | Storage- Code 80* | City of Cape Town | Not Provided | PO Box 156, Paardenland | 7420 | Carlisle Str | 511- 5957 | 511- 0360 | Mr D de Klerk |
| 128 | Golf Beach Body Corporate | | Helderberg | Not provided | C/O MANPROP SERVICES CC, PO Box 30184, Tokal | 7966 | St. Andrews Drive | | 713- 0600 | Nigel Anderson |
| 128 | Strand Naastediens BPK (Retirement Village) | | Helderberg | Not provided | | 7140 | 24 Altena Road | | 853- 7225 | |
| 128 | Nywerheidskool Ottery | | South Peninsula | Stand 757 | Privaatsak X4, Ottery | | 3 Ottery Road | | | |
| 127 | Copper Kettle Kitchen (PTY) LTD | | South Peninsula | Stand 1187 | C/O Speciality Seafoods, Harbour Road, Hout Bay | 7806 | | | 790- 1137 | Mr B Scarlett |
| 126 | Gabriel South Africa (PTY) LTD | | South Peninsula | Stand 64602 | PO Box 30214, Tokal | 7966 | 76 White Road | | 710- 6855 | Mr Kevin Mall |
| 126 | University of Cape Town | | City of Cape Town | Not Provided | | | Main Campus, | | 650- 9111 | Mr Sedick Samodien |
| 124 | Radiant Mansions Body Corporate | | South Peninsula | Stand 1096 | Mirweep Property Consultants, PO Box 24528, Lansdowne | 7779 | East Close | | | |
| 124 | Dept. of Community Development | | South Peninsula | Stand 66047 | Private Bag X9019, Cape Town | | Waterloo Road | | | Mr Engelke |
| 124 | CMC-Engineers Blaauwberg | | Blaauwberg | Erf 44065 | still to confirm with the CMC | 7435 | 0 Alcrity Street | | | |
| 124 | GCC | | City of Cape Town | Not Provided | Not Provided | | | | | |
| 124 | Spoornet | | City of Cape Town | Not Provided | Property Management, PO Box 36, Cape Town | 8000 | | | 449- 4036 | Ms Young |

| | | | | | | | | | | |
|-----|------------------------------------|----------------------------|-------------------|--------------|---|------|---|----------|----------|------------------|
| 123 | The Town Clerk | | City of Cape Town | Not Provided | | | | | | |
| 123 | The Argus Printing | | City of Cape Town | Not Provided | PO Box 56, Cape Town | 8000 | | 488-4762 | 488-4911 | Mr Alan Boyd |
| 121 | Bridgewater Manor C C | | Helderberg | Not provided | | 7130 | 1 Andries Pretorius Street, Somerset west | | 850-2232 | Mrs Ellis |
| 121 | Nkazimulo Primary School | | City of Tygerberg | Erf 32383 | The Principal, Private Bag X 9114, Cape Town | 8000 | Kuphela T3V3 Street | | 362-5302 | |
| 121 | The Sarang Family Trust | | City of Cape Town | Not Provided | | | | | | |
| 121 | Diocesan College Council | | City of Cape Town | Not Provided | | 7700 | Estate Manager, Campground Road, Rondebosch | | 659-1038 | Noel Greef |
| 118 | Zewenwacht Wynlandgoed | Wine farm- Code 60* | Oostenberg | Not provided | PO Box 387, Kullisrivier | | Langverwacht Road, Kullisrivier | 903-3373 | 903-5123 | Denise Johnson |
| 116 | New Apostolic Church Cape | | Helderberg | Not provided | PO Box 25, Southfield | 7800 | | 854-8602 | 705-0200 | |
| 114 | CMC-Engineers Blaauwberg | | Blaauwberg | Erf 283 | still to confirm with the CMC | 7435 | Off Otto du Plessis Drive | | | |
| 114 | Harrington Street Investments | | City of Cape Town | Not Provided | | | | | | |
| 114 | Dairybelle (PTY) LTD | | City of Cape Town | Not Provided | PO Box 2, Eppindust | 7475 | Cochrane Avenue, Epping Industrial | | 535-0440 | Jan Huge |
| 113 | Durbanville Private Hospital | Private hospital- Code 90* | City of Tygerberg | Erf 7453 | Durbanville Medi-clinic, Private Bag X15, Durbanville | 7550 | 45 Wellington Road, Durbanville | 975-4096 | 980-2100 | Mr Eugene Snyman |
| 113 | City Hospital, Greenpoint | Hospital- Code 90* | City of Cape Town | Not Provided | | | Portwood Road, Green Point | 419-6259 | 421-6647 | Mr JA Steyl |
| 112 | Body Corporate Cap Du Mont | | Blaauwberg | Erf 11315 | C/o Jaynor Real Estate, PO Box 400, Cape Town | 8000 | 20 Beach Road Boulevard | | | |
| 112 | Van Leer SA (PTY) LTD | | Blaauwberg | Erf 4 | PO Box 1613, Dassenberg | 7350 | 0 Charles Mathews Street | | 577-2257 | David Faulkes |
| 112 | Kleinsake Ontwikkelings Korporasie | | Blaauwberg | Erf 4293 | | | 0 Westfleur Circle | | | |
| 112 | Uxolo Senior Primary School | | City of Tygerberg | Erf 20670 | The Principal, Private Bag X9114, Cape Town | 8000 | Batandwa Ndongo T2V3 Road | | 362-0003 | |
| 112 | Est Prop (PTY) LTD | | South Peninsula | Stand 106149 | | | 2 Estmit Road, Diep River | | | |
| 111 | Syfin Property (PTY) LTD | | City of Tygerberg | Erf 52983 | C/O Financial Manager, PO Box 2009, Cape Mail | 8003 | Showground Avenue | 595-2028 | 595-1444 | Mr Wilson Dries |
| 110 | CMC-Engineers Blaauwberg | | Blaauwberg | Erf 44077 | still to confirm with the CMC | | D Alacrity Street | | | |
| 110 | Parow High School | | City of Tygerberg | Erf 3483 | C/O Principal, Hoer Skool Parow, Private Bag X01, Parow-Oos | 7501 | Hampton Road | 939-4323 | 939-4146 | |
| 110 | Mahlthandane Primary School | | City of Tygerberg | Erf 1194 | The Principal, Private Bag X9114, Cape Town | 8000 | Mkonto T1V1 Crescent | | 381-3957 | |
| 110 | Parks and Forests | | City of Cape Town | Not Provided | Not Provided | | | | 400-3823 | Mr Desaar |

| | | | | | | | | | | |
|-----|---------------------------------------|----------------|-------------------|---------------|--|------|--|-----------|-----------------|---------------------------|
| 108 | Green's Bottle Recycler's | | Oostenberg | Not provided | PO Box 1027, Brackenfell | 7500 | | | 981- 2675 | |
| 107 | Lafarge Ready Mix | | City of Cape Town | Not Provided | District Sales Manager, PO Box 139, Pardenelland | 7420 | 16 Milner Road, Metro Industrial | | 511- 1743 | Mr Greg Damonze |
| 107 | SA Naval Headquarters | | South Peninsula | Stand 9999991 | Private Bag X1, Simonstown | 7995 | | | 787- 3911 | Captal Roodt |
| 106 | Communicare | | South Peninsula | Stand 117401 | PO Box 259, Cape Town | | 2 Myburgh Road | | 715- 7710 | Ms De Kock |
| 106 | Byfin Property (PTY) LTD | | City of Tygerberg | Erf 52983 | C/O Financial Manager, PO Box 2009, Cape Mail | 8003 | Showground Avenue | 595- 2028 | 595- 1444 | Mr Wilson/ Dries |
| 106 | University of Cape Town | | City of Cape Town | Not Provided | PO Box 50506, Waterfront | 8002 | Graduate School of Business | | 406- 1922 | Chris Marola |
| 105 | Todays Frozen Foods | Food- Code 00* | Blaauwberg | Erf 1183 | PO Box 1529, Dassenberg | 7350 | 0 Charles Piers Street | | 557- 1434 | Alan Momberg |
| 105 | Nomsa Mapongwana School | | City of Tygerberg | Erf 21863 | The Principal, Private Bag X9114, Cape Town | 8000 | Winnie Mandela T2V3 Crescent | | 362- 1460 | |
| 104 | Eskom | | Blaauwberg | Erf 2965 | Private Bag X10, Kernkrag | 7441 | 0 Otto du Plessis Drive | | 550- 5252/ 4582 | Estelle Flits/ Mr Kasslem |
| 104 | Kohler Packaging LTD | | City of Tygerberg | Erf 1643 | PO Box 46, Eppindust | 7475 | Losack Avenue | | 535- 1086 | Garner Jeffreys |
| 103 | CCC | | City of Cape Town | Not Provided | Not Provided | | | | | |
| 103 | Transwerke | | City of Cape Town | Not Provided | | | | | | |
| 103 | CMC- Engineers South Peninsula | | South Peninsula | Stand 1438 | PO Box 1073, Cape Town | | Victoria Avenue | | | |
| 102 | Homeowners Association | | South Peninsula | Stand 663 | PO Box 648, Noordhoek | | | | | |
| 102 | Korrektlewe Dienste Goodwood | | City of Tygerberg | Erf 35608 | Room 823, Dept. Public Works, Private Bag X9027, Cape Town | 8000 | | | 559- 3500 | Ms B Blight |
| 102 | Shoprite Checkers, Kennilworth Centre | | City of Cape Town | Not Provided | PO Box 1160, Brackenfell | 7561 | As Above | | 683- 7780 | Mr Mouton |
| 102 | Pick n' Pay Stores, Kennilworth | | City of Cape Town | Not Provided | | | As Above | | 658- 1448 | Mrs Solomans |
| 102 | OK Bazaars 1829 LTD | | City of Cape Town | Not Provided | | | CBD | | | |
| 102 | Pick n Pay Property Division | | South Peninsula | Stand 741 | PO Box 24095 Claremont | 7735 | 20 Woodlands Road | | 683- 2900 | Craig Homewood |
| 101 | Biopolymers | | Blaauwberg | Erf 1183 | PO Box 344, Paarl | 7620 | 0 Nell Hare Road | | | |
| 101 | Tedelex (PTY) LTD | | Blaauwberg | Erf 4 | PO Box 1702, Dassenberg | 7350 | 0 Christopher Starke Street | 577- 2600 | 577- 2622 | R Lotter/ F Fourie |
| 101 | The Libertas Property Trust | | City of Tygerberg | Erf 17719 | Libertas Clinic, PO Box 20, Goodwood | 7459 | Libertas Hospital | 591- 5734 | 591- 1151 | Mr Pipers |
| 100 | Tygerbush Homeowners Association | | South Peninsula | Stand 1482 | Estate Manager, PO Box 26807, Hout Bay | 7872 | Skuif Cottage, Riverstone Road, Hout Bay | | 790- 6185 | Mr Ted Mercer |

| | | | | | | | | | | |
|-----|--------------------------------|------------------------------------|-------------------|---------------|--|------|-----------------------------------|-----------|-----------|-------------------|
| 100 | Primere Skool Irista (Sarepta) | | Oostenberg | Not provided | Iris Street, Kullsrivier | 7580 | Irista, Kullsrivier | 903- 8685 | 903- 3987 | |
| 100 | Provinciale Administrasie | | Oostenberg | Not provided | | | | 697- 5784 | | |
| 100 | Shoprite Checkers (PTY) LTD | | Oostenberg | Not provided | PO Box 1160, Brackenfell | 7561 | Checkers Superstore, Old Paarl Rd | 980- 4050 | 980- 4000 | Charmaine Newland |
| 100 | South Peninsula Municipality | | South Peninsula | Stand 5001114 | Private Bag X8, Plumstead | | Lufa Lane | | | |
| 100 | Hoerskool Tygerberg-Parow | | City of Tygerberg | Erf 4594 | The Principal, 120 Fairfield Street, North Parow | 7500 | Avon Street | | 939- 2023 | Mr Burger |
| 100 | Sans Fibres (PTY) LTD | The production of fibres- Code 20* | City of Tygerberg | Erf 24034 | PO Box 272, Bellville | 7523 | Sacks Circle, Bellville | 959- 4621 | 959- 4911 | Mr P Kulentic |

NOTES:

(1) The users have been ranked according to daily potable water consumption figures.

(2) The list was finalised on the 28 July, 2000.

(3) The following symbol has been used to indicate that a user has been 'black listed':



(4) An explanation for the 'black listing' has been provided in section 2.1 of this chapter.

(5) Some of the users have several water meters. As a result, the names of these users appear on the list a number of times. Only one questionnaire was sent off to these users. In these special cases, a note was made on each of the questionnaires indicating which Erf/ Stand numbers the questionnaire pertained to.

(6) The * symbol denotes the industrial coding as detailed in section 2.1 of this chapter.

APPENDIX V: Questionnaire Document

University of Cape Town



DEPARTMENT OF
WATER AFFAIRS
AND FORESTRY



Cape Metropolitan Council
Kaapse Metropolitaanse Raad
Ibhunga Lolawulo Lwenqila Yekapa

**INTEGRATED WATER RESOURCE PLANNING STUDY
REGISTRATION FORM AND QUESTIONNAIRE
JULY 2000**

Thank you for agreeing to participate in the Cape Metropolitan Council's 'Integrated water resource planning study'. Please complete this registration form and the attached questionnaire, and **FAX** it back to **(021) 650 3791** by the **24th July 2000**. The FAX can be marked for the attention of the 'UCT Water Demand Management Group'. Should you have any problems in this regard, please do not hesitate to call our group at **(021) 650 2957** and we can make an alternative arrangement.

NB. The information provided will in no way be directly linked to the respondent or his/her organisation and will not be utilised, other than for the purposes of the study.

Organisation Registration Form:

NAME OF ORGANISATION:.....

TYPE OF ORGANISATION (the dominant activity the organisation is involved in):

.....

ADDRESS:

.....

TELEPHONE: FAX:

Optional: Representative's details

TITLE: INITIALS: SURNAME:

FIRST NAME:

POSITION:



QUESTIONNAIRE ON WATER CONSUMPTION IN THE CAPE METROPOLITAN REGION

Respondents Notes:

- As well as being representative of the organisation, the person answering this questionnaire should have knowledge of water consumption within the organisation.
- The questionnaire should take approximately 15 minutes to complete.
- The sections within the questionnaire should be approached as follows:

Section 1. National and Regional Level Issues

This section is included to get an idea of your attitudes and perceptions of water related issues at a national and regional level.

Section 2. Organisation Level Issues

This section is included to get an idea of actual water consumption at the organisation level.

1. National and Regional Issues

- 1a) In your view, natural fresh water resources (rivers, dams, rainfall and groundwater) in **South Africa** are... *(Please ✓ choice)*

| | | | | | |
|---------------------|-----------|----------|--------|------------------|-----------|
| Extremely plentiful | Plentiful | Adequate | Scarce | Extremely scarce | Uncertain |
|---------------------|-----------|----------|--------|------------------|-----------|

- 1b) In your view, natural fresh water resources in the **Western Cape Province** are... *(Please ✓ choice)*

| | | | | | |
|---------------------|-----------|----------|--------|------------------|-----------|
| Extremely plentiful | Plentiful | Adequate | Scarce | Extremely scarce | Uncertain |
|---------------------|-----------|----------|--------|------------------|-----------|

- 1c) In your view, natural fresh water resources in the **Cape Metropolitan Area (CMA)** are... *(Please ✓ choice)*

| | | | | | |
|---------------------|-----------|----------|--------|------------------|-----------|
| Extremely plentiful | Plentiful | Adequate | Scarce | Extremely scarce | Uncertain |
|---------------------|-----------|----------|--------|------------------|-----------|

- 2) If you were challenged with solving a water shortage problem in the CMA, what do you think would be the most suitable alternative to solve the problem? Suitability should cover feasibility, effectiveness and environmental sensitivity. **Of the options provided below, please rank your best alternative 1, your second best alternative 2 and your third best alternative 3, etc.**

- [] Construct more dams in the catchment areas
 [] Pump water from other areas

-] Desalinate sea-water
-] Water loss management and control (leakage detection and repair programme)
-] Implement escalating block-rate tariff (the greater the amount of water used, the greater the charge for each additional unit.)
-] Recycle more water
-] Implement water restrictions
-] Promotion of the use of water saving fixtures and fittings (retrofitting).
-] Use groundwater resources (e.g. aquifers)
-] Tow icebergs from the Antarctic
-] Clear more invasive trees from the catchment areas
-] Other

If other, please elaborate further:

- 3) The total water demand for the CMA is estimated at 900 MI/day based on the water use for the year 1999. The categories of sectoral water use, and their estimated percentages of the total demand are listed below (City of Cape Town, City Engineer's Annual Report dated 1995/96):

| | |
|--|-----|
| Household | 34% |
| Gardening and Sports Bodies | 22% |
| Industrial | 13% |
| Commercial | 6% |
| Municipal | 6% |
| Unaccounted for water (UAW) ¹ | 19% |

In your opinion, prioritise which sector has the potential to save the most water (**Rank sector with greatest potential to save water as 1 followed by the sector with next greatest potential saving ranked as 2 etc.**).

-] Household
-] Gardening and Sports Bodies
-] Industrial
-] Commercial
-] Municipal
-] Unaccounted for water

- 4) Below is a map of the CMA, showing the six Metropolitan Local Councils (MLC) boundaries. In your opinion, where is most of your organisation's water sourced from? (**Please ✓ one choice**)

| | |
|--------------------------|--|
| <input type="checkbox"/> | Within your organisation's municipal boundary |
| <input type="checkbox"/> | From a number of municipal areas, but within the CMA |
| <input type="checkbox"/> | From outside the CMA |
| <input type="checkbox"/> | Uncertain |

¹ **Unaccounted for Water (UAW):** This is water that is lost from the reticulation system either through leaks, unmetered consumption and/or theft (Davies and Day, 1998).

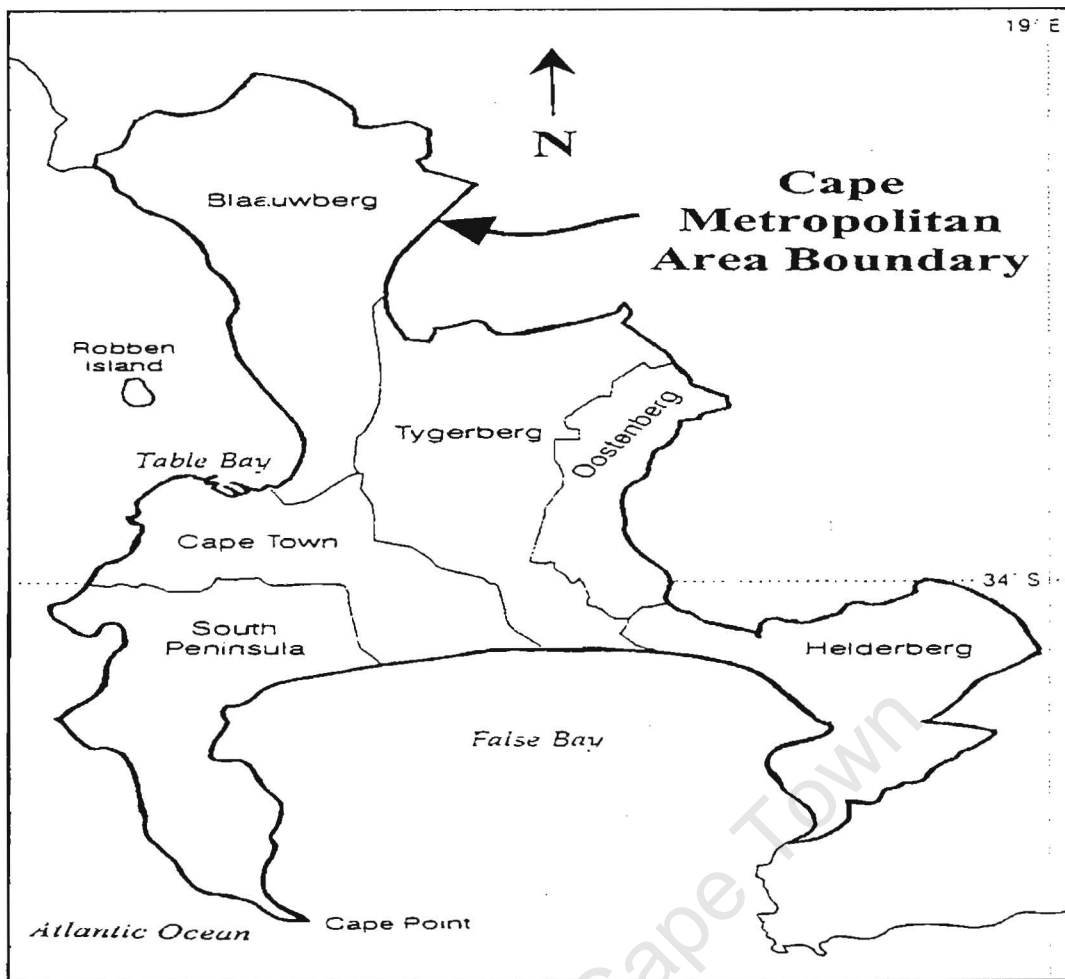


Figure taken from State of the Environment Report for the CMA, Year One-1998

- 5) In your view, when do you estimate that the demand for potable water will exceed the existing supply within the CMA?

| | |
|--------------------------|--|
| <input type="checkbox"/> | Less than one year |
| <input type="checkbox"/> | Between one and five years |
| <input type="checkbox"/> | Between five and twenty years |
| <input type="checkbox"/> | Between twenty and fifty years |
| <input type="checkbox"/> | Longer than 50 years |
| <input type="checkbox"/> | Uncertain |

- 6) What are your feelings about the following statement?

Water use (including water resource development) in the CMA has little effect on the environment of the Western Cape.

| | | | | | | | | | |
|--------------------------|----------------|--------------------------|-------|--------------------------|-------------|--------------------------|----------|--------------------------|-------------------|
| <input type="checkbox"/> | Strongly agree | <input type="checkbox"/> | Agree | <input type="checkbox"/> | Indifferent | <input type="checkbox"/> | Disagree | <input type="checkbox"/> | Strongly disagree |
|--------------------------|----------------|--------------------------|-------|--------------------------|-------------|--------------------------|----------|--------------------------|-------------------|

Please explain your choice:

2. Organisation Issues

7a) Does your organisation have an Environmental Policy?

| | |
|-----|----|
| YES | NO |
|-----|----|

7b) Does your organisation have a Water Conservation Strategy? (e.g. strategy to retrofit e.g. automatic flushing urinals, upgrade water fittings, fix leaks, utilise more water efficient devices/equipment or optimise irrigation and/or garden watering)

| | |
|-----|----|
| YES | NO |
|-----|----|

7c) Does your organisation publish an environmental report?

| | |
|-----|----|
| YES | NO |
|-----|----|

7d) If yes, does this environmental report include information on water use?

| | |
|-----|----|
| YES | NO |
|-----|----|

7e) Would your organisation be prepared to make any of this information available?

| | |
|-----|----|
| YES | NO |
|-----|----|

7f) Does your organisation have an environmental management system? (e.g. based on ISO 14001)

| | |
|-----|----|
| YES | NO |
|-----|----|

8a) How much potable and non-potable water (in kilolitres) does your organisation use per month? **(Please provide the quantity of water in the block, or if uncertain ✓ unknown)**

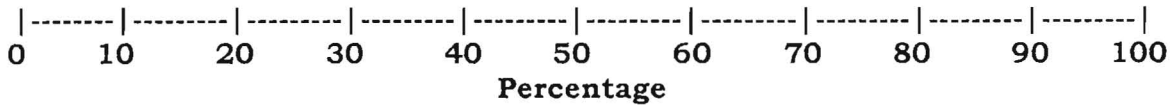
| Water Type | i) Potable | ii) Non-Potable |
|-------------------------|------------|-----------------|
| Water volume (Kl/month) | | |
| Unknown | | |

8b) Please tick (✓) the sectors of your organisation's water use in which the quantities used are known and monitored. Also, please cross (X) those you don't know.

- [] Cooling and heating
- [] Domestic uses (e.g. toilets and showers)
- [] Process rinsing
- [] Cleaning activities

- Kitchens and laundries
- Landscaping
- Evaporation
- Leaks
- Other. Please specify _____

9a) Of your organisation's total monthly operating costs, what percentage does your average monthly water bill constitute? **(Mark with a X on the most likely %)**



| |
|-----------|
| Uncertain |
|-----------|

9b) Some areas in the CMA are subject to a 5-step or block tariff structure for domestic water use. This pricing strategy is based on the principle whereby the more water you use, the more you pay per extra unit. Do you think that this system should be imposed on all organisations using large amounts of water in the CMA?

| | |
|-----|----|
| YES | NO |
|-----|----|

Comments:

10a) Has an **environmental audit** ever been conducted on your site/premises?

| | |
|-----|----|
| YES | NO |
|-----|----|

10b) Has a **water audit** ever been conducted of your site/premises?

| | |
|-----|----|
| YES | NO |
|-----|----|

10c) Would your organisation be willing to have its water consumption assessed/monitored as part of a water audit?

| | |
|-----|----|
| YES | NO |
|-----|----|

Comments:

10d) If you answered "YES" in the previous question, would your organisation allow the information, gathered during the water audit, to be published?

| | |
|-----|----|
| YES | NO |
|-----|----|

10e) In your opinion, how would a water audit benefit your organisation?

10f) If it is clear from the results of a water audit that there is a potential for water demand management² and/or savings within your organisation, what would encourage your organisation to implement the necessary changes?

Comments:

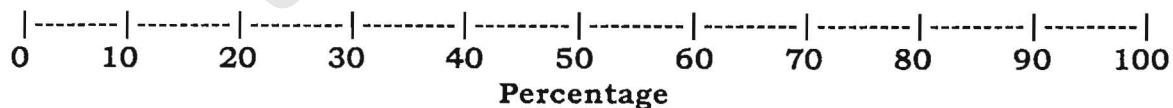
11a) Does your organisation re-use any of its own water? (i.e. re-use of any water excluding sewage by recycling and/or treating water which has already been utilised on your organisation's premises)

| | | |
|-----|----|--------|
| YES | NO | UNSURE |
|-----|----|--------|

11b) If **yes**, what quantity of this water does your organisation re-use?

| |
|------------|
| kl / month |
|------------|

11c) If your organisation does re-use water, what percentage of your total water use does this re-use constitute? (**Mark with a X on the most likely %**)



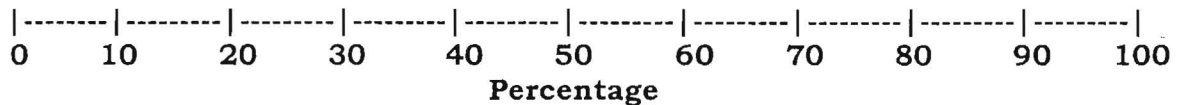
| |
|--------|
| Unsure |
|--------|

² **Water Demand Management:** The adaptation and implementation of a strategy by a water institution to influence the water demand and usage of water. Strategies can include leak detection/repair programmes, promotion of water efficient fittings, promotion of private boreholes, water audits and price elasticity of water.

11d) If your organisation does **not** presently re-use water (excluding sewage by recycling), do you think that there is a possibility that your organisation may be able to re-use part of this source in the future?

| | | |
|-----|----|--------|
| YES | NO | UNSURE |
|-----|----|--------|

11e) What percentage of your total water use could **potentially** be re-used by your organisation? (assuming latest technology and investment in infrastructure)



| | |
|--|--------|
| | Unsure |
|--|--------|

12a) Does your organisation use any of the following in its operations?

| | |
|--|---------------------------------------|
| | Treated municipal wastewater effluent |
| | Sea-water |
| | None of above |

If **yes**, for what purpose?

12b) If your organisation does not utilise any of the types/sources listed in question 12a, is there a possibility that you may be able to use these types/sources in the future?

| | | | |
|-----|----|--------|---------------------------------------|
| YES | NO | UNSURE | Treated municipal wastewater effluent |
| YES | NO | UNSURE | Sea-water |

13) Has your organisation considered any of the following as potential water conservation measures? (**Please ✓ suitable choice**).

- [] Education
- [] Retrofitting
- [] New technological advances
- [] Leak detection
- [] Improved water metering
- [] Advances that save water and encourage water recycling

Comments:

APPENDIX VI: MLC Information Letter

University of Cape Town

FINANCE

DIREKTORAAT • ISEBE • DIRECTORATE

Income

Afdeling • Icandelo • Section

M Lambrechts

918 2218

Vra vir • Buza u • Ask for

Telefoon • Ifoni • Telephone

918 2268

Faks • Fax

E-Mail

Private Bag X6, Bellville, 7535

Adres • Idilesi • Address



20 May 2000

Datum • Umhla • Date

Tygerberg

Diensarea • Inqinzi yenkonzu • Service area

Verwysing • Isalathiso • Reference

TO WHOM IT MAY CONCERN

WATER AUDIT

The following people are hereby authorised by the City of Tygerberg to undertake a Water Audit, on behalf of the Cape Metropolitan Council, in connection with an Integrated Resource Study.

Any available information herein is of utmost importance and your input in this matter will be highly appreciated.

| NAME | REPRESENTING |
|--------------------------|-------------------------------------|
| Mr Roy Donovan (RD) | Tweeddale Consulting Services |
| Mr Heinrich Hess (HH) | Arcus Gibb |
| Mr Bas Kothuis (BK) | Arcus Gibb |
| Mr Hylton Allison (HA) | UCT/EGS ¹⁾ Masters Group |
| Mr Andrew Hester (AH) | UCT/EGS ¹⁾ Masters Group |
| Mr Jozeph Kombe (JK) | UCT/EGS ¹⁾ Masters Group |
| Mr Mark van Druten (MVD) | UCT/EGS ¹⁾ Masters Group |

¹⁾ University of Cape Town, Environmental and Geographical Science Department

Yours faithfully

S L VENTER
ACTING DIRECTOR : FINANCE

\\user\Gressem\WPOC\LAMBREC\LETTER4.WPD

APPENDIX VII: Project Explanation from CMC and ARCUS GIBB

University of Cape Town

CAPE METROPOLITAN COUNCIL
KAAPSE METROPOLITAANSE RAAD
IBHUNGA LOLAWULO LWENQILA YEKAPA



44 Water Street
Cape Town 8001
P.O. Box 15548
Vlaeberg 8013
Republic of South Africa

Waalstraat 44
Kaapstad 8001
Posbus 15548
Vlaeberg 8013
Republiek van Suid-Afrika

44 Water Street
eKapa 8001
IBHUNGA: 15548
Vlaeberg 8013
Republiki yomzantsi Afrika

OFFICE / KANTOOR / IQOSI

ENQUIRIES / INYABEYI / IMIBUZO

TELEPHONE / TELEFON / IYON

OUR REF / ONS / IYERWU / ISALATHISO / SETHU

YOUR REF / UYERWU / ISALATHISO / SAKHO

FILE / IYAKO / IYAKO

Our Ref: ALG/jm/JA0094A/algaudit1

DATE / DATUM / UMHLA

EMAIL

19 May 2000

To whom it may concern

Dear Sir/Madam

ASSESSMENT OF WATER CONSUMERS IN THE CAPE METROPOLITAN AREA

Population growth, industrial development, increasing irrigation demands and improved living standards have increased the demand for water in the Cape Metropolitan Area (CMA). Meeting this growing demand is an issue of concern to everyone in the area, as well as those living in the catchments of the nearby rivers from which these water supplies are obtained.

Until quite recently the general trend in addressing increasing water demand was to develop new resources and/or water supply and augmentation schemes which could only be achieved at high costs and environmental impacts. Increasing development costs, capital shortages, diminishing sources of water supply and the awareness of the need to protect the natural resources and the environment, however, have forced innovations in water use efficiency that can often delay and sometimes even possibly cancel the expansion of planned water supply infrastructure. Therefore water is becoming an increasingly strategic resource requiring optimal management.

The Western Cape has been identified as the first region to run out of water. There are just no more dam sites available to develop to store more water. The only option is to use the water currently available, more efficiently.

The Cape Metropolitan Council (CMC) is currently responsible for bulk water supply in the CMA. This involves accepting bulk water from State supply schemes, developing their own supply schemes, and treating and distributing it to the local substructures. Rather than to follow the historical tendency to concentrate on supply options, the CMC wishes to initiate an integrated resource and conservation planning approach to the provision of water. The CMC has therefore commissioned the first phase of a study titled "Integrated Water Resource Planning Study".

The main focus of the study will be to investigate all feasible ways to implement water conservation and water demands management principles with the object of reducing demand or at least reducing the growth rate. The types of water demand management interventions which will be investigated include:

- Water loss management and control
- Water efficient use
- Promotion of private boreholes
- Water audits of large consumers
- Price elasticity of water
- Constraints to implementation

- Water reclamation

The CMC has appointed Ninham Shand Consulting Engineers and ARCUS GIBB as main consultants to undertake the above study on their behalf. Numerous other consultants will form part of the study team.

As one of the study tasks ARCUS GIBB will be assessing water consumption and possible demand management and related perceptions through conducting a survey and associated water auditing of certain large consumers. It is their aim to assess your organisation's views on some of the issues pertaining to current and future water consumption and water conservation/demand management issues in the CMA. Within this context ARCUS GIBB will be assisted by a group of masters' students of the University of Cape Town.

Due to the importance of the study and its findings, we respectfully request you to assist our Consultants in their approach and conducting of the survey and auditing process. The results of the study will greatly contribute to the CMC's understanding of water consumption and possible conservation and demand management in the CMA.

We thank you in advance for your co-operation with our project team and your time and input in our study.

Yours faithfully
for Cape Metropolitan Council

AJ CLAYTON
Executive Director: Water and Waste

24 May 2000

ARCUS GIBB

To whom it may concern

2nd FLOOR
1 HIGH STREET
ROSENPARK
DURBAN ROAD
DURBANVILLE 7550
SOUTH AFRICA

PO BOX 3965
CAPE TOWN 8000
SOUTH AFRICA

TEL +27 21 314 5550
FAX +27 21 314 5530
EMAIL gjacob@mwco.co.za

Dear Sir/Madam

ASSESSMENT OF WATER CONSUMERS IN THE CAPE METROPOLITAN AREA

In response to possible metropolitan water shortages and restrictions, the Cape Metropolitan Council (CMC) has initiated the first phase of a study into alternative options to address the rising water needs of the Cape Metropolitan Area (CMA). The first phase of the two-phase study will be conducted at a pre-feasibility level and will consider options at a broad scale. The later second phase will explore a selection of the most promising of the first phase options and will be examined at the more detailed level of investigation.

The study is being undertaken by consultants Ninham Shand and ARCUS GIBB with a number of specialist sub-consultants forming part of the study team. These include a group of postgraduate students from the Environmental and Geographical Science Department at the University of Cape Town. As part of their Master of Philosophy course they will assist ARCUS GIBB during the study's first phase in assessing the water use of large consumers in the CMA. These large consumers include commercial, industrial, institutional, municipal, etc users.

Your organisation is being approached to assist us for the purposes of the study. It is our aim to assess your organisation's views on some of the issues pertaining to current and future water consumption, conservation and demand management issues.

Please find attached to this letter a relevant questionnaire to be completed by a representative of your organisation at his/her earliest convenience to assist us in the above for the benefit of our study. The results of this questionnaire will greatly contribute to the CMC's understanding of water consumption and possible conservation in the CMA.

The following points should be borne in mind when answering the questions:

- The person answering this questionnaire should be a suitable representative of the organisation and should have some knowledge and responsibility regarding water consumption patterns within the organisation.
- Confidentiality of the respondent and organisation will enjoy the highest priority but can unfortunately not be guaranteed.
- The questionnaire will take approximately 15 minutes to complete.
- Honesty and accuracy would be appreciated.

Due to the importance of the findings of the study, we request that you please provide further details/comments, or further information that you deem relevant. Answers to the questionnaire and any other related information will be treated as strictly confidential (ie no data will be presented that can be traced back to any individual/institution/company) unless otherwise arranged with your organisation. Please note that the return of the completed questionnaire within **two weeks** of receiving it will be greatly appreciated.

We thank you in advance for your co-operation and time as well as input to our study.

Directors:

M Y Ahmed, A S Bosch, N B Carter, T J Davidson, G D du Toit, J R Farrow, V Frazier, R P Gordon, P J Hevdanovich,
P J Jacobs, M A Jamie, Vice Chairman, G J Jordaan, G H P Jordaan, H S Joubert, A Joubert, M D Joubert,
P Karamez, Kenyan, H A Kavthankar, Indian, A J Killian, J M Klansmith, A J P de Grange, R Logan, S MacSear,
T Maruexa, J H McStay, A J Nissen, P M Nweve, D J Potgieter, J Raimondo, J M N Ras, T M G Sexwale, Chairman,
R D Shan, Mauritian, H P Steenkamp, Vice Chairman, M Tendaubenyu, C van der Merwe, W J Vogetzang

If you have any questions or would like to discuss any aspect of the study further, please do not hesitate to contact myself or Johan du Plessis of ARCUS GIBB at telephone number (021) 914 5550 or fax (021) 914 5530 and/or our student representative Hylton Allison at telephone number (021) 650 2873 or fax (021) 650 3791.

Yours faithfully
for ARCUS GIBB

~~DR ADL P. DU~~ LE GRANGE - Pr Eng
Director

Encl

cc Cape Metropolitan Council
University of Cape Town

Mr Charles Chapman
My Hylton Allison

APPENDIX VIII: Audit Sheets (Copyright Mr Roy Donovan)

University of Cape Town

INTEGRATED WATER RESOURCE PLANNING STUDY

**WATER AUDIT CHECKLIST FOR TARGETED CONSUMERS IN
THE CAPE METROPOLITAN AREA**

DRAFT 3

(31/05/2000)

NAME OF ORGANISATION:

University of Cape Town

PART 1: GENERAL

| | | |
|---------------------------------------|----|--|
| Survey by | 1: | |
| | 2: | |
| | 3: | |
| | 4: | |
| | 5: | |
| | 6: | |
| Date of survey | | |
| Name of organisation | | |
| Physical address | | |
| Postal address | | |
| Telephone number | | |
| Telefax number | | |
| Contact person (Name and capacity) | | |
| Telephone number | | |
| Cell phone number | | |
| Telefax number | | |
| E-mail address | | |

PART 2: METERING AND WATER USAGE IN KILOLITRES/MONTH

Metering

| | |
|---|--|
| Are all supplies metered (Yes/No)? | |
| If "No", then state exceptions (eg fire hydrants) | |
| Is water use for swimming pools metered separately (Yes/No)? | |
| Is water use for sports fields metered separately (Yes/No)? | |
| Water meter suitable to be fitted with a standard datalogger (Yes/No)? | |
| If "No", is datalogging possible, and if so, what additional equipment/steps are required? | |
| Purpose of datalogger explained to representative of organisation (Yes/No)? | |
| Would the organisation object to its monthly water consumption data for the last year being released by the MLC to the study for anonymous use (Yes/No)? | |
| Do you have a planned maintenance programme for your plumbing installations (Yes/No)? | |

Water usage in kilolitres/month

| | |
|----------------------------------|--|
| Total potable water consumption | |
| Used in products | |
| Used for cooling/airconditioning | |
| Used for washing/sterilisation | |
| Used for "domestic" purposes | |
| Main product(s) | |

PART 3: BUILDING AND OCCUPANCY

| DESCRIPTION | QUANTITY | REMARKS |
|------------------------------|----------|---------|
| No of permanent staff | | |
| No of seasonal staff | | |
| No of pupils | | |
| Maximum number of guests | | |
| Total number of persons | | |
| Number of floors | | |
| No of rooms (guest rooms) | | |
| No of toilet blocks | | |
| No of kitchens | | |
| No of restaurants/cafeterias | | |
| No of laundries | | |
| No of function rooms | | |
| No of swimming pools | | |
| Other | | |
| | | |
| | | |
| | | |
| | | |
| | | |

PART 4: WATER FITTINGS ANALYSIS

TYPE OF ROOM:
 (Eg, Kitchens/Kitchenettes, Restaurants/Cafeterias, Laundries, Toilet Blocks, Process: Factories, Guest Rooms)

IF GUEST ROOM:

| | |
|---------------------------------|--|
| Room number | |
| Floor number | |
| Type of room (eg double/single) | |

| FITTING | TYPE/SIZE (Insert approximate quantity in each block) | | | | | | REMARKS |
|---------------------|--|-------------------|--------------|------------------|----------|--------|---------|
| | Standard | Standard threaded | Country | Country threaded | Metering | Demand | |
| Pillar tap | | | | | | | |
| Basin tap | | | | | | | |
| Bib tap | | | | | | | |
| Hose bib tap | Standard | | Country | | | | |
| Basin mixer | Standard | | Single lever | | | | |
| Sink mixer | Standard | | Single lever | | | | |
| Bath mixer | Standard | | Single lever | | | | |
| Shower mixer | Standard | | Single lever | | | | |
| Other tap (specify) | | | | | | | |
| Other tap (specify) | | | | | | | |
| Other tap (specify) | | | | | | | |

| FITTING | TYPE/SIZE (Insert approximate quantity in each block) | | | REMARKS |
|-----------------------------|--|-------------|---------------|---------|
| | | | | |
| WC cistern, syphonic, 15ℓ | High level | Low level | Close coupled | |
| WC cistern, syphonic, 13ℓ | High level | Low level | Close coupled | |
| WC cistern, syphonic, 11ℓ | High level | Low level | Close coupled | |
| WC cistern, syphonic, 9ℓ | High level | Low level | Close coupled | |
| WC cistern, syphonic, 6ℓ | High level | Low level | Close coupled | |
| WC cistern, beta valve, 15ℓ | High level | Low level | Close coupled | |
| WC cistern, beta valve, 13ℓ | High level | Low level | Close coupled | |
| WC cistern, beta valve, 11ℓ | High level | Low level | Close coupled | |
| WC cistern, beta valve, 9ℓ | High level | Low level | Close coupled | |
| WC cistern, beta valve, 6ℓ | High level | Low level | Close coupled | |
| Auto cistern | 11ℓ | 9ℓ | | |
| WC flush valves | | | | |
| | Flush time: | Flush time: | | |
| Flush valve (urinals) | Senior | Junior | | |
| | Flush time: | Flush time: | | |
| | | | | |

NOTE:

Pertaining to WC cisterns with beta valves, please indicate in the "Remarks" column the number of dual flushing and multi flushing systems encountered (where relevant).

| FITTING | TYPE/SIZE | | | REMARKS |
|----------------------------|---|-----------|--|---------|
| | (Insert approximate quantity in each block) | | | |
| Shower head | Low flow | High flow | | |
| | | | | |
| Balanced water pressure | Yes | No | | |
| Storage water heater | | | | |
| Instantaneous water heater | | | | |
| Dishwasher | | | | |
| Washing machine | | | | |
| Steam iron machine | | | | |
| Other fitting (specify) | | | | |
| Other fitting (specify) | | | | |
| Other fitting (specify) | | | | |
| | | | | |

University of Cape Town

IRRIGATION SYSTEMS

| | |
|---|--|
| Is borehole/wellpoint water used (Yes/No)? | |
| If "Yes", is this metered? | |
| Automated irrigation system (Yes/No)? | |
| If "Yes", system set for night irrigation, other? | |
| Hand watering (Yes/No)? | |
| Subsurface irrigation system (Yes/No)? | |

MISCELLANEOUS

| | |
|---|--|
| Fire hoses metered (Yes/No)? | |
| Are forecourts/paved areas washed (Yes/No)? | |
| | |
| | |
| | |

University of Cape Town

PART 5: GENERAL OBSERVATIONS/RECOMMENDATIONS

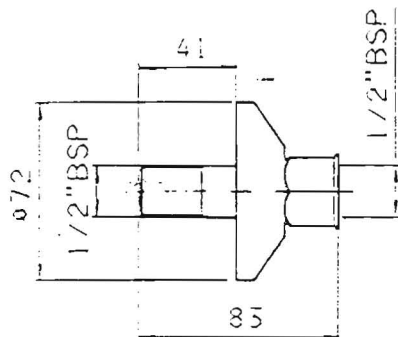
| | |
|--|--|
| Level of maintenance | |
| General observations | |
| General recommendations | |
| Any relevant additional information | |

University of Cape Town

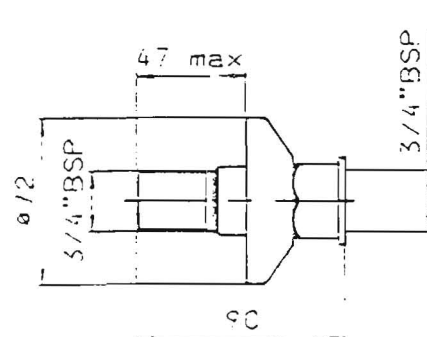
APPENDIX IX: Diagrams of Fixtures and Fittings

University of Cape Town

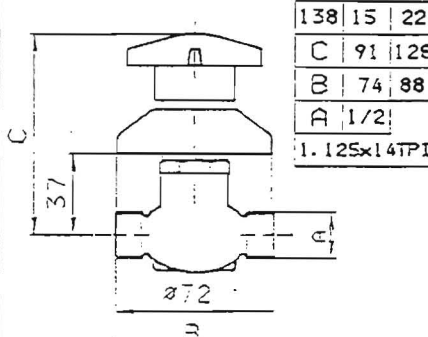




059-15 Extension Piece

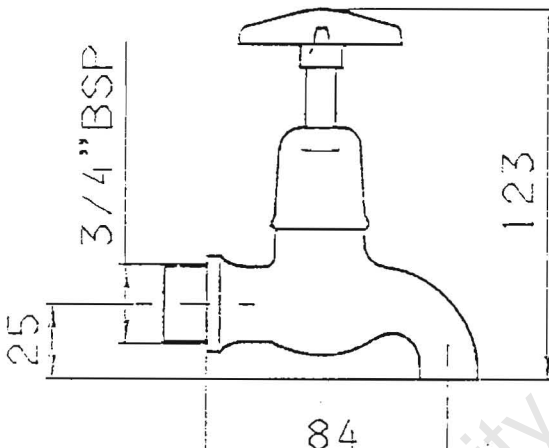


059-20 Extension Piece

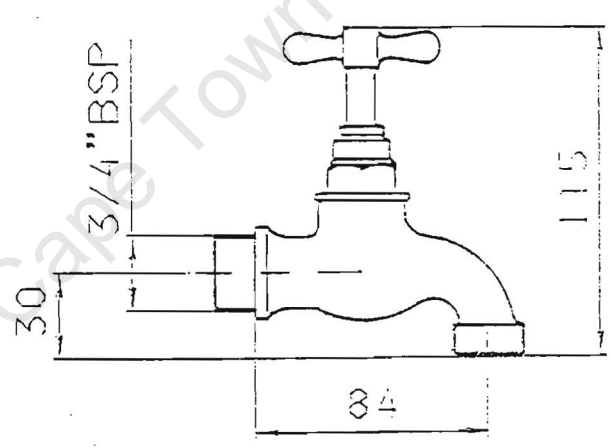


| | | |
|--------------|-----|-----|
| 138 | 15 | 22 |
| C | 91 | 126 |
| B | 74 | 88 |
| A | 1/2 | |
| 1. 125x14TPI | | |

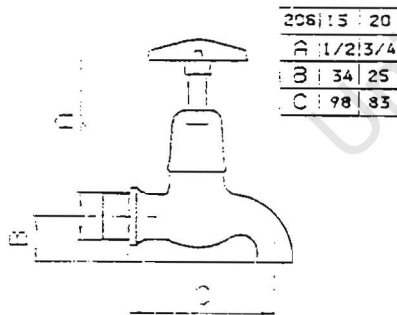
138 Undertile Stoptap



106-20 Bibtap

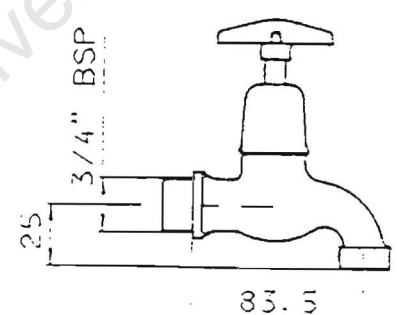


108-20 Hose Bibtap

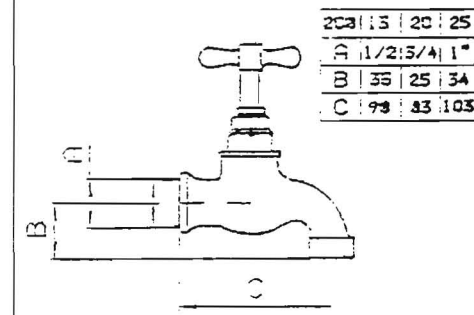


| | | |
|-----|-----|-----|
| 206 | 15 | 20 |
| A | 1/2 | 3/4 |
| B | 34 | 25 |
| C | 98 | 83 |

206 Bibtap

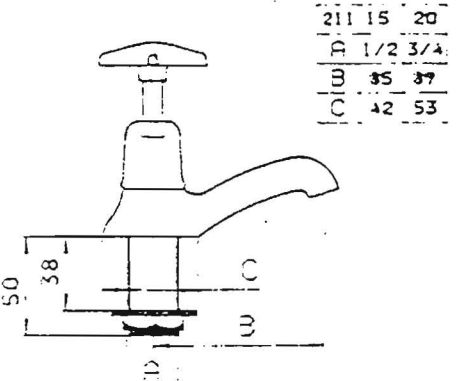


207EC-20 Hose Bibtap



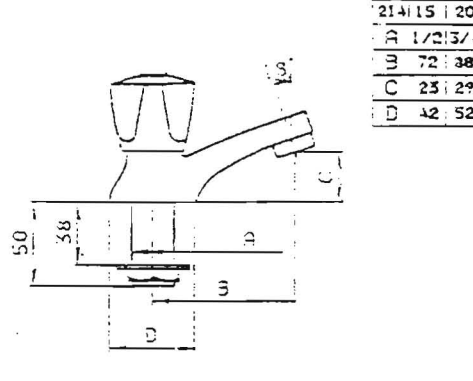
| | | | |
|-----|-----|-----|-----|
| 208 | 15 | 20 | 25 |
| A | 1/2 | 3/4 | 1" |
| B | 35 | 25 | 34 |
| C | 98 | 83 | 103 |

208 Hose Bibtap



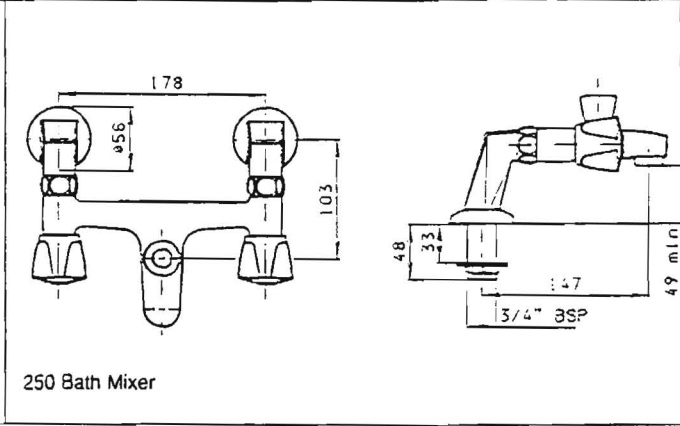
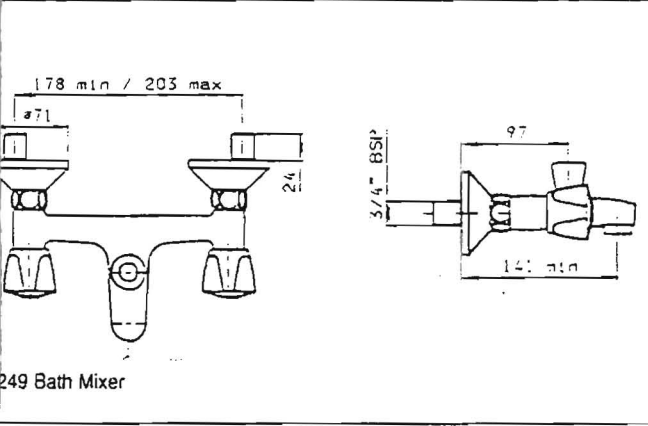
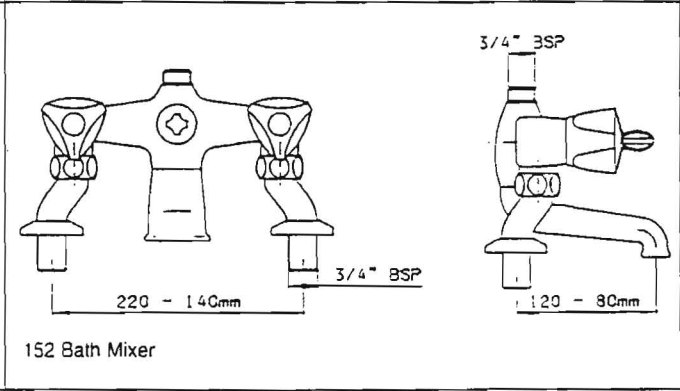
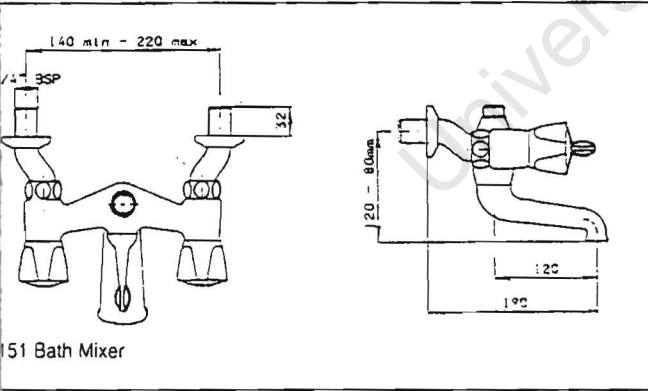
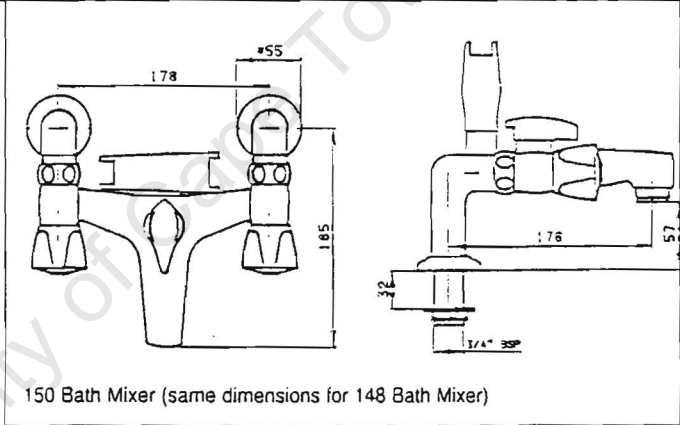
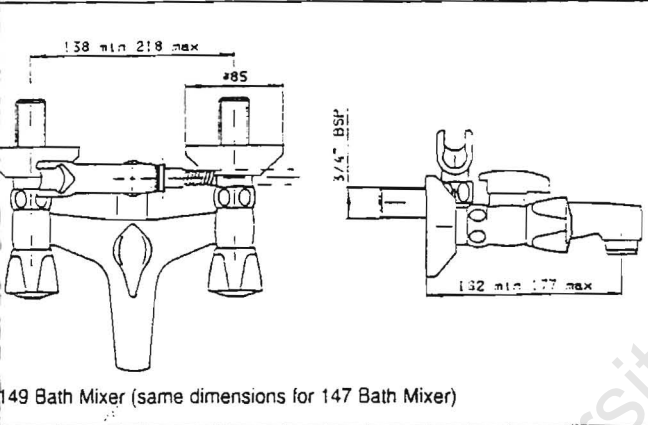
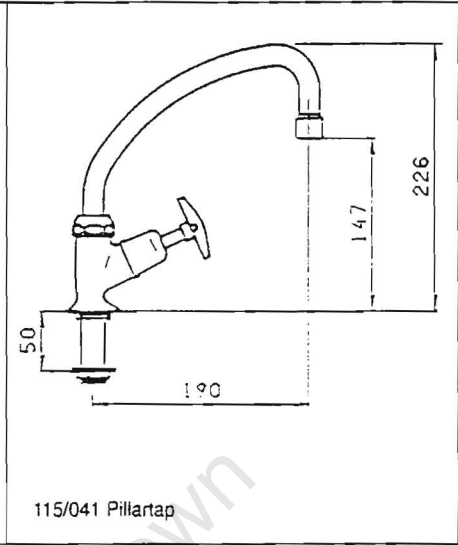
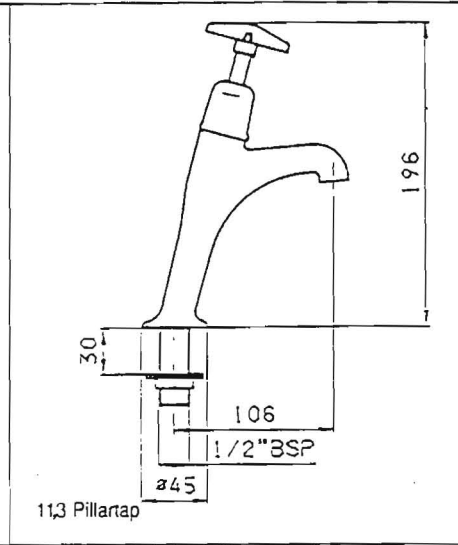
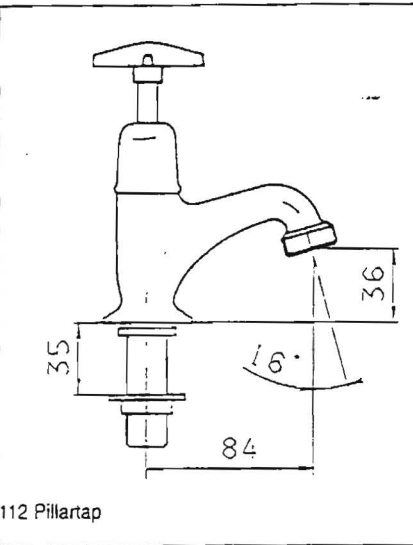
| | | |
|-----|-----|-----|
| 211 | 15 | 20 |
| A | 1/2 | 3/4 |
| B | 35 | 37 |
| C | 42 | 53 |

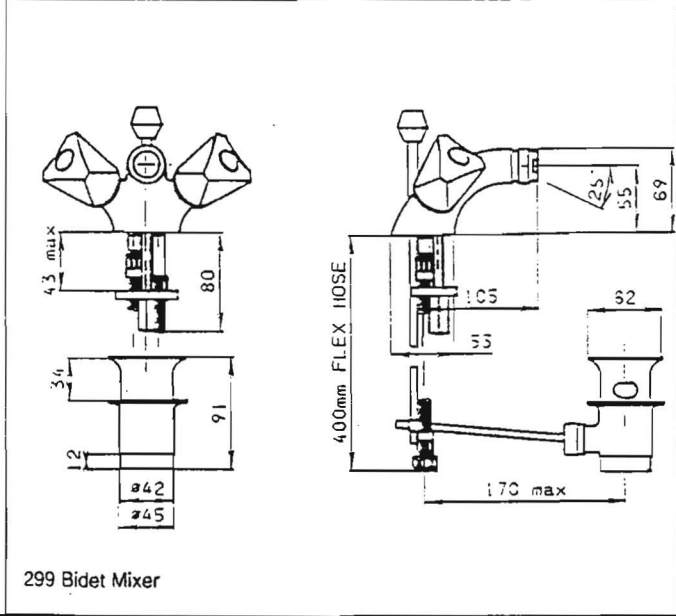
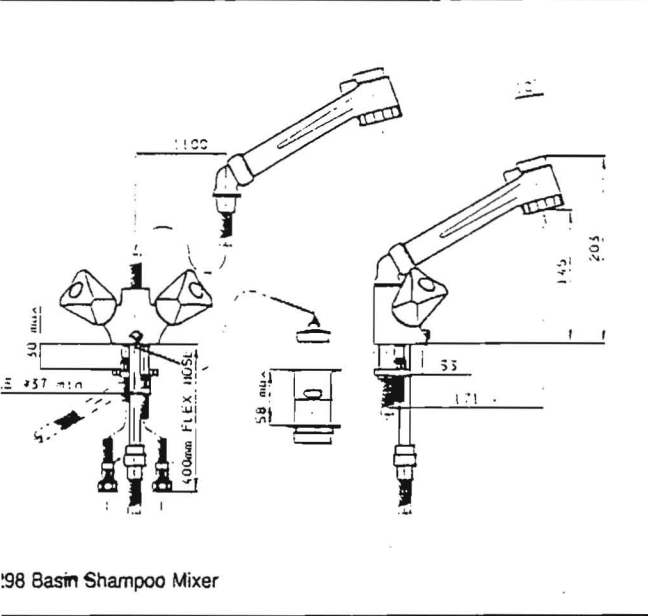
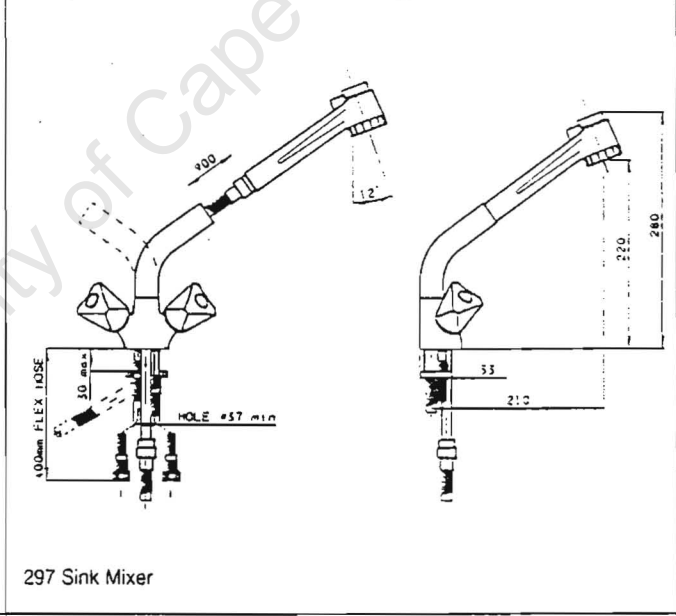
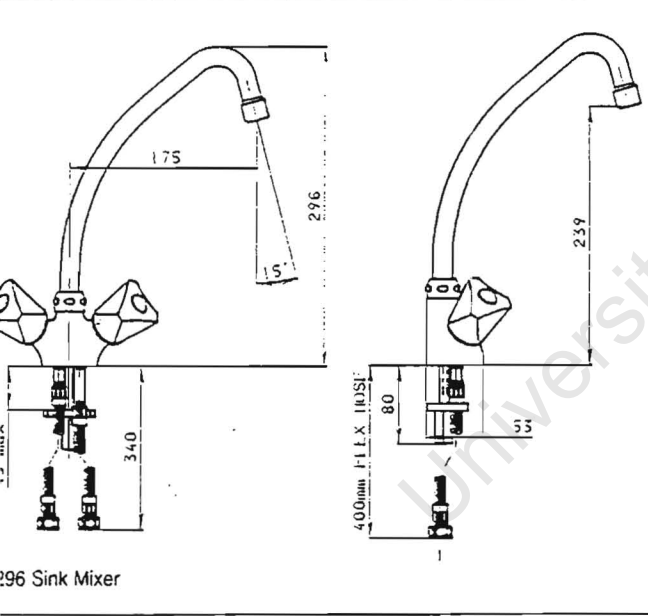
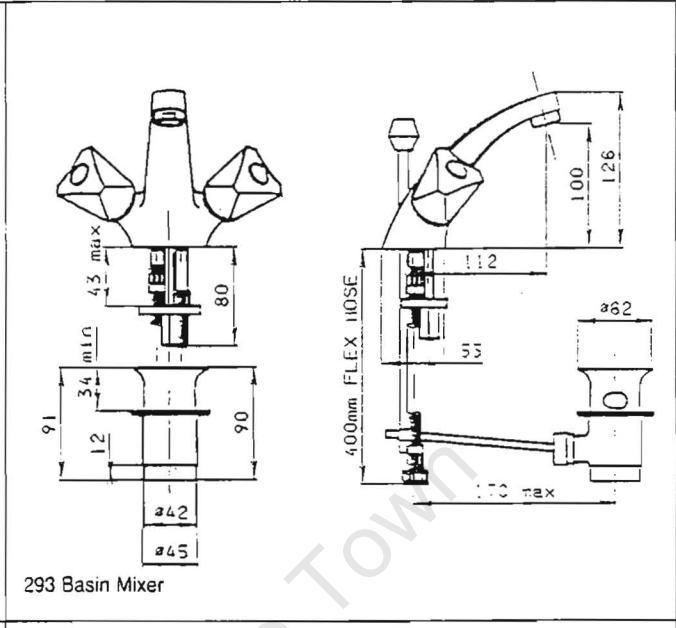
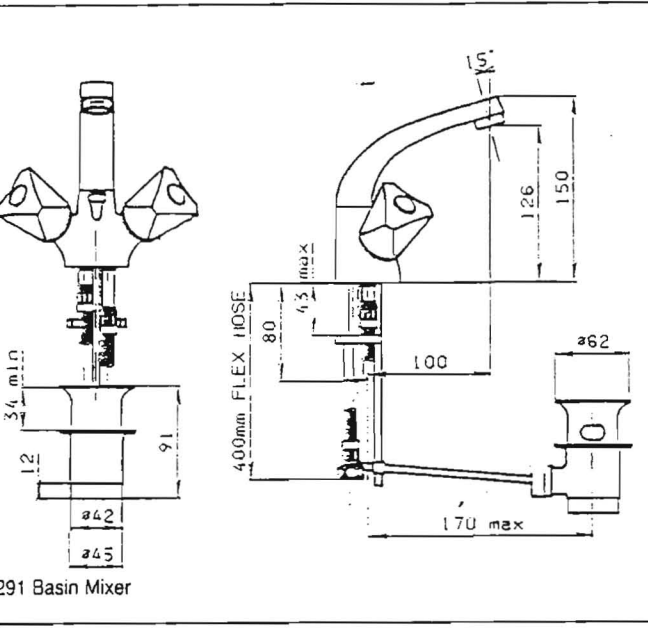
211 Pillartap

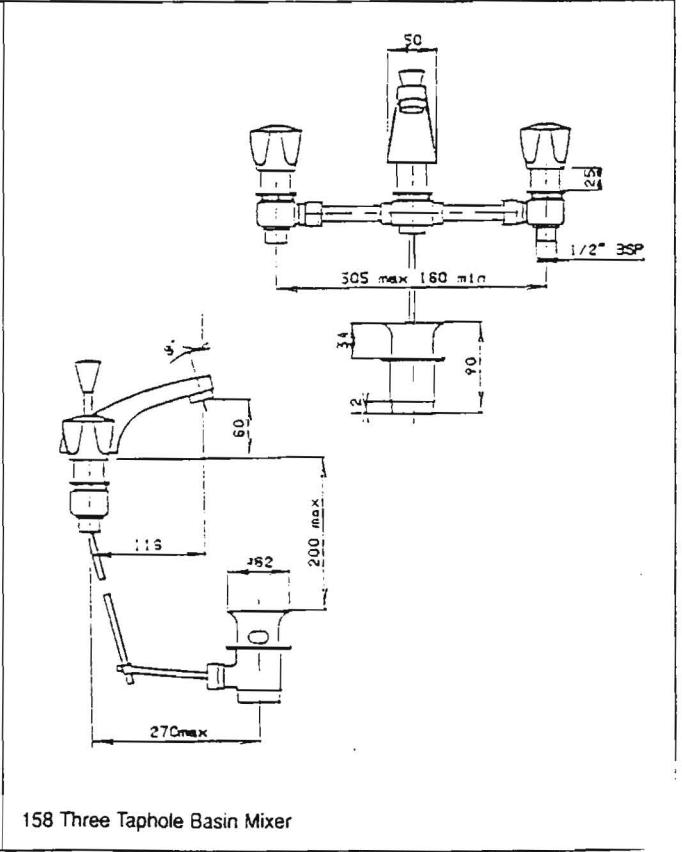
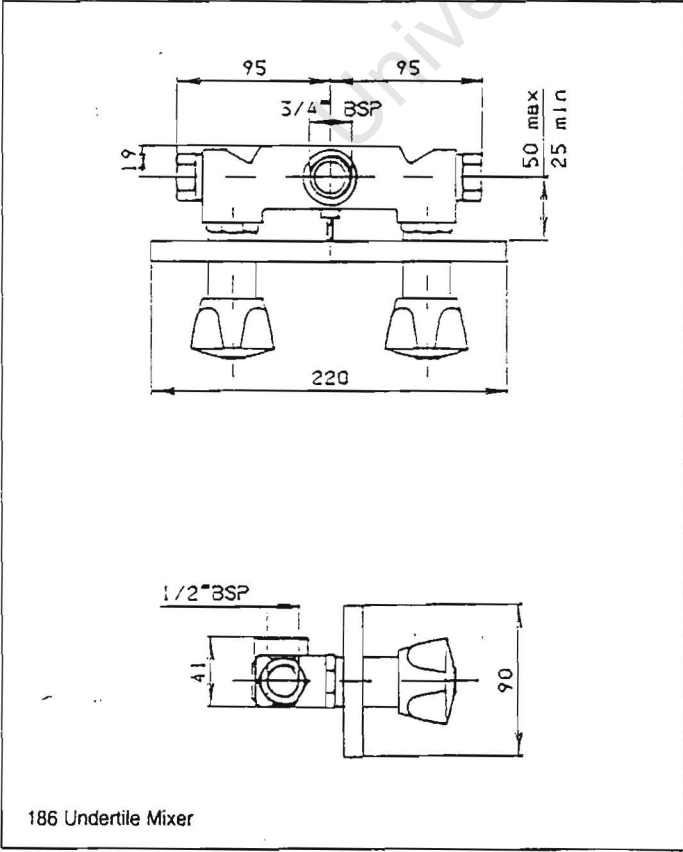
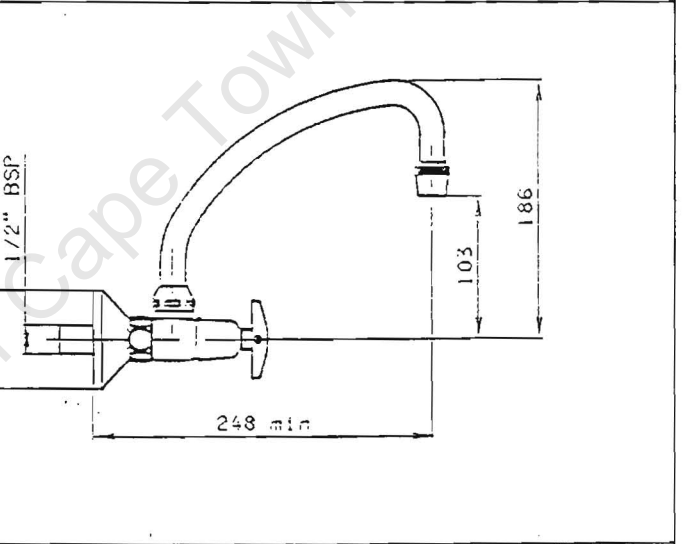
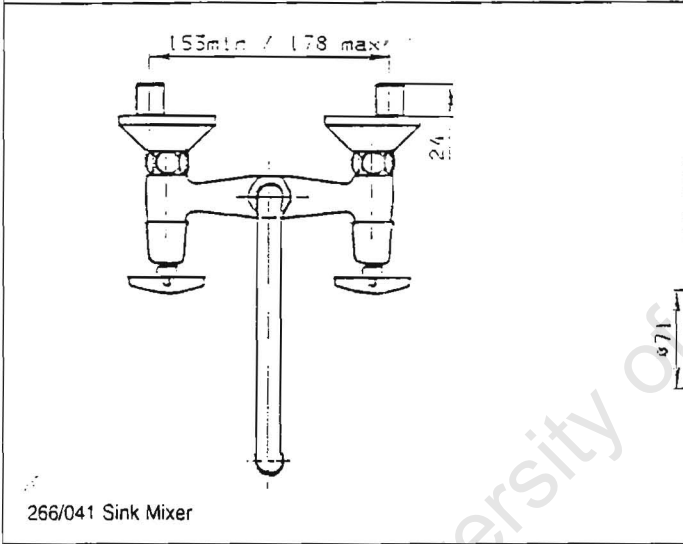
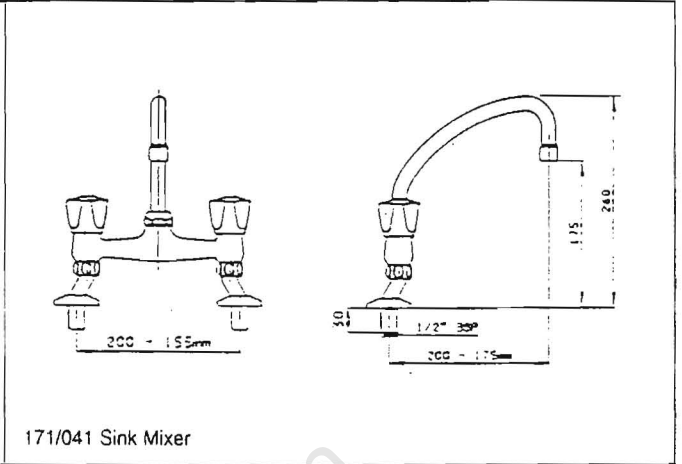
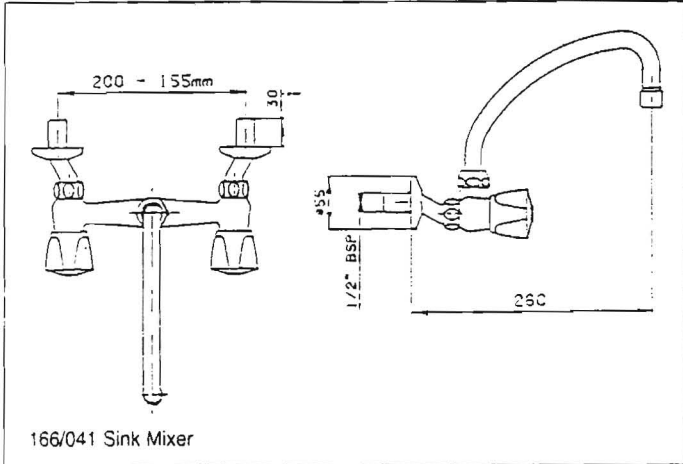


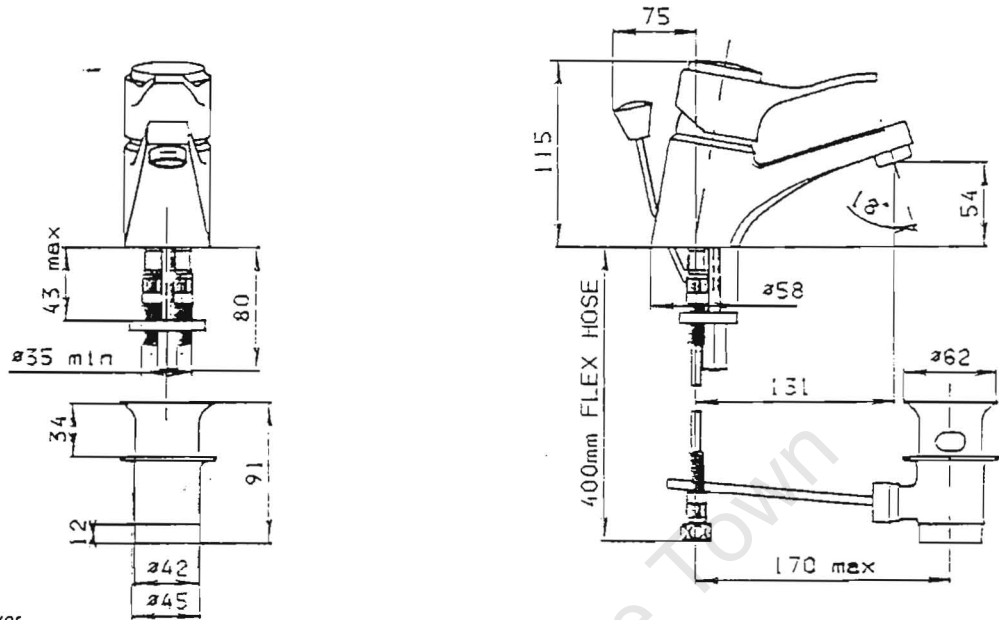
| | | |
|-----|-----|-----|
| 214 | 15 | 20 |
| A | 1/2 | 3/4 |
| B | 72 | 38 |
| C | 23 | 29 |
| D | 42 | 52 |

214 Pillartap

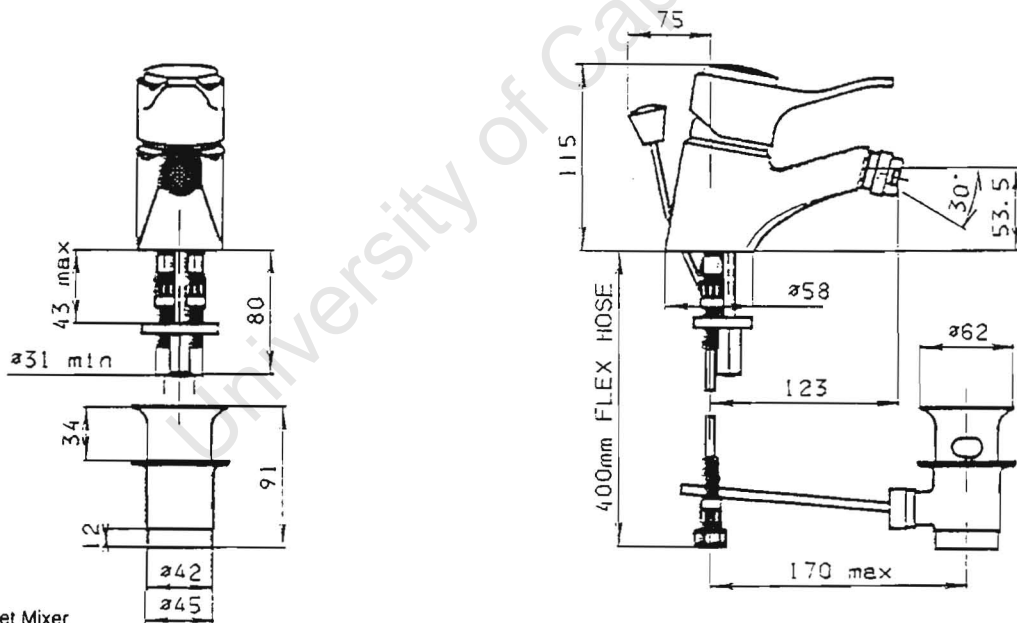




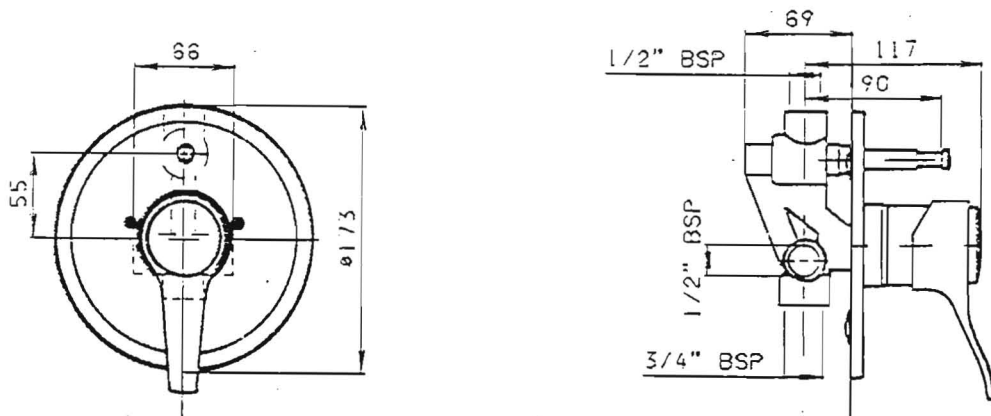




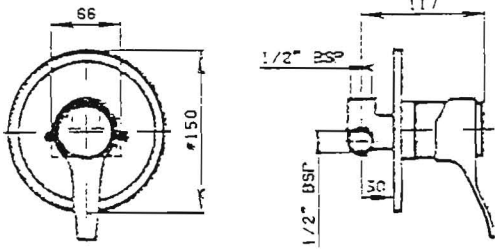
900 'Focus' Basin Mixer



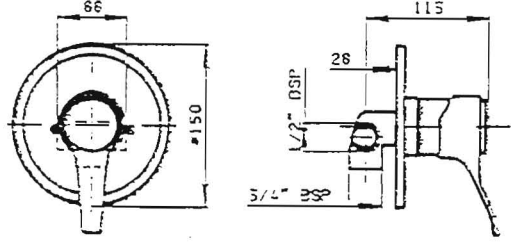
915 'Focus' Bidet Mixer



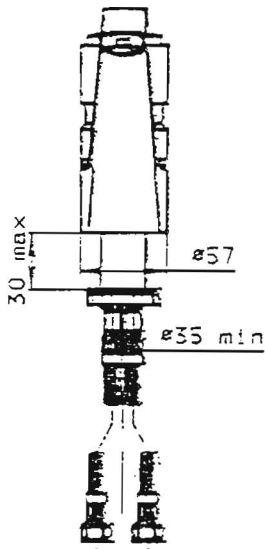
911 'Focus' Bath/Shower Diverter Mixer



905 'Focus' Shower Mixer

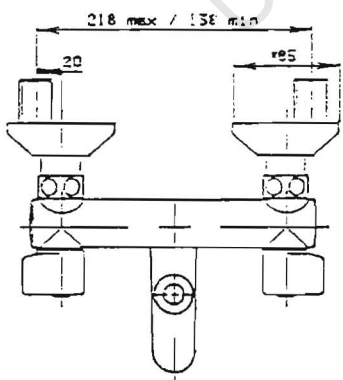
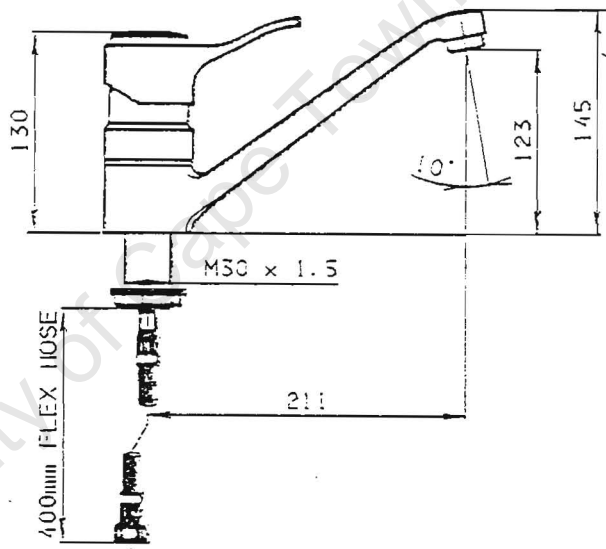


910 'Focus' Bath Mixer

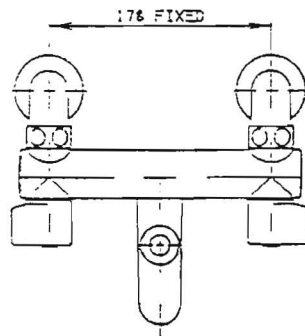
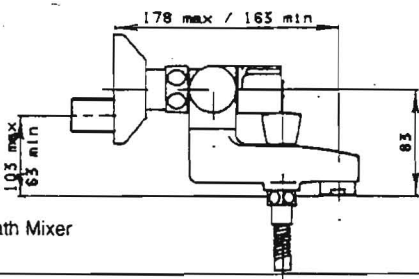


920 'Focus' Sink Mixer

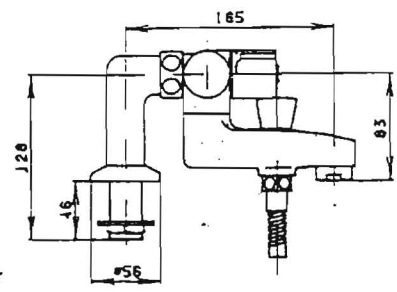
Note: 922 has same dimensions except spout is 290 mm from centre to centre

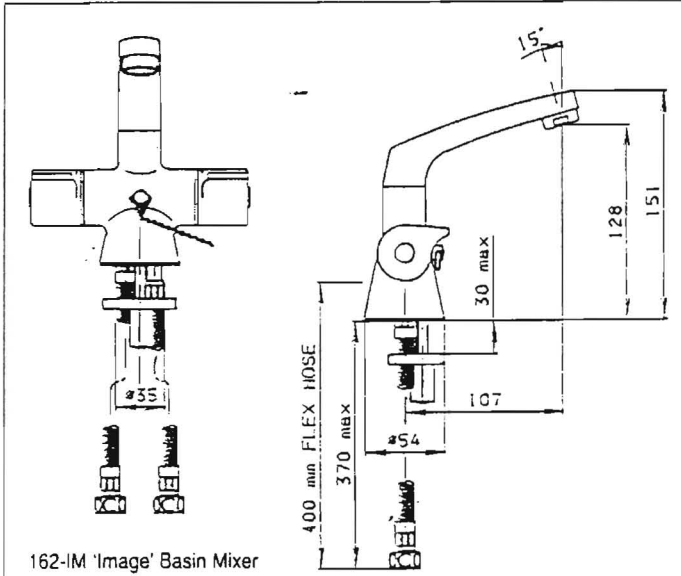


159-IM 'Image' Bath Mixer

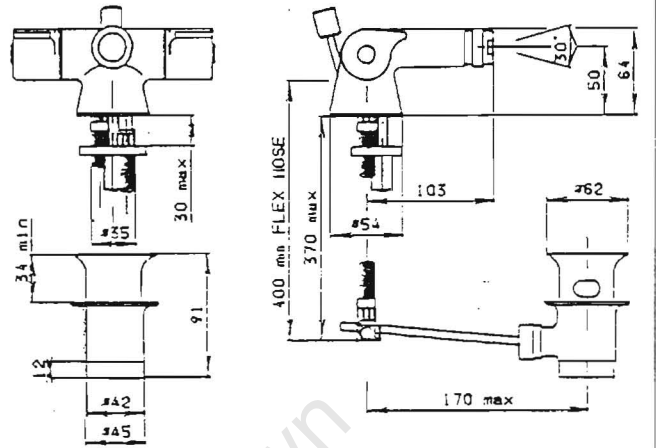


160-IM 'Image' Bath Mixer

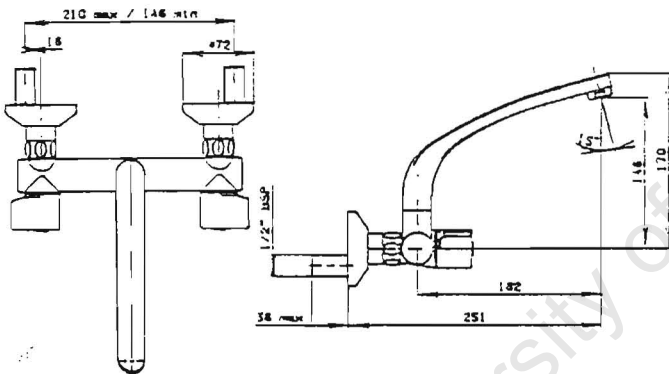




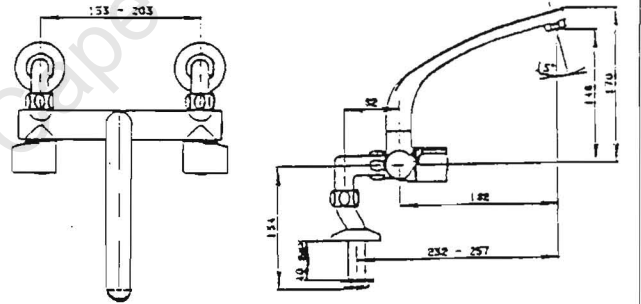
162-IM 'Image' Basin Mixer



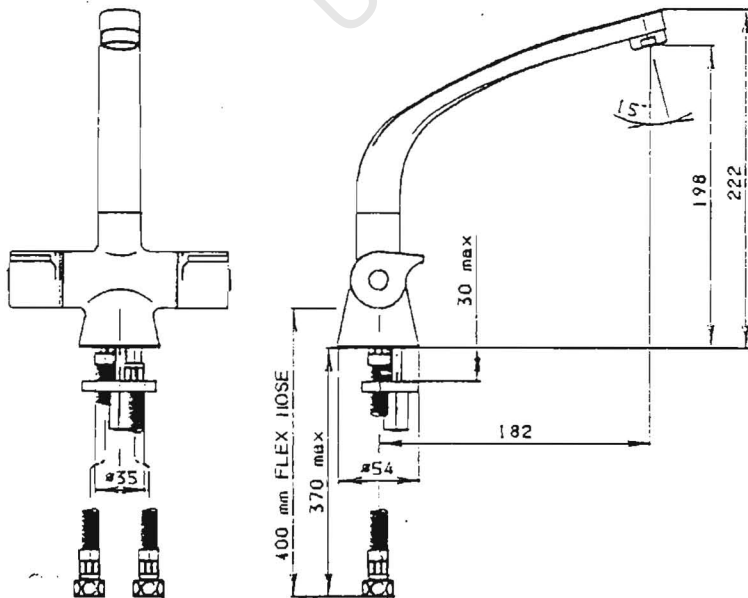
169-IM 'Image' Bidet Mixer



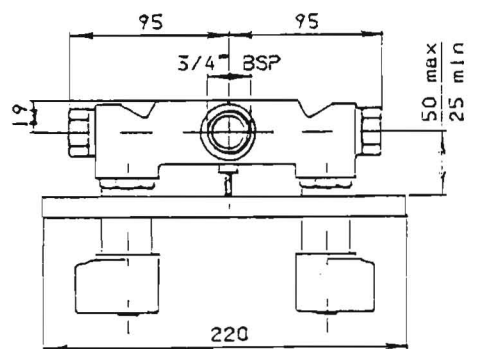
164-IM 'Image' Sink Mixer



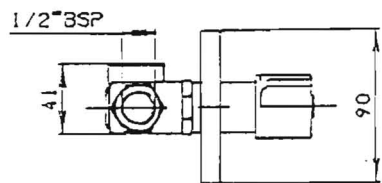
165-IM 'Image' Sink Mixer

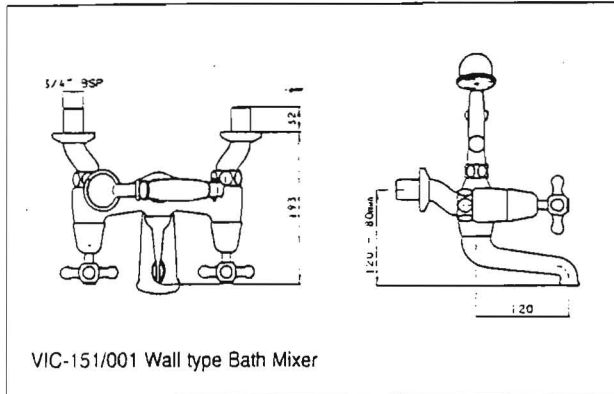


168-IM 'Image' Sink Mixer

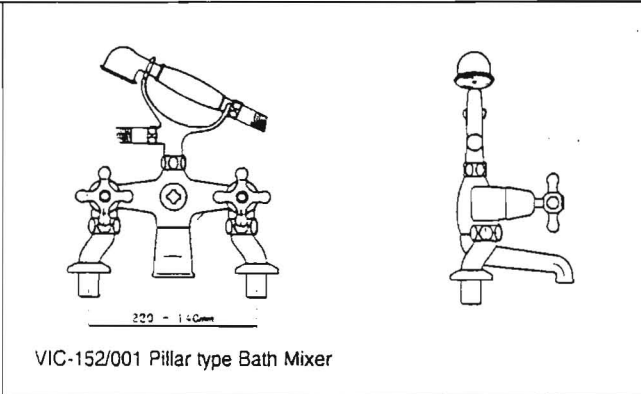


170-IM 'Image' Bath or Shower Mixer

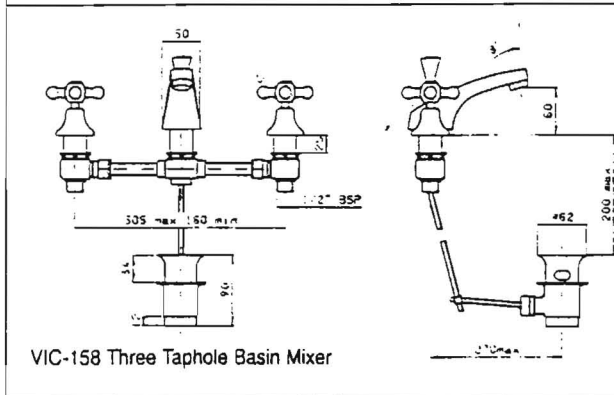




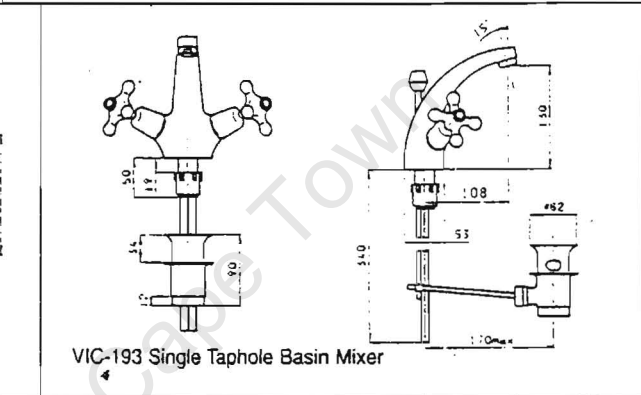
VIC-151/001 Wall type Bath Mixer



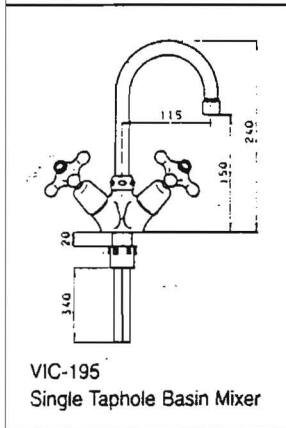
VIC-152/001 Pillar type Bath Mixer



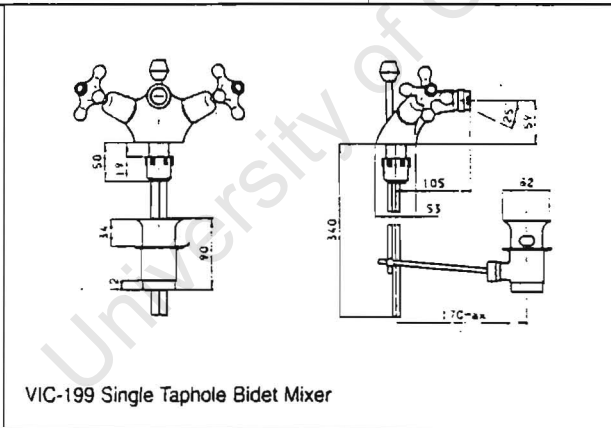
VIC-158 Three Taphole Basin Mixer



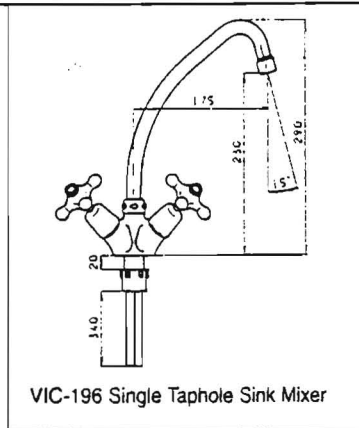
VIC-193 Single Taphole Basin Mixer



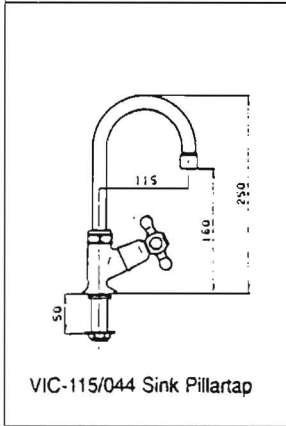
VIC-195 Single Taphole Basin Mixer



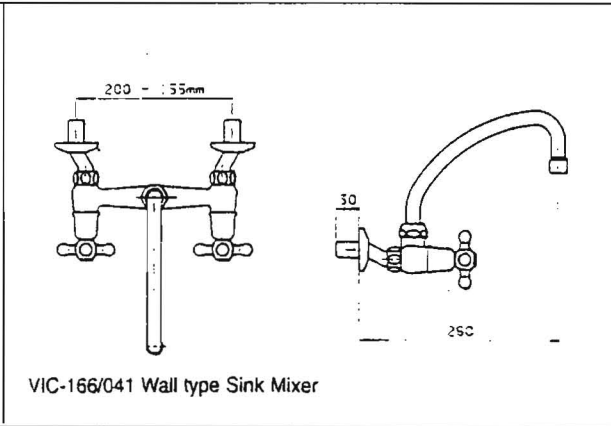
VIC-199 Single Taphole Bidet Mixer



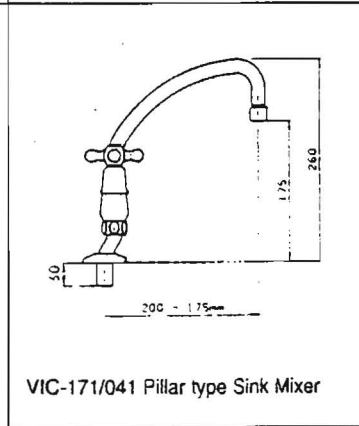
VIC-196 Single Taphole Sink Mixer



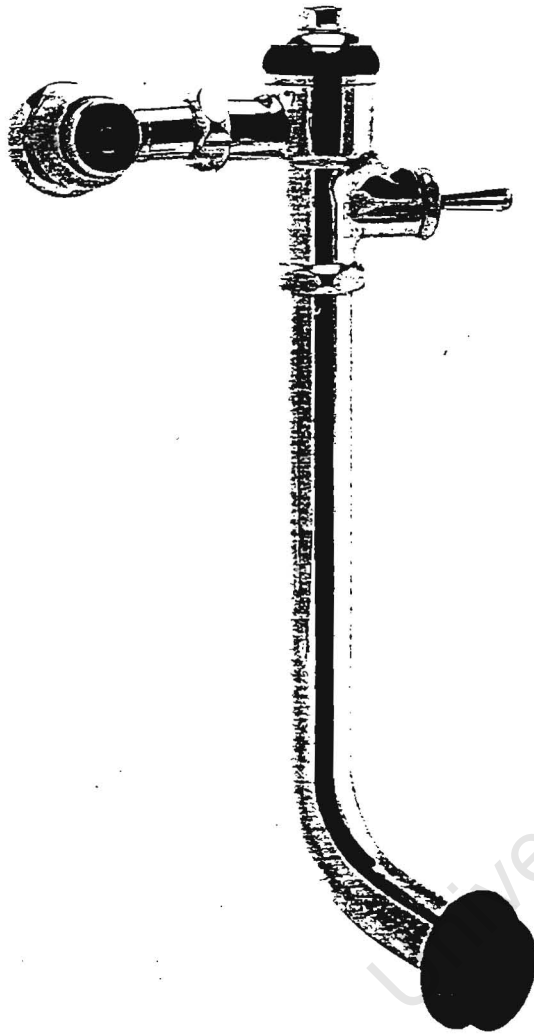
VIC-115/044 Sink Pillartap



VIC-166/041 Wall type Sink Mixer

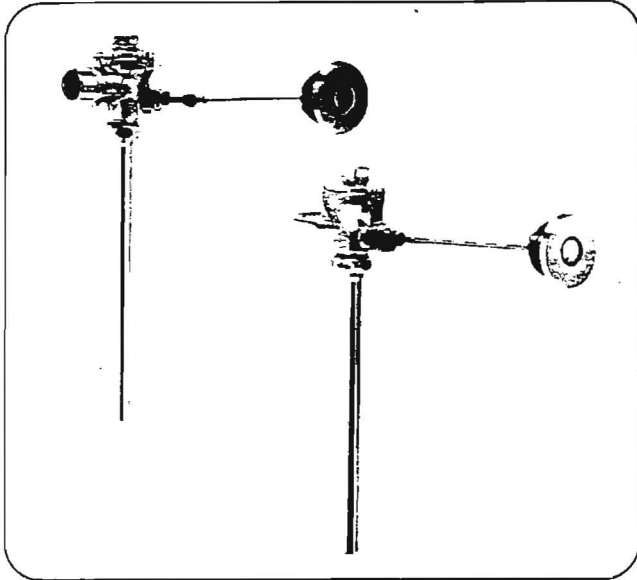


VIC-171/041 Pillar type Sink Mixer

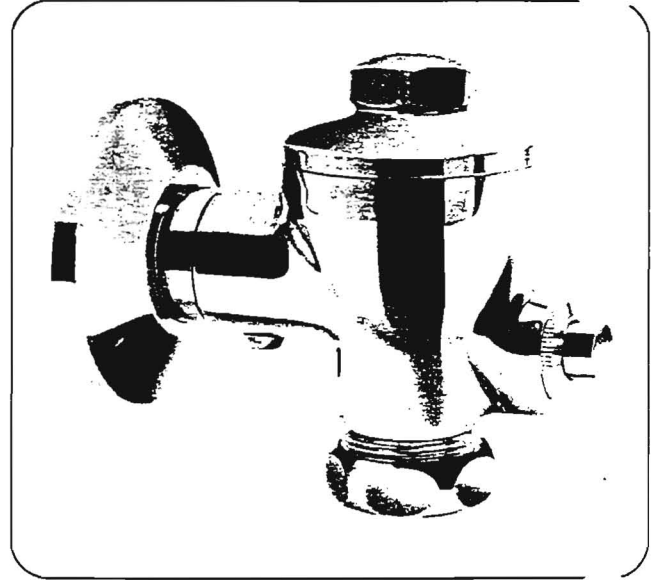


M1.100
 M1.100 1 1/4" Standard 'Flushmaster' Toilet Flushvalve, Chrome Plated, back entry type, with integral vacuum breaker, non-return valve, inlet control stop and wallplate, comprising:
 1 No. FM1.000 Flushvalve, CP.
 1 No. FMT1.1 Bent Flushpipe, CP., 38,2 mm Ø x 335 mm x 140 mm
 1 No. FMV8.3 Rubber Flushpipe connector

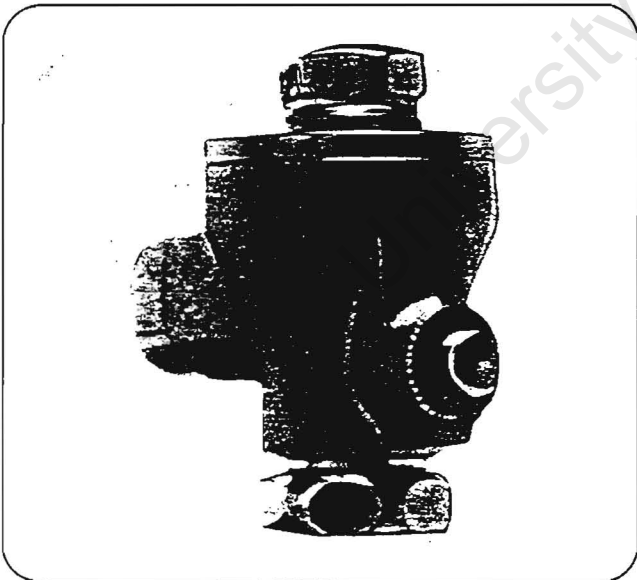
FM2.100
 FM2.100 1 1/4" Standard 'Flushmaster' exposed back entry Toilet Flushvalve, Chrome Plated, with integral non-hold-open valve, vacuum breaker and shut-off valve, comprising:
 1 Flushvalve, CP.
 1 No. FMT1.1 Bent Flushpipe, CP., 38,2 mm Ø x 335 mm x 140 mm
 1 No. FMV8.3 Rubber Flushpipe connector



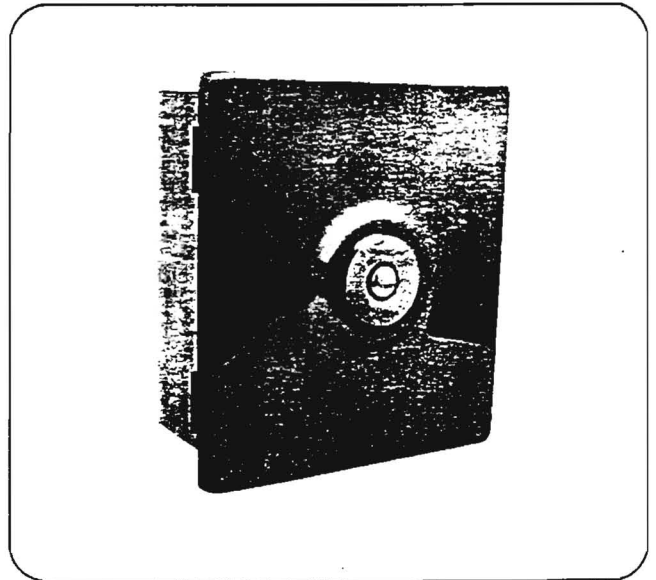
FJ8.102
 FJ8.102 3/4" 'Flushmaster Junior' Urinal Flushvalve, Brushed Chrome, concealed type, with integral ballostop, with Chrome Plated pushbutton assembly and pushrod, comprising:
 1 No. FJ8.001 Flushvalve, BC.
 1 No. KM9.13 Pushbutton Assembly, CP.
 1 No. FJT5.1 Flushpipe, 22 mm Ø x 230 mm



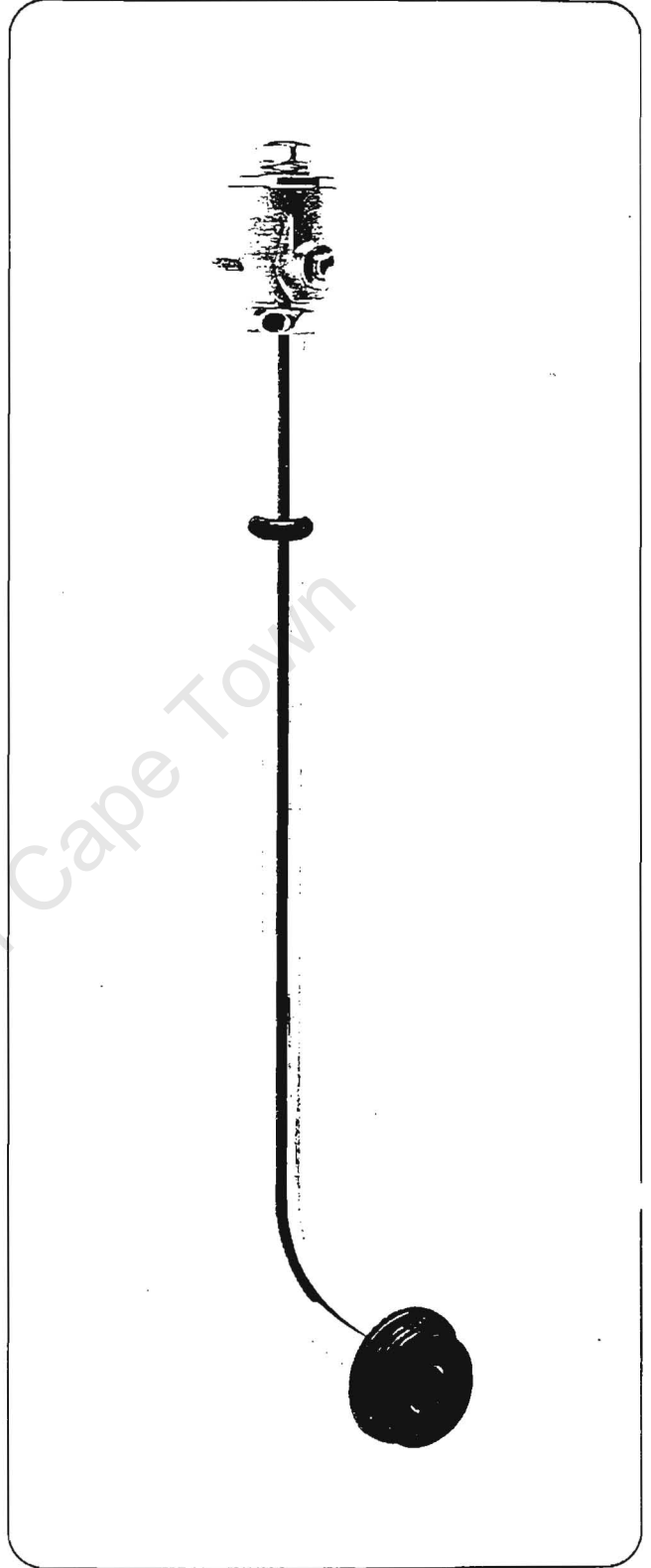
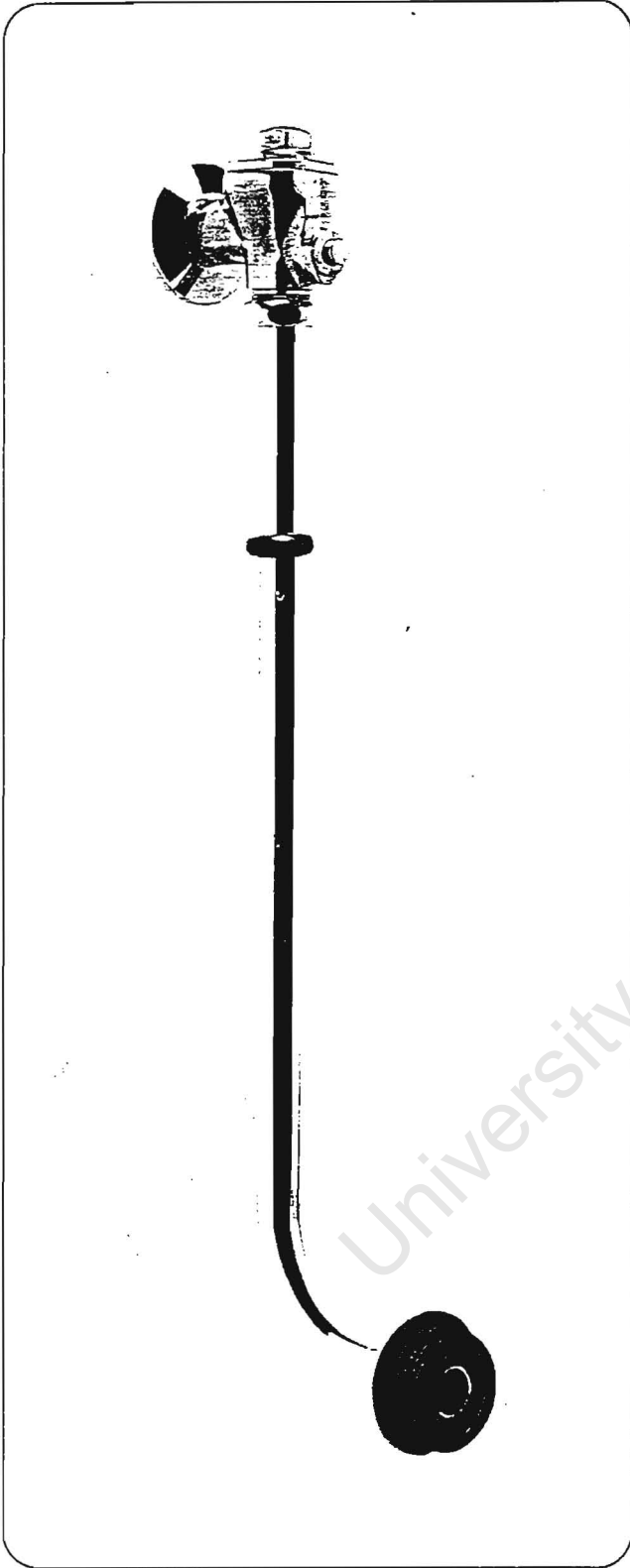
FJ6.000
 FJ6.000 3/4" 'Flushmaster Junior' Urinal Flushvalve, Chrome Plated, exposed type, with integral ballostop valve and wallplate, comprising:
 Valve ONLY with additional piston and screw for large bowl and stall urinals



FJ6.001
 FJ6.001 3/4" 'Econoflush' Toilet Flushvalve, Brushed Chrome, with integral non-hold-open, vacuum breaker and ballostop valves
 Pressure range 100 kPa – 600 kPa

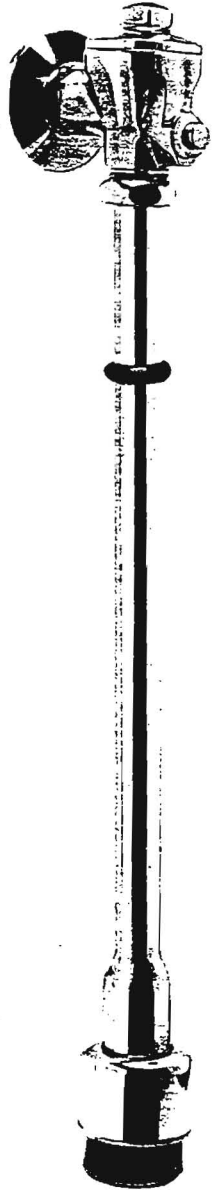


FJ8.112
 FJ8.112 3/4" 'Econoflush' front access, concealed Urinal Flushvalve with integral non-hold-open and ballostop valves.
 Comprising:
 1 No. FJ8.012 Flushvalve
 1 No. FM8.010 Box
 1 No. FJ8.000 Straight Tailpipe, F



FJ2.100
FJ2.100 3/4" 'Flushmaster Junior' Toilet Flushvalve, Chrome Plated, back entry type, with integral vacuum breaker, butterfly valve and wallplate, comprising:
 1 No. FJ2.000 Flushvalve, CP.
 1 No. FJT1.1 Bent Flushpipe, CP., 25,4 mm Ø x 540 mm x 140 mm
 1 No. FJV1.7 Rubber Flushpipe connector
 1 No. FJV1.2 Rubber seat buffer

FJ2.601
FJ2.601 3/4" 'Flushmaster Junior' Toilet Flushvalve, Brushed Chrome economy model, back entry type, with integral vacuum breaker and butterfly valve, without wallplate, comprising:
 1 No. FJ2.001 Flushvalve, BC.
 1 No. FJT1.1 Bent Flushpipe, CP., 25,4 mm Ø x 540 mm x 140 mm
 1 No. FJV1.7 Rubber Flushpipe connector
 1 No. FJV1.2 Rubber seat buffer



FJ2.210

- FJ2.210 3/4" 'Flushmaster Junior' Toilet Flushvalve, Chrome Plated, top entry type, with integral vacuum breaker, butterfly valve and wallplate, comprising:
 - 1 No. FJ2.000 Flushvalve, CP.
 - 1 No. FJT1.2 Straight Flushpipe, CP., outlet 38,2 mm Ø x 470 mm
 - 1 No. FM8.20 Flushpipe connector, CP.
 - 1 No. FJV1.2 Rubber seat buffer

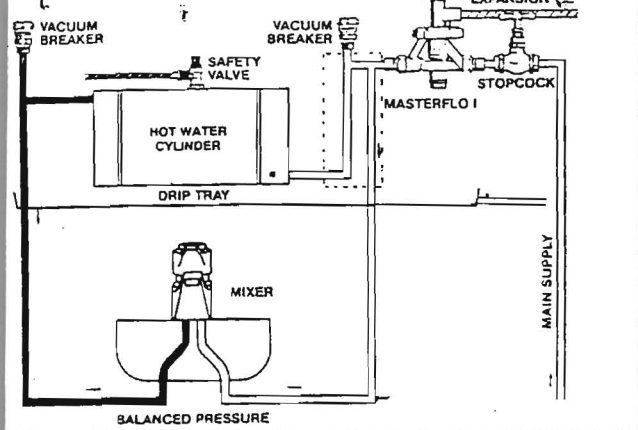
FJ4.203

- FJ4.203 3/4" 'Flushmaster Junior' Toilet Flushvalve, concealed model, back entry type, with integral vacuum breaker and butterfly valve, with pushrod and Chrome Plated pushbutton assembly, comprising:
 - 1 No. FJ4.001 Flushvalve, Brushed Chrome
 - 1 No. KM9.13 Pushbutton Assembly, Chrome Plated
 - 1 No. FM8.45 Elbow
 - 1 No. FJT1.2 Straight Flushpipe, CP., outlet 38,2 mm Ø x 470 mm long
 - 1 No. FMT1.4 Straight Flushpipe, CP., 38,2 mm Ø x 320 mm
 - 1 No. FMV8.3 Rubber Flushpipe connector

BALANCED WORKING PRESSURE

The illustration shows, diagrammatically, the correct way in which a balanced water system is ensured. Cold water supply to all outlets in the system is taken from the **downstream** side of the Pressure Reducing Valve.

The dotted area indicates the anti-syphon loop, which prevents back-siphonage from the Hot Water Cylinder, when Mains pressure fails or when the house supply is turned off.

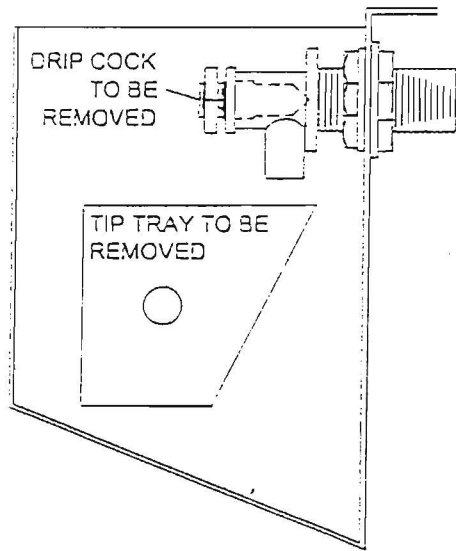


| CTION | DESCRIPTION |
|-------|---|
| 1 | COBRA Standard range of screw-down Tap and Mixer fittings. |
| 2 | COBRA ceramic disc Mixers and Thermostatic controlled Mixer. |
| 3 | COBRA Special purpose Tap and Mixer fittings; Tank, Range and Draw-off Cocks and Angle Regulating Valves. |
| 4 | COBRA Medical Tap and Mixer fittings. |
| 5 | COBRA Waste, Overflow and Trap fittings; Brass Pipe fittings. |
| 6 | COBRA Handshower Attachments, Handshowers and accessories. |
| 7 | COBRA Shower Connections and Shower Roses. |
| 8 | COBRA Extension pieces, Underwall Diverters and Bath Spouts. |
| 9 | COBRA toilet and urinal Flushvalves and 'SANBRASA' Float Valves. |
| 10 | COBRA Industrial Fittings. |
| 11 | COBRA Pressure Reducing Valves, Vacuum Breakers and Safety Pressure and Temperature Relief Valves. |
| 12 | PRESTEX and COBRA Gate Valves, COBRA Check Valves, Line Strainers and Ballcocks COBRA Fire Stopcock. |
| 13 | COBRA 'CONEX' dezincification resistant Copper Tube fittings, COBRA 'COPCAL' dezincification resistant Copper Tube fittings. |

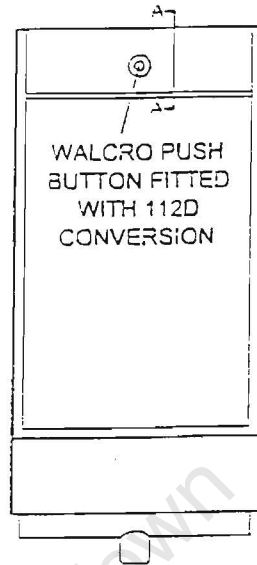
Recommended Working Pressure

While Cobra Taps and Mixers are tested to 2 000 kPa, the maximum working pressure is 400 kPa, except where otherwise stated.

WALCRO 112D URINAL CONVERSION

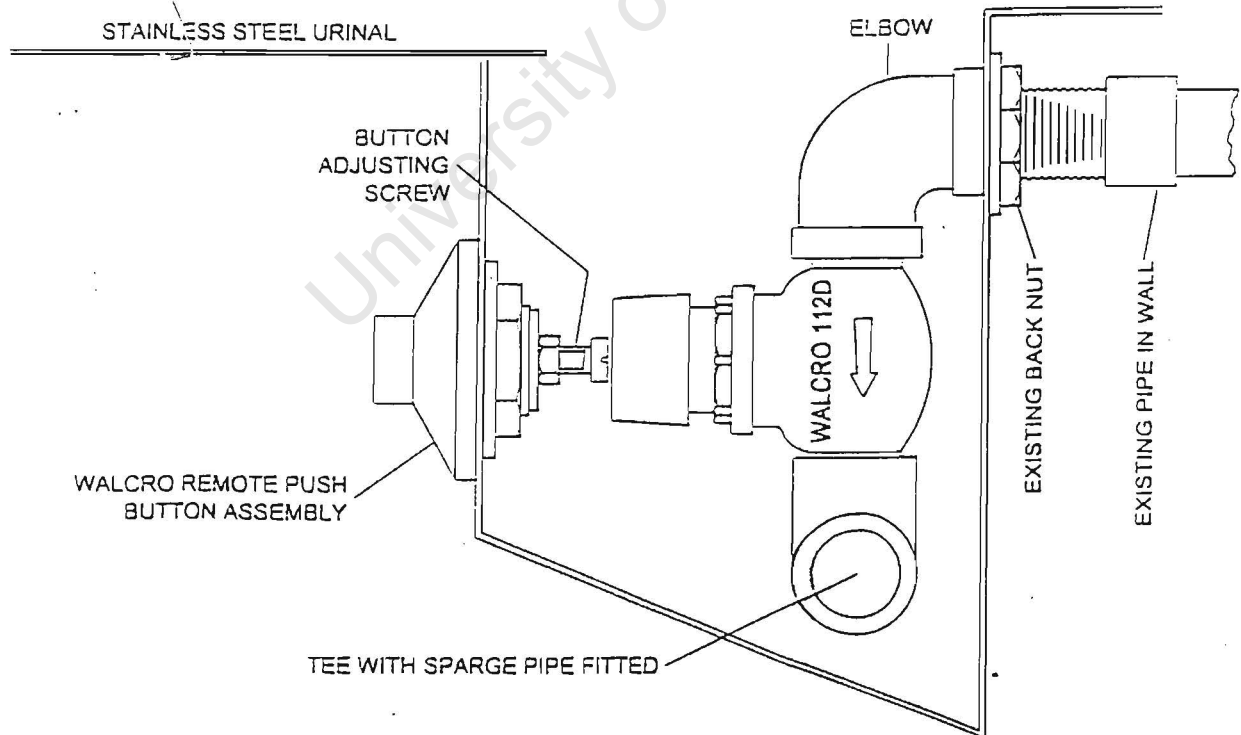


TYPICAL SECTION THROUGH
AUTOMATIC FLUSH TANK ON A
STAINLESS STEEL URINAL



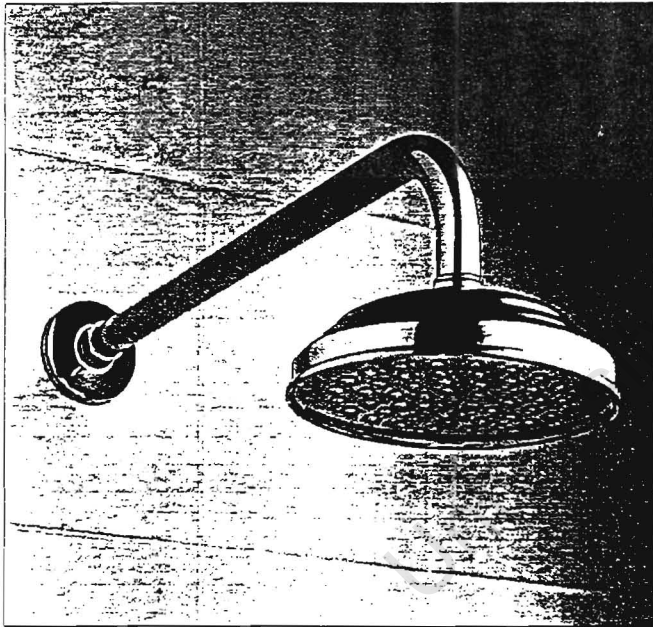
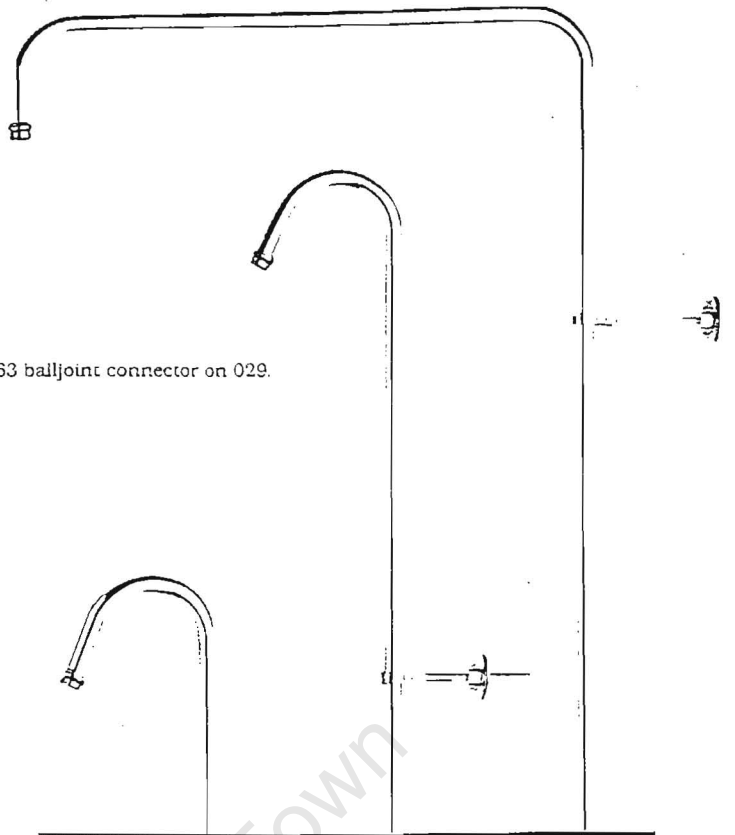
TYPICAL STAINLESS STEEL
CURVED BACK URINAL

SECTION A A





069CP Shower rose with 063 balljoint connector on 029 shower arm

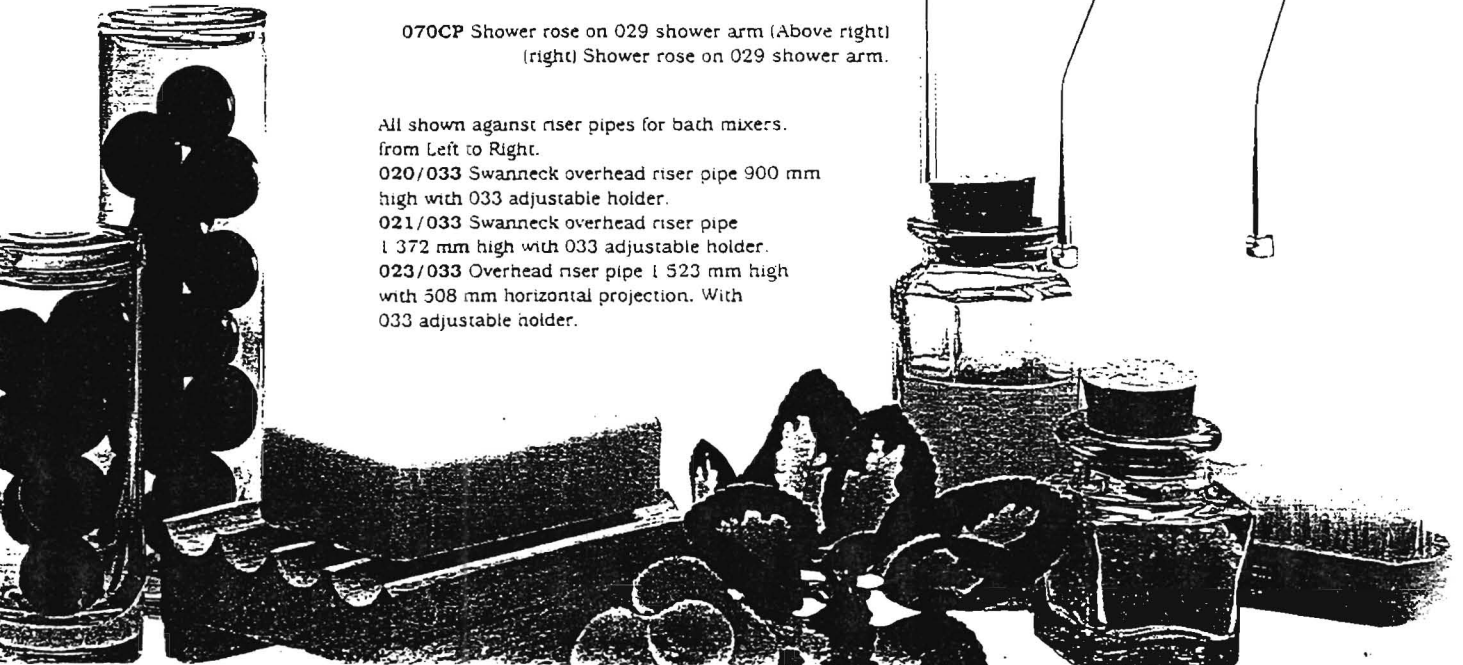


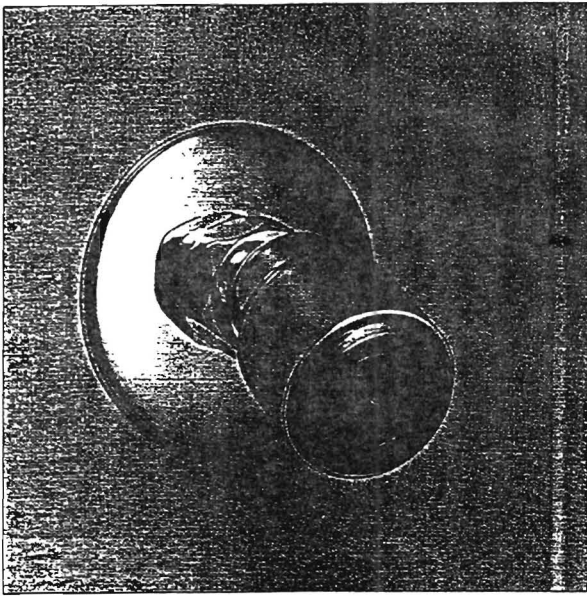
072 Shower rose on 029 shower arm.



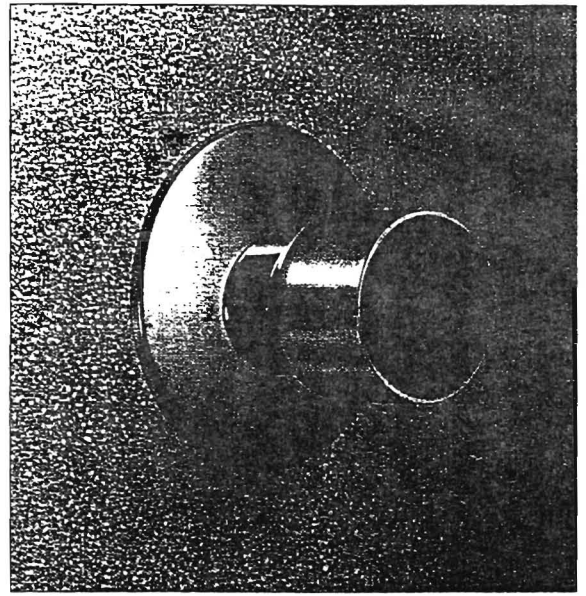
070CP Shower rose on 029 shower arm (Above right)
(right) Shower rose on 029 shower arm.

All shown against riser pipes for bath mixers.
from Left to Right.
020/033 Swanneck overhead riser pipe 900 mm high with 033 adjustable holder.
021/033 Swanneck overhead riser pipe 1 372 mm high with 033 adjustable holder.
023/033 Overhead riser pipe 1 523 mm high with 508 mm horizontal projection. With 033 adjustable holder.

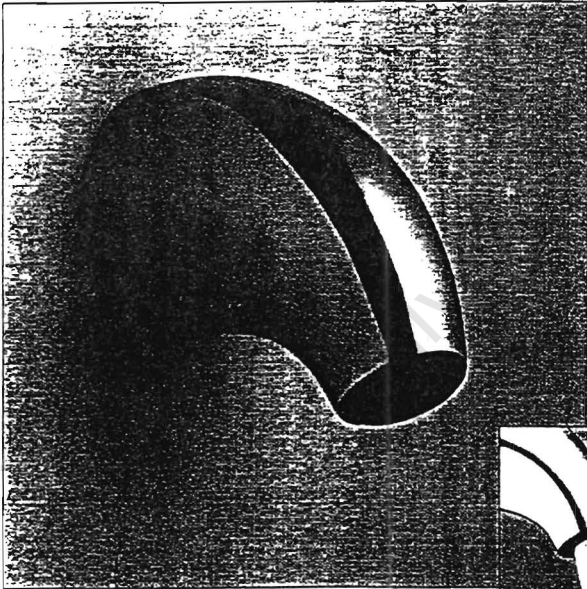




KP2.51 'Typhoon' shower rose, with integral balljoint connection installed as a side shower with 025-15 chromed wallplate.



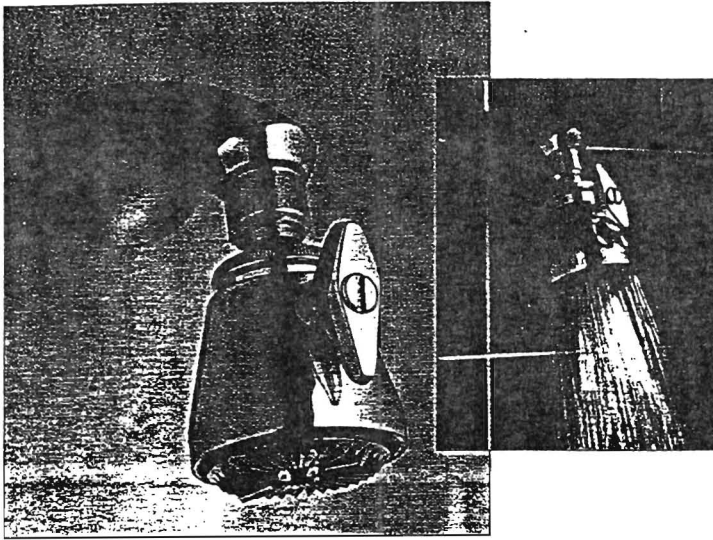
KP2.50 'Typhoon' fixed shower rose installed as a side shower with 025-15 chromed wall plate.



KP2.6 'Vandalmaster' shower rose, ideally suited to sports clubs, institutions, etc.

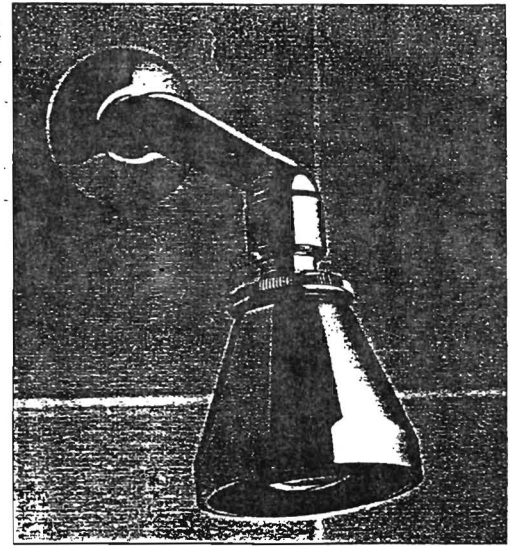
Inset: The 'Vandalmaster's' drenching shower pattern.



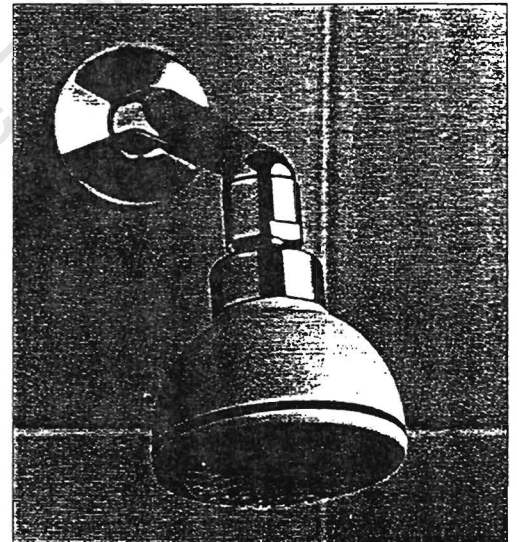


077 'Townhouse' adjustable shower rose shown on an 028 luxury shower arm. This shower rose is also shown on the front cover of this brochure.

Inset: The fine spray setting on the shower rose.



068BJ 'Concorde' shower rose shown on an 027 shower arm.



28855 'Snowite' shower rose with anti-liming faceplate with 'wipe-clean' feature. Waterflow restricted to 11 litres per minute.

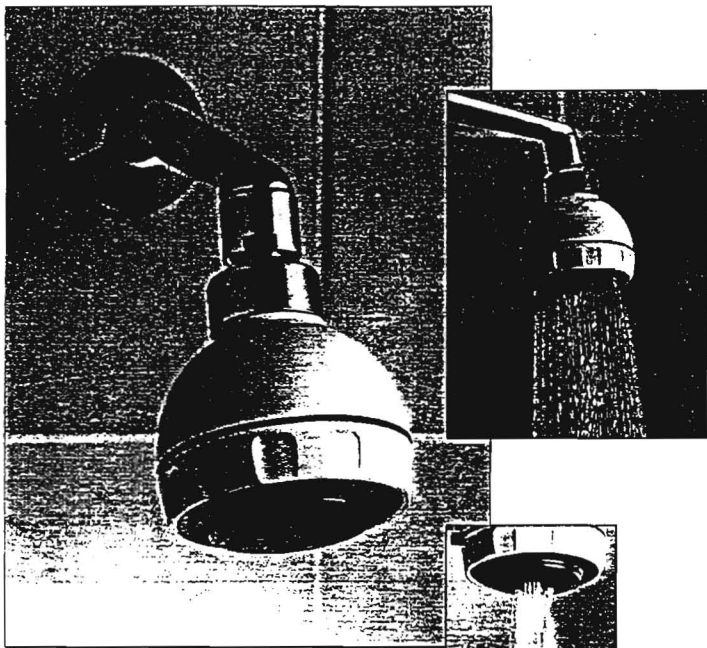


28407 'Sapphire' adjustable spray and pulsating shower rose. shown on an 027 shower arm.

Inset (L): The fine spray setting on the shower rose.

Inset (R): The massage spray setting.



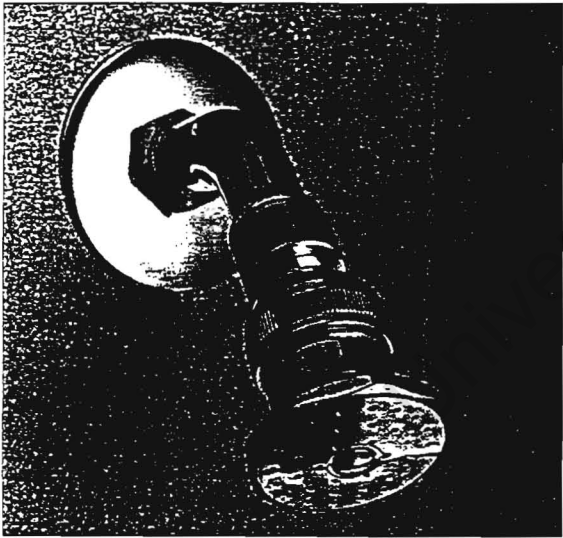


28858 'Snowite' massage shower rose featuring 'wipe-clean' normal shower.

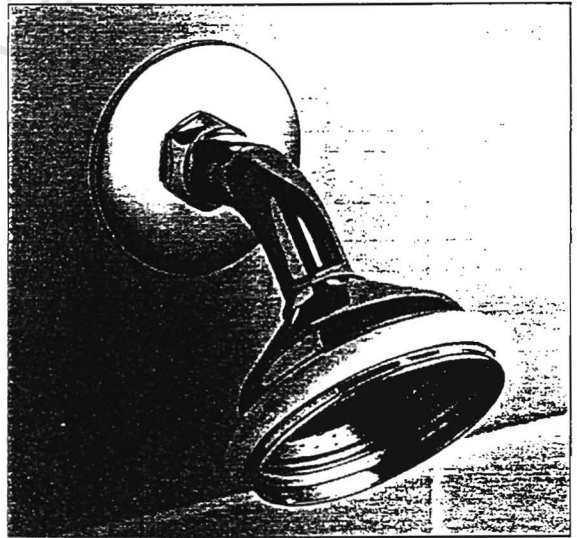
(inset top right) and pulsating massage jets (inset bottom right).



078CP 'Easi-spray' shower rose fitted to an 064 balljoint angle shower connector.



065 'Prestex' balljoint shower rose fitted to an 026 shower arm.



069CP Shower rose fitted to an 026 shower arm.

