



CITY OF CAPE TOWN
ISIXEKO SASEKAPA
STAD KAAPSTAD

ELECTRICITY SERVICES DEPARTMENT

GUIDELINE FOR ELECTRICAL CONTRACTORS

1ST EDITION

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CONTENTS

ABBREVIATIONS	4
1 SCOPE	4
2 REGULATORY CONTEXT	4
3 INTERPRETATION	5
4 INDEMNITY	5
5 COPYRIGHT	5
6 ELECTRICAL CONTRACTORS	5
7 FORMS AND INSPECTIONS	6
8 NOMINAL SUPPLY VOLTAGE	6
9 NEW SERVICE CONNECTIONS AND UPGRADES	6
9.1 General	6
9.2 Group Schemes	8
10 RETROFITS	9
10.1 Retrofit Scenarios	9
10.2 General	12
10.3 Single Residential and Single Commercial	12
10.4 Group Schemes	13
11 ADDITIONAL RESIDENTIAL METERING ON SAME ERF	14
11.1 General	14
11.2 Single Dwelling Units with Second Dwelling	14
11.3 Overhead Service Connections	15
11.4 Mid-block Overhead Service Connections	15
11.5 Three or More Prepayment Meters on Same Property	16
12 BUILDER'S SUPPLY/TEMPORARY CONNECTION	16
12.1 Requirements	16
12.2 Serviced Residential Erf	16
12.3 Temporary Three-phase Supply	16
13 CHANGES FROM OVERHEAD TO UNDERGROUND	16
14 EARTHING REQUIREMENTS	17
14.1 Single Residential Units	17
14.2 Industrial, Commercial and Sectional Title Complexes	17
14.3 Supplies Larger Than 150 A	17
15 LOAD CONTROL DEVICES	18

16 METER ROOM REQUIREMENTS	18
16.1 Location.....	18
16.2 Access.....	18
16.3 Construction.....	19
16.4 Lighting	19
16.5 Services.....	20
16.6 Accommodation of Meters	20
17 EMBEDDED GENERATION.....	20
17.1 Small-scale Embedded Generation.....	20
17.2 Embedded Generation of 1 MVA or Larger	21
18 STANDBY SUPPLIES (GENERATORS AND UPS).....	21
18.1 Application and Approval Requirements	21
18.2 Safety Requirements.....	21
18.3 Connection Requirements.....	22
Annex A: Retrofit Scenarios	23
Annex B: Meter Box Sizes	33
Annex C: Earthing Systems for Customer Connections	35
Annex D: Installation Earthing Requirements	37
Annex E: Typical Earthing Arrangements for Supplies Exceeding 150 A.....	38
Annex F: Approved Meter Room Signage	40
Annex G: Approved Warning Sign for Generator Installations.....	41
Annex H: Connection of Standby Generator.....	42
Annex I: Customer Support Centres	43
Annex J: ESD District Supply Areas	46
Annex K: Inspector Contact Details	58

ABBREVIATIONS

AMI	Advanced Metering Infrastructure
CIU	Customer Interface Unit (used in conjunction with MCU for split metering)
CSS	Customer Support Services
CT	Current Transformer
ESD	Electricity Services Department
MCU	Meter Control Unit (used in conjunction with CIU for split metering)
NERSA	The National Energy Regulator of South Africa
O/H	Overhead
OHS Act	Occupational Health and Safety Act, 1993
PCB	Passive Common Base
PVC	Polyvinyl Chloride
PPM	Pre-payment Meter
SSEG	Small-scale Embedded Generation
SWA	Steel Wire Armoured

1 SCOPE

This guideline is intended to set out the basic requirements applicable to electricity service connections and is applicable to all electrical contractors working in the City of Cape Town Electricity Services Department area of jurisdiction.

Where there is any discrepancy between this guideline and any Electricity Services Department policy, the relevant policy will apply.

2 REGULATORY CONTEXT

The following documents contain provisions that, whether referenced in the text or not, constitute requirements of these guidelines.

Legislation and Codes:	SANS 10142-1: The Wiring of Premises Part 1: Low-voltage installations, as amended
	National Building Regulations and Building Standards Act, Act 103 of 1977, as amended

National Building Regulations, GNR 2378 of 12 October 1990, as amended

Occupational Health and Safety Act, Act No. 85 of 1993, as amended

Electrical Installation Regulations, 2009 as amended (Promulgated in terms of the Occupational Health and Safety Act by GNR 242 of 6 March 2009)

City By-Laws: City of Cape Town Electricity Supply By-law, 2010 (promulgated under Provincial Notice No. 6727 on 16 April 2010), as amended

City Policies: Policy No. 11107: Installation of prepayment meters (PPM)

National Guidelines: NRS 098: Guidelines for the Installation and Safe Use of Portable Generators on Utilities' Networks

City Guidelines: Guidelines for Embedded Generation (draft)

3 INTERPRETATION

Certain developments or activities may be subject to approval by Provincial Government or National Government Departments in terms of national or provincial legislation. This document must not be interpreted as granting any such approvals.

4 INDEMNITY

This document does not create liability on the part of the City of Cape Town or any officer thereto for any damages that may result from reliance thereon.

5 COPYRIGHT

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6 ELECTRICAL CONTRACTORS

Electrical contractors must be registered by the Department of Labour in compliance with Regulation 6(1) of the Electrical Installation Regulations.

Electrical contractors must produce the registration certificate issued by the Department of Labour on request of an Installation Inspector, Law Enforcement Officer or any other authorized ESD official.

7 FORMS AND INSPECTIONS

It is the responsibility of the applicant (or an electrical contractor on its behalf) to obtain the following details before submitting any application form:

- i) existing and desired supply size.
- ii) existing meter type and position (if applicable).

An application for the supply of services must be submitted at the relevant office (see Annex I) before any installation work is started and must be completed in full (street address and erf number to be stated). The applicant must complete all applicable details and the electrical contractor is to do the same. The latest version of the application form is available from the website: www.capetown.gov.za or the relevant office (see Annex H).

A Certificate of Compliance must be submitted at the relevant Electricity CSS office before an installation, or any part of an installation that is to be metered separately, may be commissioned. The contractor is to satisfy himself that the installation is electrically safe.

When there is a request for a supply to be disconnected so that work can be done on an installation, a Certificate of Compliance must be submitted by the electrical contractor for the work that was done.

8 NOMINAL SUPPLY VOLTAGE

The voltage at which supply will be given will be determined by the ESD in accordance with the Electricity Tariff Schedule and technical considerations, and will be one of the following:

- i) Low voltage, single phase: 230 V
- ii) Low voltage, three phase: 400 V
- iii) Medium voltage: 11,50 kV or 11,66 kV, depending on the area.
- iv) High voltage: 66 kV or 132 kV, depending on the area.

9 NEW SERVICE CONNECTIONS AND UPGRADES

9.1 General

A minimum of 10 working days' notice must be given to the ESD when ready for the ESD cable to be connected, if the supply cable is at the boundary. If there is no supply cable at the boundary, the supply will be connected within 30 days, where possible.

Electrical contractors may not dig outside of the property boundary without having valid permits to excavate on hand.

Underground service connections must comprise SWA copper conductor service connection cable with two 1,0 mm² stranded copper pilot cores. The customer's service connection cable within the property (compatible with the service connection cable) must be joined by ESD staff to the ESD service connection cable. The MCU will be housed in the ESD street furniture (pole or ground mounted).

For all new single phase connections, a PCB will be issued by the ESD and must be installed by the electrical contractor. The CIU will be plugged into the PCB. To ensure easy access for the customer, the PCB must be fitted in an accessible position such that the bottom is between 1,5 m and 1,7 m above floor level.

If the ESD service connection cable to the property already exists and does not include pilot wires, ESD will provide a suitably sized meter kiosk immediately outside the street-side property boundary. The customer must provide two 1,0 mm² stranded copper conductor pilot wires (which must be maintained by the customer) between the meter kiosk and the CIU. If the pilot wires are not incorporated in the service mains cable, only the following will be acceptable methods of providing the pilot wire function:

- i) SWA multi-core cable buried in the ground
- ii) House wire in a conduit buried in the ground
- iii) Any other option subject to approval

The use of twin flex wire, telephone wire, alarm wire, intercom wire and the like will not be acceptable.

Where there are extremely narrow or no footways, thereby precluding the installation of a meter kiosk, the customer may be required to install an accessible meter box on the front property boundary wall to house the MCU.

Overhead service connections must comprise split concentric neutral cable with two 1,0 mm² stranded copper pilot cores.

For residential connections, a suitable connection box must be provided at the point where the service connection cable is connected to the internal service mains. The purpose of the connector box is to provide a point of disconnection for testing the service connection cable and no equipment is to be installed in it. The connector box must be accessible without having to enter the dwelling. However, it is not required that the connector box is placed on the property boundary. The connector box must have a degree of protection of IP 54 to SANS 60529, as a minimum. For a single phase supply, the box must be approximately 300 mm H x 240 mm W x 110 mm D and, for a three phase

supply, the connector box must be approximately 445 mm H x 460 mm W x 200 mm D.

The customer's earth electrode must be installed on the customer's property and an earthing lead from the earth electrode must be terminated onto the bar provided for neutral and earthing purposes, in a suitable box between the point of supply and the point of control, in accordance with SANS 10142-1. The connection box may be used for this purpose.

As defined by the OHS Act, the point of supply remains the point where the service connection cable enters the property, irrespective of the position of the meter.

9.2 Group Schemes

Group schemes are flats, cluster houses or commercial developments on a single erf, where no single unit is larger than 100 A, 3 phase.

For new connections and any change to the supply connections to blocks of flats and sectional title developments where the design of the complex is such that it is technically feasible to cable from a single common meter room (directly accessible at all times from a public street) to each unit in the complex, the following will apply:

- i) Pilot wire split MCUs (one for each unit) must be installed in the common meter room.
- ii) Pilot wires must be installed by an electrical contractor appointed by the Body Corporate between each MCU in the common meter room and the CIU in each dwelling unit. The Body Corporate is responsible for the integrity of these pilot wires.
- iii) A PCB, supplied by ESD, onto which the CIU is installed, must be fitted in each dwelling unit by the Body Corporate's electrical contractor in the line of the supply conductors from the common meter room to the point of control on the main distribution board of each unit.
- iv) A bulk supply point will not be provided.

Bulk conventional metering systems are installed only where the complex is of such a size that the above arrangement is not physically possible and distributed metering points within the complex are required from a technical point of view. In such large complexes the body corporate will have to sub-meter the electricity supplied to each dwelling and be responsible for collecting the revenue therefor.

Note: The ESD does not permit distributed meter rooms or kiosks housing ESD-owned metering because of the risk that unmetered points can be created which could be tapped into, knowingly or unknowingly, resulting in revenue losses to the ESD. Also, the ESD cannot maintain and may not be able to access this infrastructure on private property.

10 RETROFITS

10.1 Retrofit Scenarios

Eight retrofit scenarios have been identified as illustrated in Annex A and described below.

Scenario	Solution	ESD Duties	Contractor Duties
1. Supply from mid-boundary position where there is no existing street-front LV reticulation. (See Annex A, figures A1, A2 and A3)	A. Single phase: MCU to be housed in pole box on mid-boundary mains pole. B. Three phase: Customer to convert supply to single phase. Connection to be treated as A. (If customer cannot convert to single phase, retrofit cannot be done)	A. ESD to install a pole box on the pole where the supply is being fed from to house the meter. B. Same as A.	A. Contractor to install passive common base in the dwelling and issue a Certificate of Compliance. B. Same as A and convert installation to single phase.
2. Supply from mid-boundary position where there is existing street-front LV reticulation with adequate spare capacity. (See Annex A, figures A1, A2 and A3)	A. Single phase: Same as 1A. B. Three phase: Customer to convert supply to single phase. Connection to be treated as A. C. Three phase: If customer cannot convert to single phase, supply to be fed via underground cable from street-front LV reticulation	A. Same as 1A. B. Same as A. C. Install service connection for customer. Install MCU in suitable meter kiosk.	A. Same as 1A B. Same as A and convert installation to single phase. C. Contractor to install sub-service mains with pilot wires to street-front and issue Certificate of Compliance.

Scenario	Solution	ESD Duties	Contractor Duties
3. Supply via O/H line from the street front via goose neck to a credit meter in or on the customer's dwelling. (See Annex A, figures A4 & A5)	A. Single phase: MCU to be housed in pole box on mains pole B. Three phase: Same as A.	ESD to install a pole box on the pole where the supply is being fed from, to house the meter.	A. Contractor to install passive common base in the dwelling and issue Certificate of Compliance. B. No duties.
4. Supply connection on a pole, fed via an underground cable from the street front to a meter housed in a meter box on a wall of the customer's dwelling. (See Annex A, figure A6)	A. Single phase: MCU to be housed in pole box on mains pole. B. Three phase: Same as A.	ESD to install a pole box on the pole where the supply is being fed from, to house the meter.	A. Contractor to install passive common base in the dwelling and issue Certificate of Compliance. B. No duties.
5. Supply via an underground cable from a service pillar or distribution kiosk on the pavement to a credit meter mounted in a meter box on the boundary wall of the customer's premises.	A. Single Phase: MCU to be mounted in customers meter box on the property boundary (provided that the meter box is outward facing) B. Three Phase: Same as A.	ESD to remove the existing credit meter and install the MCU in the meter box on the boundary.	A. Contractor to install passive common base in the dwelling and issue Certificate of Compliance. B. No duties.

Scenario	Solution	ESD Duties	Contractor Duties
6. Supply via an underground cable from a service pillar or distribution kiosk on the pavement to a credit meter mounted in a meter box on the wall of the customer's dwelling.	A. Single phase: MCU to be housed in meter kiosk (in road reserve). B. Three phase: MCU to be housed in customer's meter box on property boundary.	A. ESD to replace service pillar or distribution kiosk with a 12-way meter kiosk. The MCU is to be housed in the meter kiosk. B. ESD to install MCU in customer's new meter box on property boundary.	A. Contractor to install passive common base in the dwelling and issue Certificate of Compliance. B. Contractor to install a meter box (outward facing, non-metallic) on customer's property boundary.
7. Supply fed via an underground cable from a meter kiosk on the pavement to a credit meter mounted in a meter box on the boundary wall of the customer's premises.	A. Single phase: MCU to be housed in the meter kiosk. B. Three phase: MCU to be mounted in the customer's meter box on the boundary wall (only if outward facing).	ESD to remove credit meter and install MCU.	A. Contractor to install passive common base in the dwelling and issue Certificate of Compliance. B. Contractor to install a meter box (outward facing, non-metallic) on customer's property boundary.

Scenario	Solution	ESD Duties	Contractor Duties
8. Supply via an underground cable from a credit meter in a meter kiosk on the pavement.	A. Single phase: MCU to be housed in the meter kiosk. B. Three phase: MCU to be housed in customer's meter box on property boundary.	A. ESD to remove credit meter and install MCU in meter kiosk. B. ESD to install MCU in customer's new meter box on property boundary.	A. Contractor to install passive common base in the dwelling and issue Certificate of Compliance. B. Contractor to install a meter box (outward facing, non-metallic) on customer's property boundary.

Note: If a customer requests the removal of an existing conventional three phase credit meter situated inside the premises, the disconnection/reconnection fee must be paid. The ESD will remove the meter and the electrical contractor appointed by the customer must conceal all open wiring and submit a COC for all work done.

10.2 General

A PCB, issued by the ESD, must be installed by an electrical contractor appointed by the customer (single phase connections only). The appropriate CIU will be plugged into the PCB. To ensure easy access for the customer, the PCB must be fitted in an accessible position such that the bottom is between 1,5 m and 1,7 m above floor level.

10.3 Single Residential and Single Commercial

The supply may be no larger than 100 A, 3 phase.

Only split PPMs may be used for retrofit cases whether to replace existing PPMs or to replace conventional meters. The MCU must be installed in a street kiosk, a pole-mounted box, meter room or box on the boundary of the property as for new service connections.

Wireless split PPMs may be used where pilot wires do not exist or are not operational ONLY if it is technically feasible. If wireless split PPMs are not technically feasible and there is no history of tampering on the premises, an integrated PPM may be used. Where there is a history of tampering, pilot wires

must be installed between the MCU and the CIU in the dwelling by the customer's electrical contractor at the consumer's cost. The customer is responsible for the integrity of these pilot wires beyond the point of supply.

For single phase connections, an electrical contractor must install a flush mounted 100 mm x 100 mm draw box in the dwelling. A conduit must be installed to the draw box for the supply cable and another conduit from the draw box to the distribution board for the load conductors. The PCB to accommodate the CIU must be secured over the draw box.

For three phase connections, the preference is to convert to single phase. If this is not acceptable to the customer, a three phase split PPM must be installed in accordance with the solution for the specific scenario. (Cognizance should be given to the impact on load balancing when converting to single phase).

10.4 Group Schemes

Group schemes are flats, cluster houses or commercial developments on a single erf, where no single unit is larger than 100 A, 3 phase.

The installation of a PPM in an individual dwelling unit forming part of a bulk metered block of flats or group scheme is not possible. The whole block or group must be converted to individual PPM metering as part of one process.

Currently, due to technical considerations, only pilot wire PPMs are allowed in blocks of flats, sectional title developments and full title developments accessed via a private road. Recognising the cost implications, the two options detailed below are allowed. In both cases, a single common meter room accessible at all times from a public street must be provided by the Body Corporate where the ESD will install the MCUs. If these options are not acceptable or suitable, the retrofitting will have to be postponed until such time that the PPM policy is reviewed as technology changes allow.

10.4.1 Option 1

If the design of the complex is such that it is technically feasible to cable from the common meter room directly to each dwelling unit in the complex, the Body Corporate's electrical contractor must install a CIU in each dwelling unit and install pilot wires between the MCUs and the CIUs.

The MCUs will be installed in the common meter room by the ESD.

The Body Corporate's electrical contractor must install a PCB, onto which the CIU will be fitted, in each dwelling unit in the line of the supply conductors from the common meter room to the point of control on the main distribution board of the dwelling unit. The PCBs are supplied by the ED and the cost is included in the meter cost. The Body Corporate will be responsible for the maintenance of the pilot wires to ensure communication between MCU and CIU.

10.4.2 Option 2

The Body Corporate provides one or more common locations (not in the single common meter room) where the CIUs for all the dwellings units must be accommodated. The Body Corporate's electrical contractor must reroute the supply and load conductors from the common meter room to the common CIU location(s). Pilot wires must be installed from each MCU in the common meter room to the corresponding CIU in the common CIU location(s). Each CIU must be housed in a lockable enclosure for which the customer will be responsible. The MCUs will be installed in the meter room by the ESD.

Note: For this option, the Body Corporate must consider the risks to the customer and the premises and take full responsibility for all matters thereto such as compliance with the Consumer Protection Act (Act 68 of 2008) and the Protection of Information Act (Act 84 of 1982), the security of CIU infrastructure, keypad mounting height, and note that, if a CIU is not installed in the dwelling unit, the objective of active consumption monitoring by the customer will not be met.

11 ADDITIONAL RESIDENTIAL METERING ON SAME ERF

11.1 General

Additional metering on properties zoned for residential use will be considered only for residential purposes, i.e. for a second dwelling, and not for a business or other activity run from the property.

Non-residential activities on a residential erf that require separate metering will have to be privately sub-metered by the owner.

11.2 Single Dwelling Units with Second Dwelling

The authorised capacity of the property may remain the same, if so desired. In the case of a 60 A connection, should the customer wish to increase the supply capacity but retain the existing 16 mm² copper connection cable, the supply will be limited to 80 A and the increase will be subject to payment of the Development Capital tariff for the upgrade from 60 A to 80 A.

A meter box of approved size and type must be installed on the front property boundary to accommodate a main circuit breaker, two circuit breakers to supply the main dwelling and the second dwelling respectively, and two MCUs. All circuit breakers in the meter box, as well as the main circuit breakers in the distribution boards, must be Curve 2 (faster curve, white toggle), with a fault rating of 5 kA. The current rating of the two secondary circuit breakers in the meter box must be smaller than the rating of the main circuit breaker but need not add up to exactly the rating of the latter. The electrical contractor must supply and install all the circuit breakers to be used in the meter box.

The meter box may be installed in an existing boundary wall or a wall section built for the purpose. Alternatively, if there is no wall, an approved free-standing ground-mounted meter box may be used.

Split PPMs will be installed for both the main dwelling and the second dwelling.

If there is an existing credit meter or an integrated prepayment meter in the main dwelling, this will be replaced with a split prepayment meter at the customer's cost. (See requirements for Retrofits).

If the service connection cable to the main dwelling has to be replaced, two PVC insulated 1,0 mm² copper stranded pilot wires must be installed with the connection cable between the meter box on the property boundary and the main dwelling distribution board.

In the case of the second dwelling, a suitably sized service connection cable with two PVC insulated 1,0 mm² copper stranded pilot wires must be installed between the erf boundary meter box and the second dwelling distribution board.

Pilot wires must comply with the requirements stated under New Service Connections.

11.3 Overhead Service Connections

If a second prepayment meter is requested where there is an existing street-front overhead supply dedicated to the property, the overhead connection must be replaced with an underground cable from the street-front boundary. A suitable meter box on the street-front boundary must be provided by the customer. Circuit breaker, service connection cable and pilot wire requirements are the same as for Single Dwelling Units with Second Dwelling. The cost of undergrounding the connection will be added to the connection fee for the additional metering.

11.4 Mid-block Overhead Service Connections

If an additional prepayment meter is requested where there is an existing mid-block overhead connection to the main dwelling, the overhead connection must be replaced with an underground cable from the street-front boundary. A suitable meter box on the street-front boundary must be provided by the customer. Where it is necessary to supply the connection from the mid-block mains, the cost of bringing the overhead mid-block service connection point to the street-front boundary must be borne by the property owner. Circuit breaker, service connection cable and pilot wire requirements are the same as for Single Dwelling Units with Second Dwelling.

11.5 Three or More Prepayment Meters on Same Property

The installation of three or more meters will be considered only on presentation of building plans (showing more than two dwellings) approved by the City's Planning & Building Development Management Department. The installation will be subject to Policy No. 11107: Installation of prepayment meters.

12 BUILDER'S SUPPLY/TEMPORARY CONNECTION

12.1 Requirements

A separate compartment/enclosure must be made available for City metering. This compartment/enclosure must house only the metering and earthing requirements, and may not be used to house any of the electrical contractor's equipment.

All enclosures are to meet the requirements of SANS 10142-1 for temporary builder's supplies.

Temporary builder's supplies are valid for a period of one year only. When this time has expired, a new application must be made.

12.2 Serviced Residential Erf

The temporary supply to the property must be treated as the permanent supply at all times. The electrical contractor's main switch in the compartment/enclosure must be an earth leakage unit with overload protection.

12.3 Temporary Three-phase Supply

All temporary three phase connections are quotable.

For supplies of 100 A and less, the electrical contractor's main switch in the compartment/enclosure must be an earth leakage unit. For supplies exceeding 100 A, an isolator of an approved type, equal to the requested current rating, may be used provided that it is supplied via a CT-type earth leakage unit with a sensitivity rating of no less than 125 mA.

13 CHANGES FROM OVERHEAD TO UNDERGROUND

The ESD will supply all cables and electrical material on its distribution system as well as civil work outside the property at the customer's expense. No civil work on private property or changes to the building or customer's installation will be done by ESD. The relevant district must be contacted to co-ordinate changeovers.

Split PPMs will be moved off the property and installed in a kiosk or in a pole-mounted box. If the split PPM cannot be installed in a kiosk or in a pole-mounted box, a connection box must be made available by the customer on

the property boundary. This connection box will be required for three phase supplies especially.

For mid-block overhead connections, all supplies must be rerouted to the street-front boundary via a connection or meter box that is to be fitted on the boundary, where practicable.

All commercial installations will be quotable, irrespective of size of installation.

14 EARTHING REQUIREMENTS

14.1 Single Residential Units

An earthing system complying with SANS 10142-1 must be installed on the customer's property. The earth resistance must be 20 ohms or less.

A line tap used as connector for the neutral earthing is not acceptable. The neutral and earth conductors must be terminated on a bar dedicated for neutral/earthing.

The earth wire (earthing lead) between the earth electrode and the connection box must be a minimum of 6 mm² PVC insulated copper conductor.

14.2 Industrial, Commercial and Sectional Title Complexes

If there is only one building, an earth electrode must be installed in accordance with Annex C. Where there are a number of factories, shops, offices or flats on the same property, either a common earth electrode or individual earth electrodes may be installed. Each earthing conductor from the units and from the customer earth electrode must be terminated separately from each other to a common, accessible, earth bar that must be linked to a neutral bar.

14.3 Supplies Larger Than 150 A

For supplies larger than 150 A, earth electrodes must be driven into the ground in a minimum of three positions. The electrodes must be spaced at a distance apart double their depth in the ground. The earth electrodes must be linked by means of 70 mm² bare copper earthing conductors. Two 70 mm² bare copper earthing wires are to run from two earth electrodes to the metering panel. These two earthing wires must not touch anywhere in the trench where they are laid and must not touch the distribution board as they enter.

Only brazed or exothermically welded (cad-weld or similar) joints may be used to connect earthing conductors and trench earths to the electrode(s).

If earth electrodes cannot be driven into the ground, a 70 mm² copper mat, trench or foundation earthing may be used.

15 LOAD CONTROL DEVICES

A 50 mm x 100 mm or a 50 mm diameter flush PVC box must be installed in the wall, approximately 150 mm away from each distribution board. The supply conductors (both live and neutral) for the geyser are to run via the PVC box to the isolator at the geyser (if one is required to be fitted). A length of wire of approximately 200 mm must be coiled in the PVC box and a blank cover must be fitted.

Where a load control device is present, under no circumstances may seals on the equipment terminal covers be removed nor may any alteration, temporary or otherwise, be carried out on the geyser wiring in the distribution board without the prior approval of the ESD. Any problems that may be encountered regarding the output supply from any such device must be reported immediately to the ESD fault reporting centre (Telephone 0860 103 089 or SMS 31220), whether after normal working hours or not. For safety purposes, note that the relays may at any time be remotely switched on or off by the ESD.

If more than one geyser is being supplied from the same distribution board, the following requirements must be met:

- i) Both geyser circuits must be wired through the same PVC box.
- ii) An additional 5 A circuit breaker must be installed in the distribution board to supply the load control device.
- iii) A separate contactor must be provided for each geyser controlled from the load control device.

Note: If ESD has switched load control devices off, there will be a minimum delay of approximately 15 minutes before the geyser can be switched on again.

16 METER ROOM REQUIREMENTS

16.1 Location

Meter rooms must be located on the property boundary. The meter room must be accessible directly from a public road reserve. The customer is responsible for maintaining all cables on the property.

The meter room must be large enough to accommodate all equipment but not less than 2,2 m high and 1,5 m wide or 1,5 m long.

There must be a minimum of 1,0 m space immediately in front of all metering equipment.

16.2 Access

24 hour access must be ensured.

Access by an unauthorized person is not to be permitted, unless an arrangement has been made with an official from the ESD.

Under no circumstances may keys be given to any electrical contractor for the purposes of accessing a meter room.

Under no circumstances may the meter room be used for the storage of any items or equipment, such as cleaning equipment and the like.

16.3 Construction

The construction must be vermin proofed and all cable entries must be filled.

Walls on which meters are to be mounted must be at least 215 mm thick. Unplastered walls must be constructed straight and plumb with a true face to the interior.

A ceiling must be installed.

The walls and ceiling must be painted with white or cream PVA.

Adequate cross ventilation must be provided by two air bricks either at ceiling or at floor level.

The floor must be level with the surrounding floor or must be more than 75 mm above the surrounding ground level. Where this is not possible, steps must be provided if the floor is more than 200 mm above or below the surrounding floor/ground level.

The floor must be levelled such that any water entering the room will drain towards the door and will not accumulate in the room.

The door must be substantial, open outward and be constrained from opening more than 90°. No louvres may be fitted as part of the construction of the door.

The door must be fitted with a pull handle and a suitable approved locking device.

The door must be ventilated at the top if no air bricks have been fitted.

All applicable signage (minimum height to be 150 mm) must be fitted on the meter room door (see Annex F).

16.4 Lighting

Suitable lighting must be provided to enable meters to be read easily.

The lighting circuit must be connected to the customer's general lighting distribution board and the light switch must be situated adjacent to the door.

16.5 Services

No drainpipes, water pipes, telecommunication ducts or other services may pass through the meter room.

Supply systems for irrigation equipment, access control, general lighting distribution boards and the like are not permitted in the meter room.

16.6 Accommodation of Meters

Meter boards must be block board with a minimum thickness of 20 mm to accommodate the installation of meters. Chip board is not permitted.

Meter boards must be 400 mm off the floor and a minimum of 150 mm wide.

Meters must be installed no higher than 1,5 m above the floor level.

All meters must be properly labelled clearly showing what they supply.

The space required for the meters must be calculated as follows: 300 mm between the centres of meters plus 70 mm at each row end or an additional 450 mm on each corner wall if adjacent walls are to be used.

In exceptional cases, if approved in writing by the ESD, the customer's main switch and main protective devices may be accommodated in the same room as the ESD metering equipment and protective devices.

The customer's sub-metering equipment must be installed in a room separate from the meter room housing the ESD metering equipment.

For any additional metering support specifications, refer to ESD measurement installation policies which are available from CSS and Measurement in compliance with SANS 474 and 473. This applies especially to CT metering and generator applications.

17 EMBEDDED GENERATION

17.1 Small-scale Embedded Generation

Small-scale embedded generation is local generation that is connected to the ESD distribution network. This typically comprises installations such as roof-top photo-voltaic installations and wind turbines.

The approval process for a SSEG installation in the City varies depending on the size of the system, customer category and area of connection. The detailed requirements are set out in the Guidelines for Embedded Generation (currently in draft). These guidelines apply to systems with a generation capacity smaller than 1 MVA and all applications for grid connection of SSEG installations up to this limit are required to comply with the conditions and process described in the Guidelines.

17.2 Embedded Generation of 1 MVA or Larger

Applications for the connection of embedded generation installation with a capacity of 1 MVA or larger will be dealt with on a case-by-case basis. Before submitting an application for connection, customers must have obtained a generating licence from NERSA, failing which the application will not be considered.

18 STANDBY SUPPLIES (GENERATORS AND UPS)

18.1 Application and Approval Requirements

Before any work may commence for either a new or an existing connection, an application must be submitted to the relevant ESD Engineer for approval. (The latest version of the application forms is available on the City's website: www.capetown/en/electricity.gov.za or from one of the CSS area office.) The application must include a control circuit diagram of the generating unit, including all interlocks with the electricity supply network. The application must meet all legal requirements (e.g. approval from body corporate etc.)

Approval from the City's Planning and Building Development Management Department and Health Directorate with regard to zoning and noise and air pollution services must be obtained so that the application form can be completed prior to submitting it to the ESD.

Work may commence only upon written approval from the relevant ESD Engineer.

18.2 Safety Requirements

The installation must comply with the following:

- i) There must be no feedback onto the electricity supply network while the generator unit is in operation.
- ii) There must be no danger whatsoever to the user if the supply is changed over manually to energise the generator unit during a power failure.
- iii) Devices required to start and stop machinery must be in a position that can be readily and conveniently reached by the person who operates the machinery.
- iv) Means must be provided to isolate the generator unit easily and safely in case of an emergency or so that maintenance can be carried out.
- v) The generator unit is not in an enclosed space that is not well ventilated.
- vi) Nobody in the area surrounding the generator will be exposed to excessive carbon monoxide from the engine exhaust.
- vii) Generator noise and pollution must comply with legislation.
- viii) The owner/tenant must comply with legislation for the storage of fuel.
- ix) An easily accessible emergency stop button must be installed and, once operated, must prevent the generator unit from starting.

- x) The network fault level must be considered before any generator is installed.

18.3 Connection Requirements

A Certificate of Compliance must be completed and submitted to the ESD before the supply will be connected to the premises.

Where any distribution board is supplied from a generator unit, there must be visible signs showing that the distribution board can also be fed from a generator supply (see Annex G).

When the generator supply is active, clearly visible indicating lights must show that the supply to all phases of the distribution board is on.

No generator component unit assembly is permitted in a meter room.

The control circuit diagram must be visibly placed at the generator unit and at the main distribution board.

The control panel must be installed on the customer side of the meter point of any installation.

The generator unit location must be on the customer's property, with no exception.

The interlock switch must be of the correct type and rating to prevent the grid and generator supply from being on at the same time.

Unless explicitly agreed upon by the ESD and owner, the generator set must not run in parallel with the main supply at any time.

The installation must comply with SANS 10142-1 in all relevant respects. Also refer to the applicable NRS documents and, where there is still uncertainty, refer to the relevant ESD Engineer and CSS staff.

Annex A: Retrofit Scenarios

Figure A1: Scenarios 1 & 2 (meter inside)

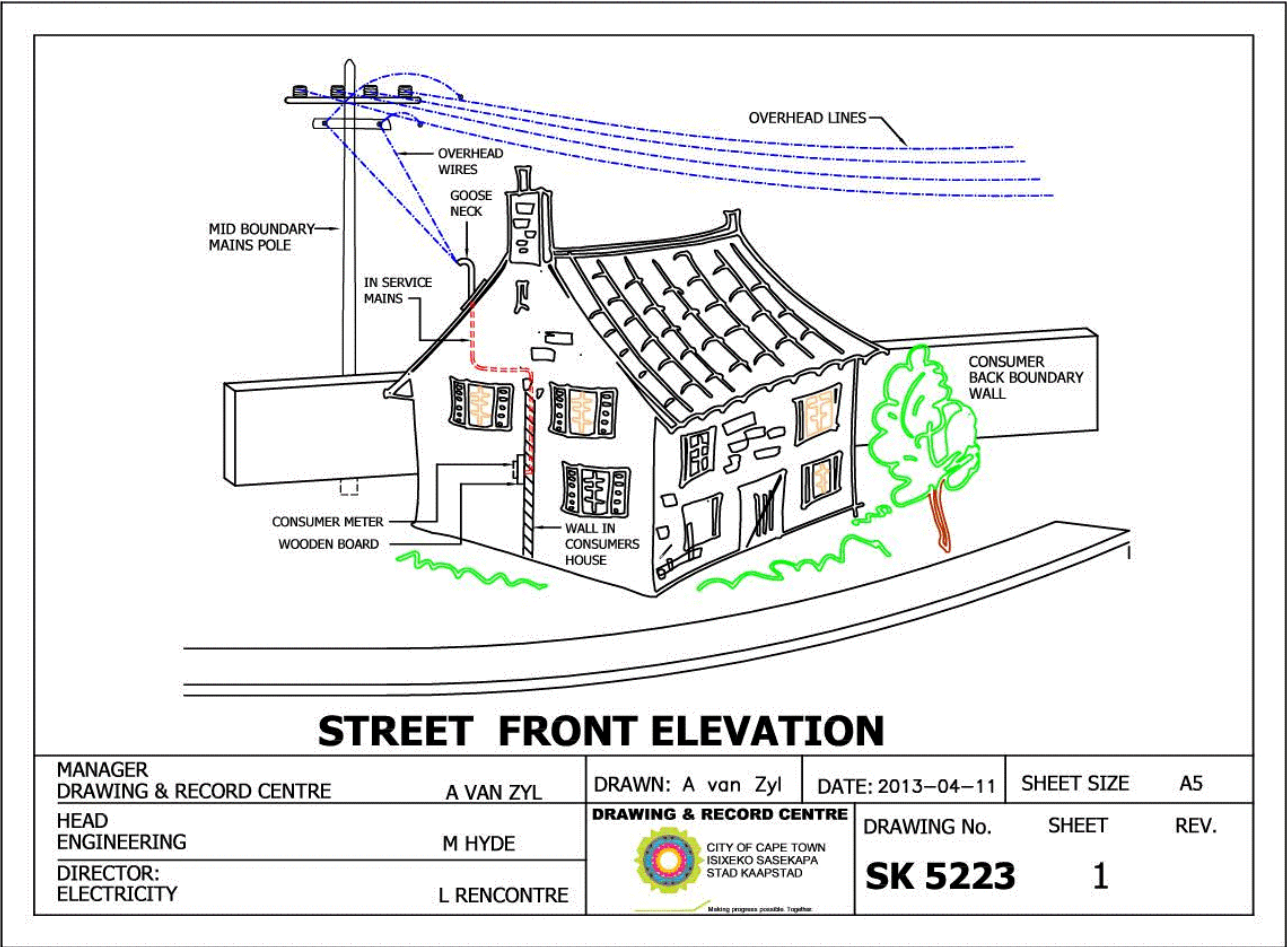


Figure A2: Scenarios 1 & 2 (meter outside)

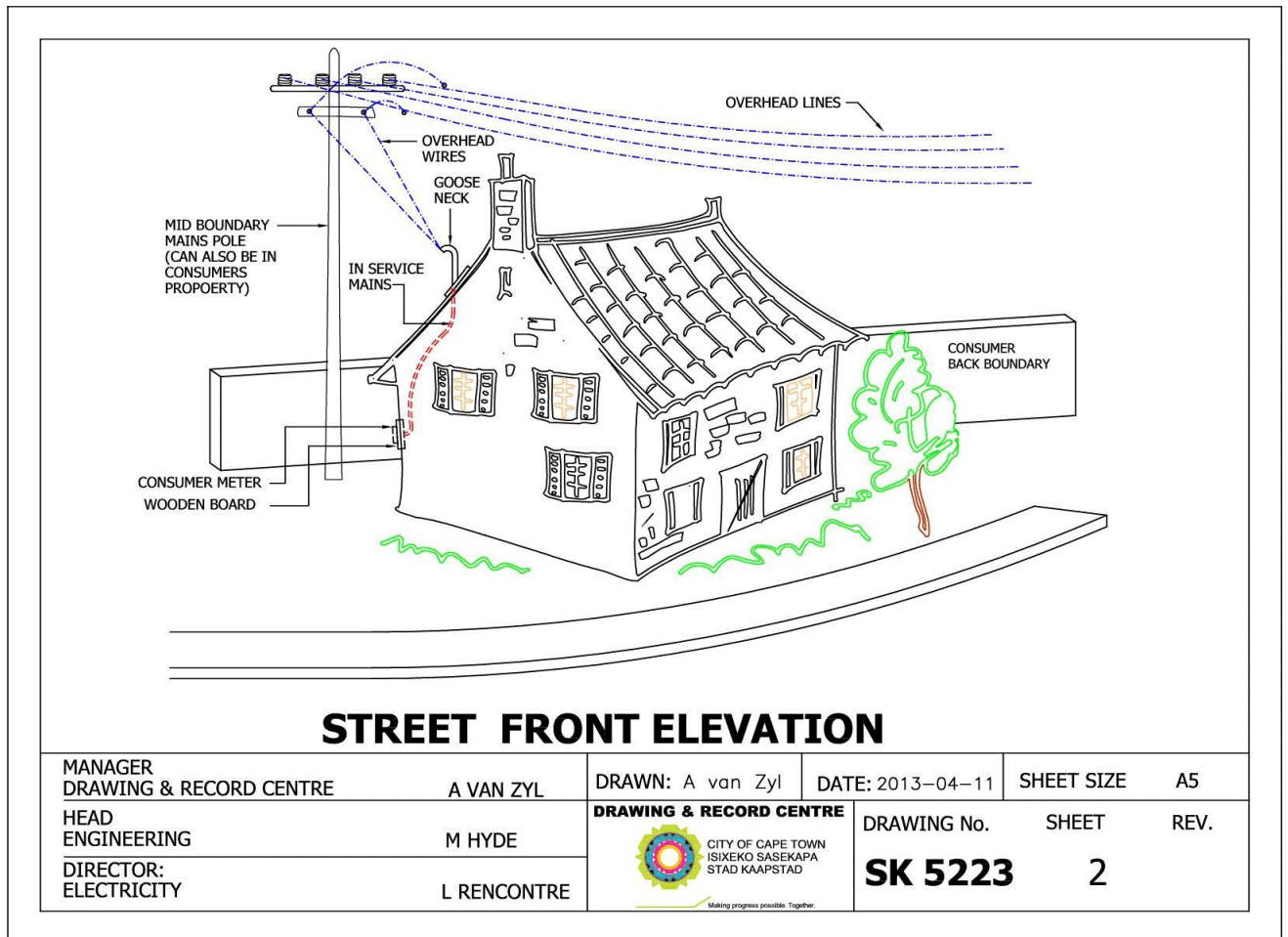


Figure A3: Scenarios 1 & 2 (underground cable)

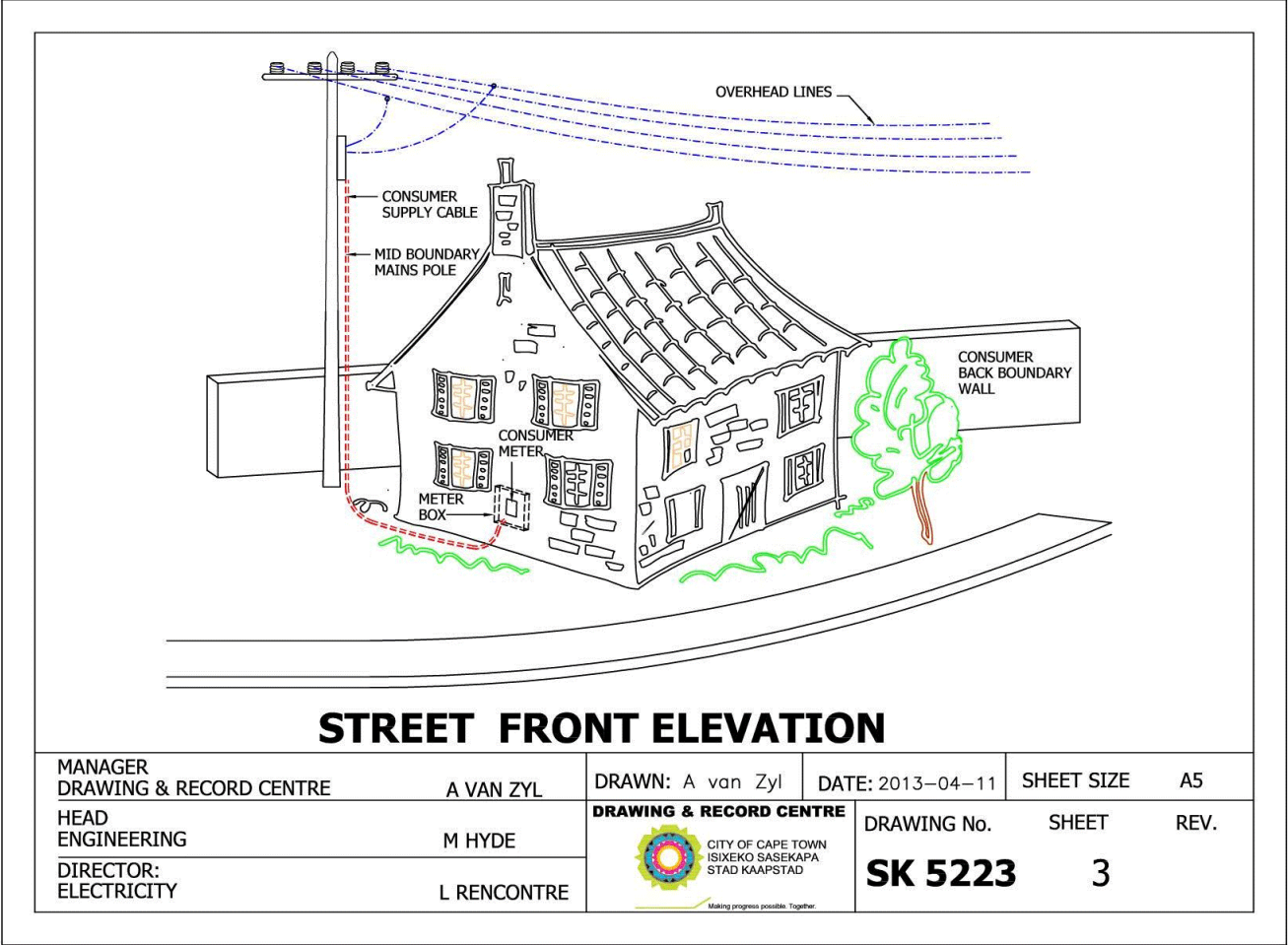


Figure A4: Scenario 3 (meter inside dwelling)

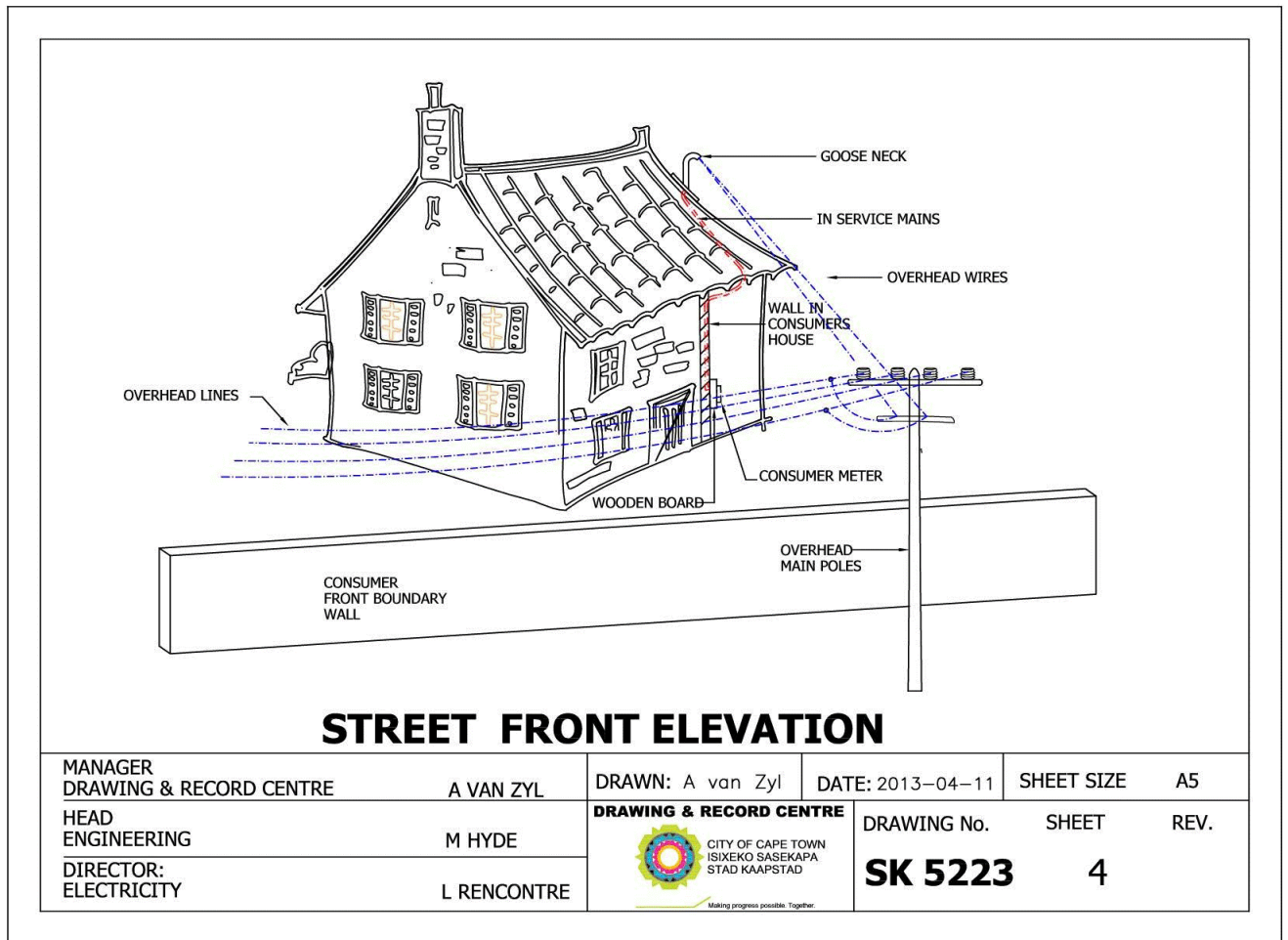


Figure A5: Scenario 3 (meter outside dwelling)

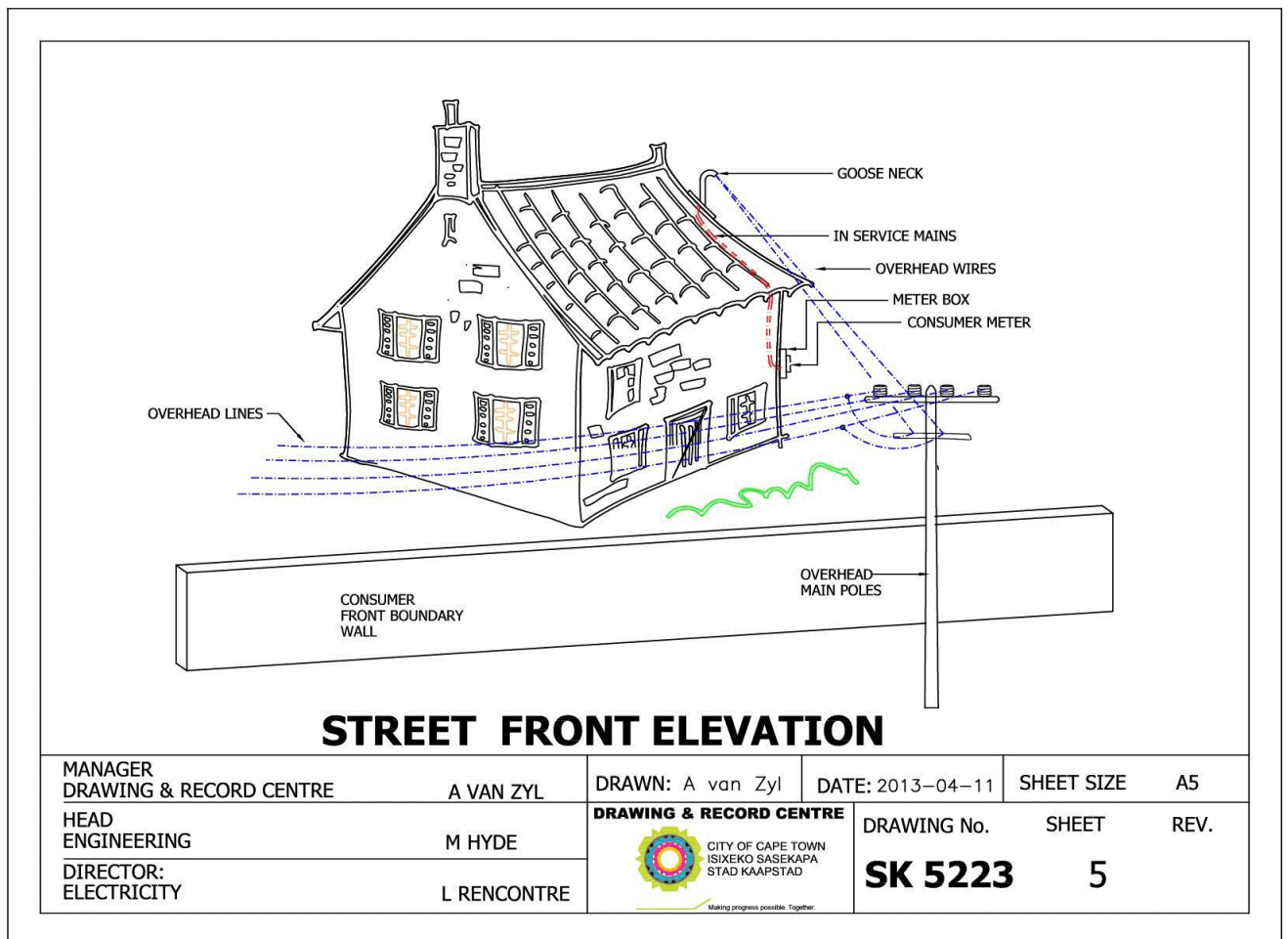


Figure A6: Scenario 4 (meter outside dwelling)

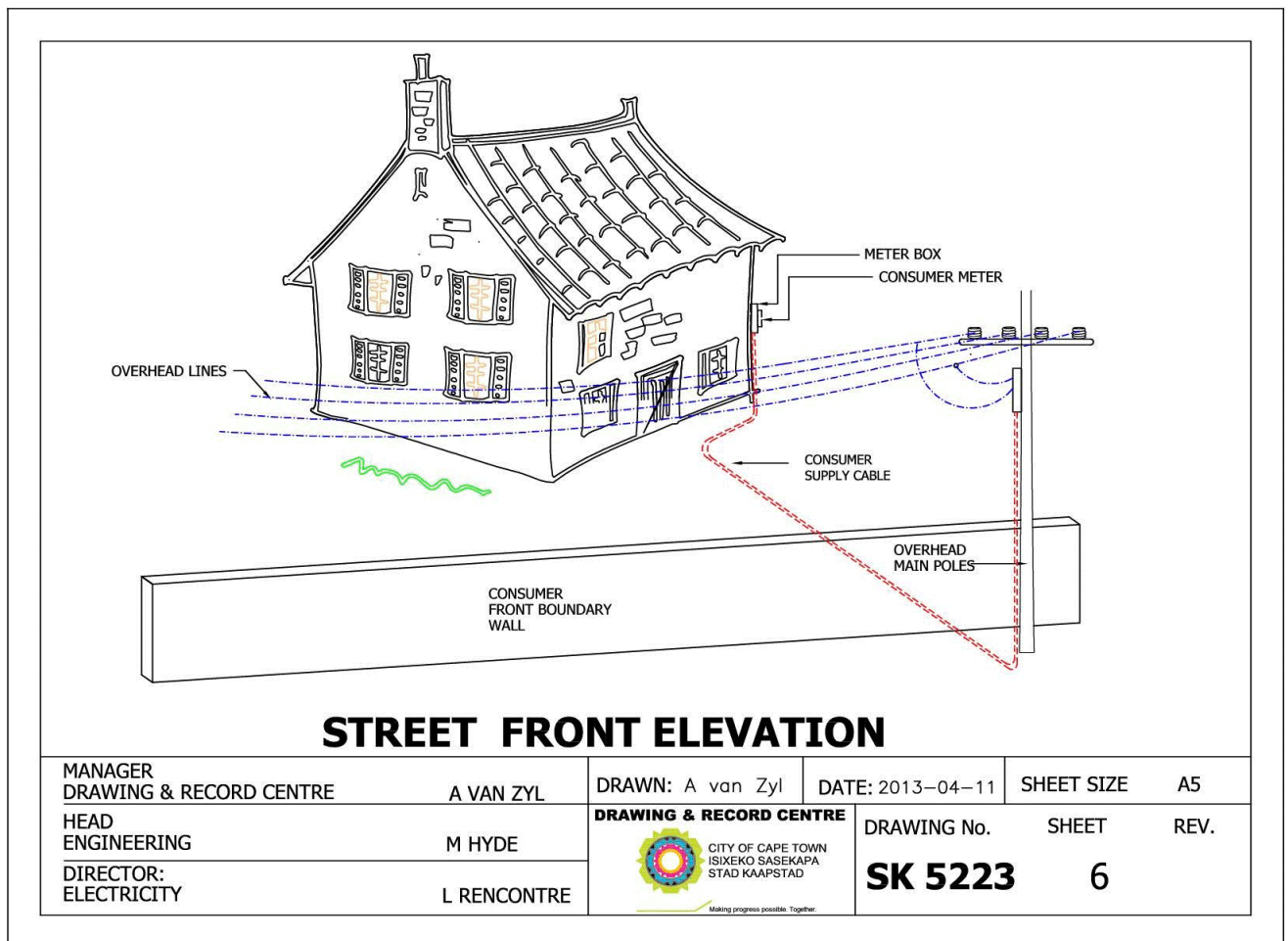


Figure A7: Scenario 5 (meter in meter box on boundary wall)

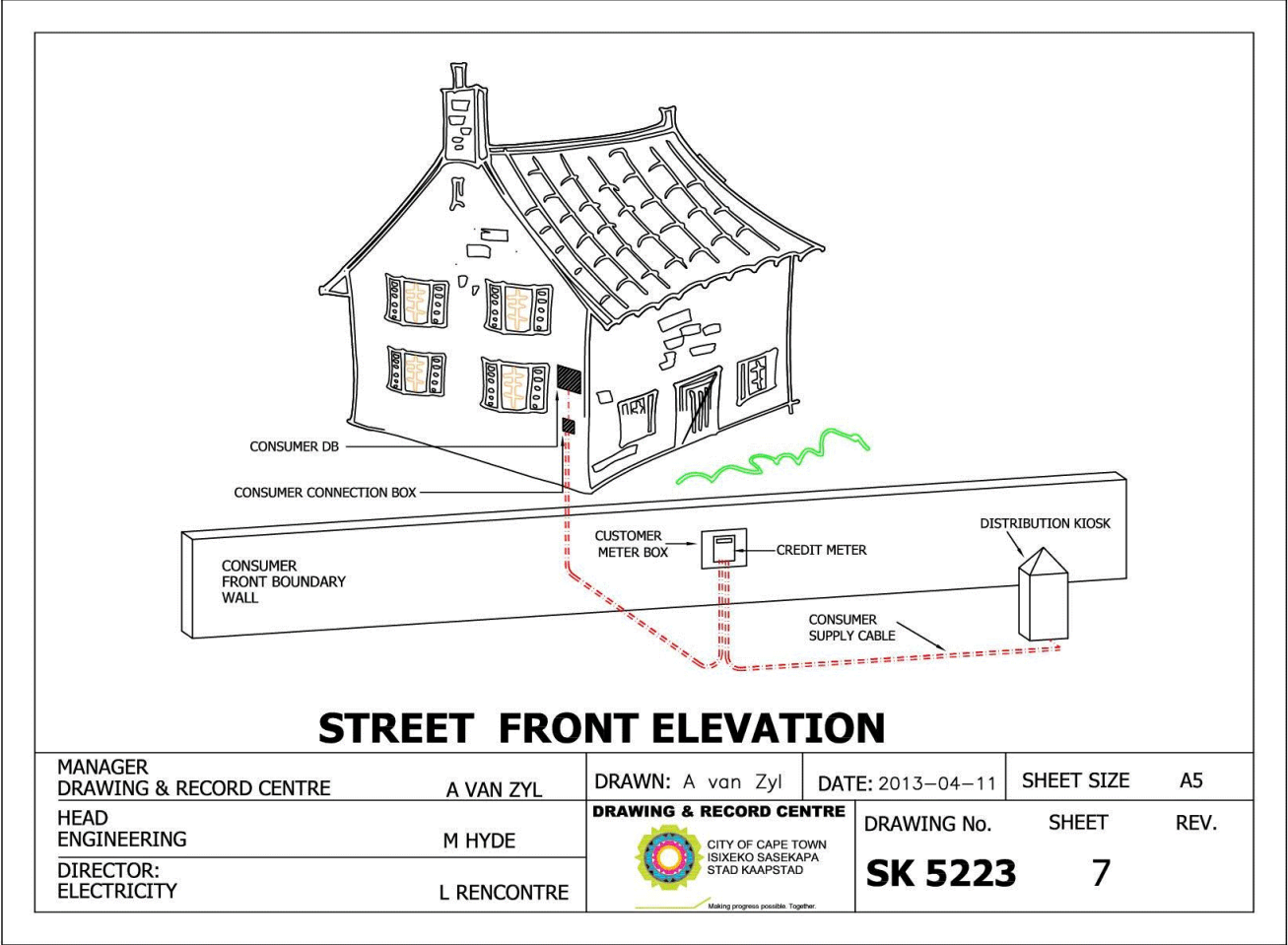


Figure A8: Scenario 6 (meter in meter box on house wall)

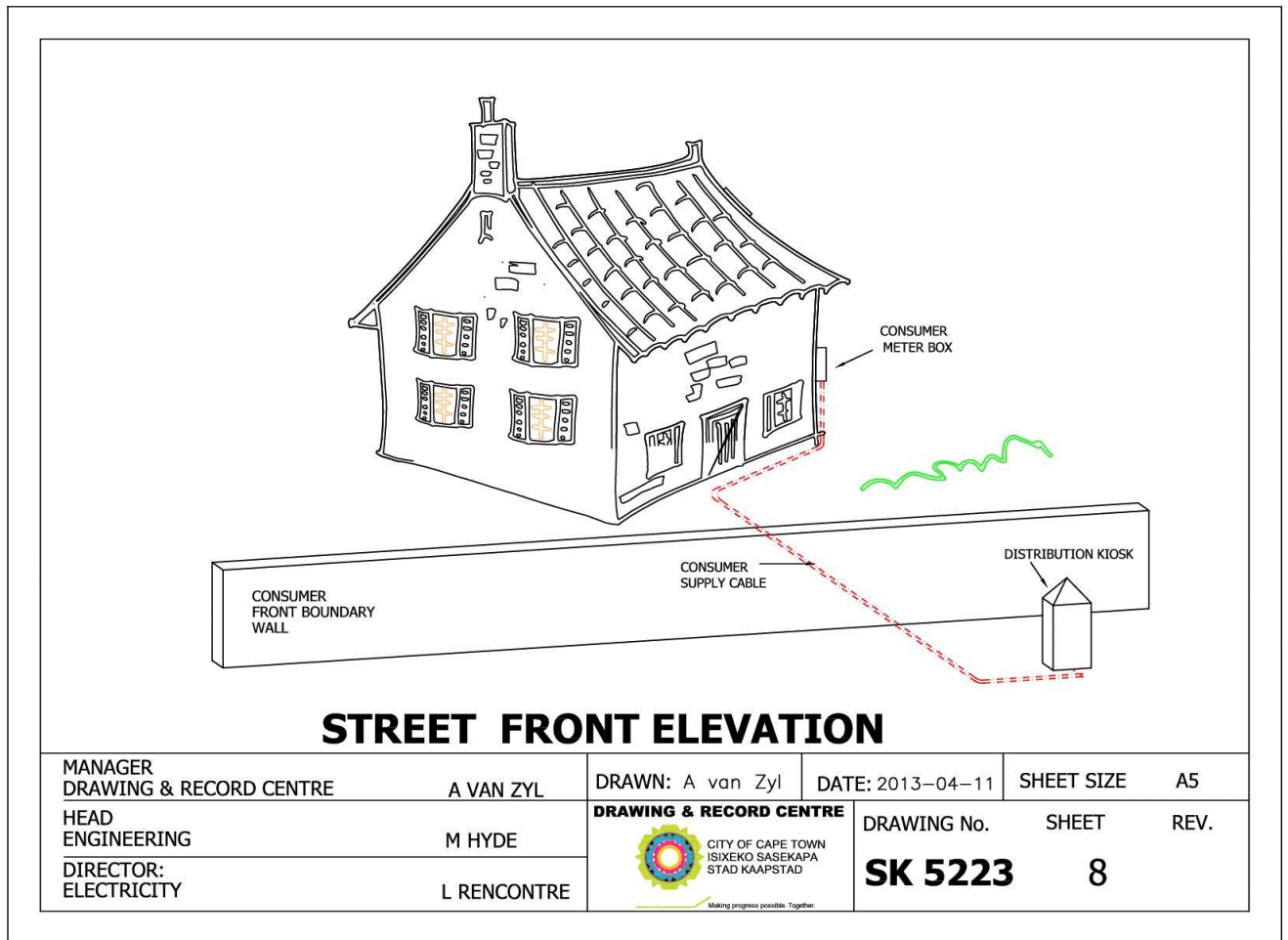


Figure A9: Scenario 7 (meter in meter box on boundary wall)

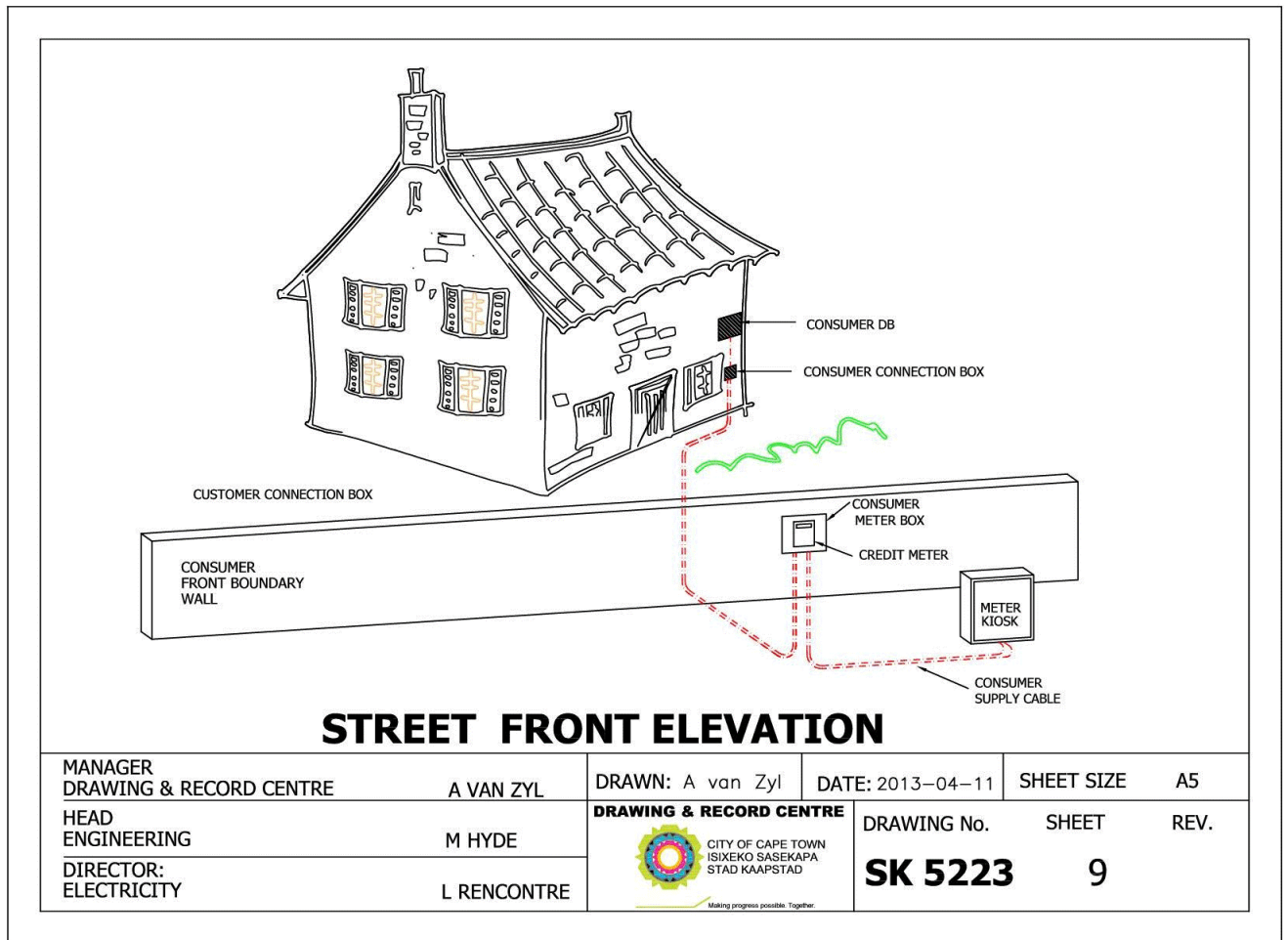
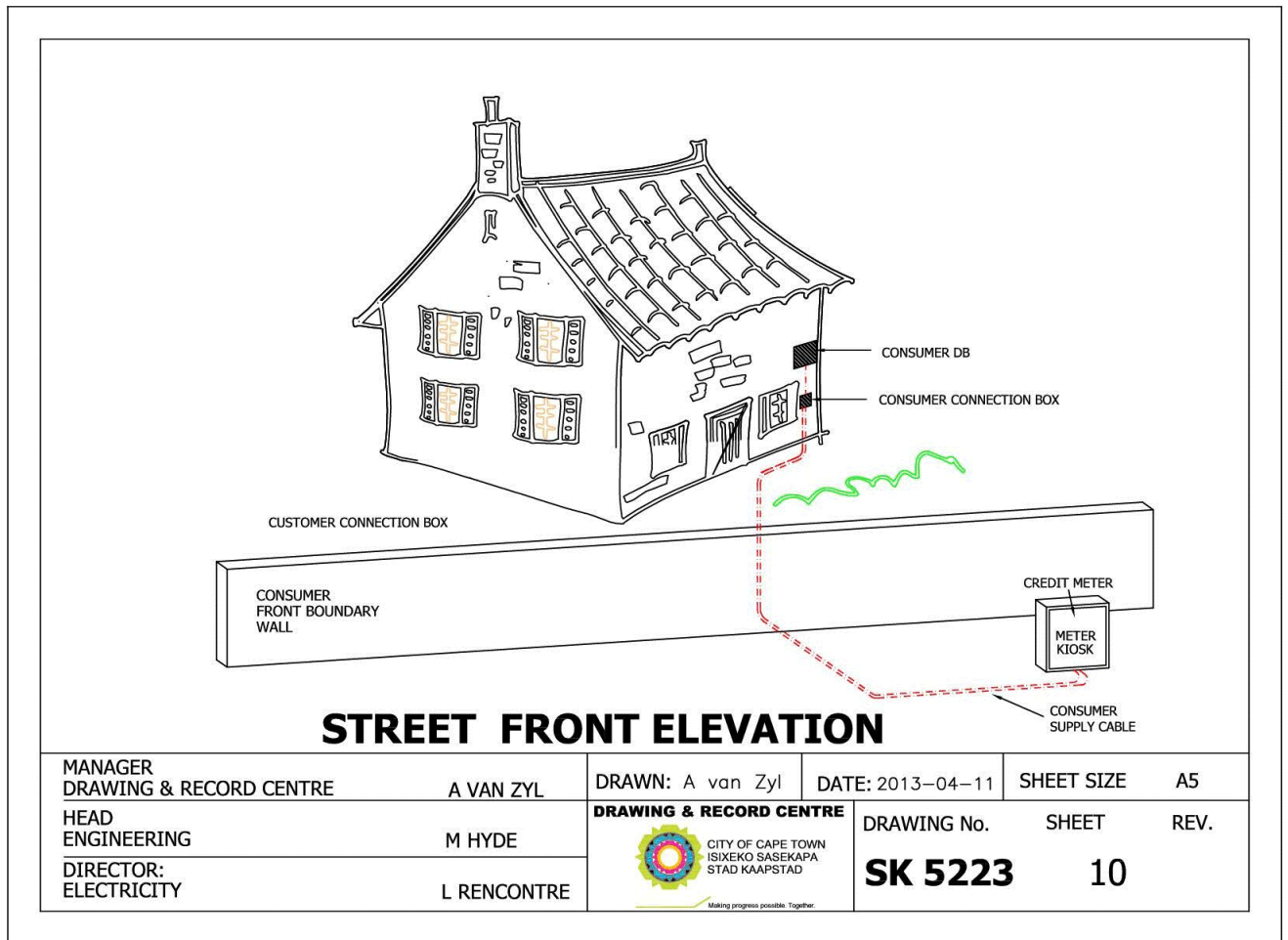
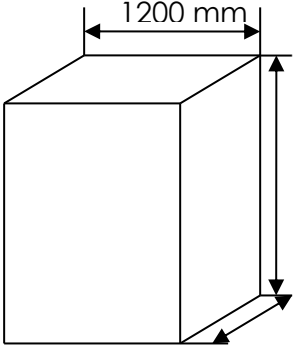
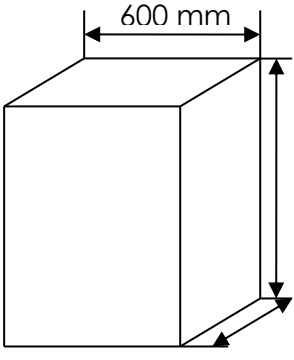
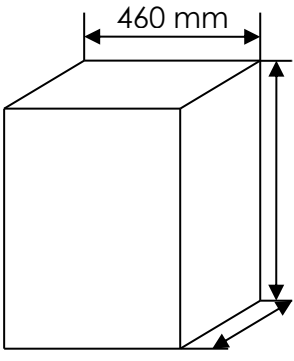
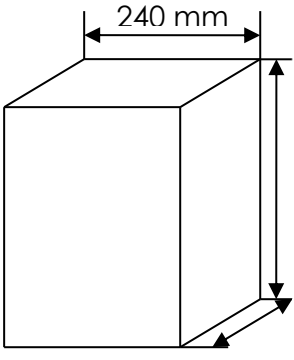


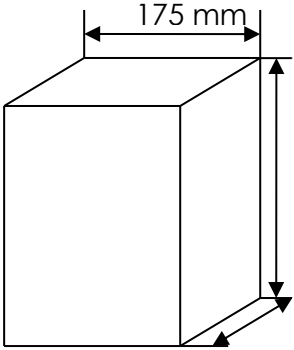
Figure A10: Scenario 8 (meter in meter box on house wall)



Annex B: Meter Box Sizes

Note: The sizes shown are the minimum required.

 Drawing is not to scale	Metal enclosure (double door with Barker Nelson locks) – epoxy coated, not galvanised 9 x single phase credit meters or 20 x single phase split energy dispensers or 4 x three phase credit meters (100 A) or 4 x three phase split energy dispensers or 200 A – 300 A CT metering
 Drawing is not to scale	Metal enclosure (single door with Barker Nelson locks) – epoxy coated, not galvanised 6 x single phase credit meters or 10 x single phase split energy dispensers or 2 x three phase credit meters (100A) or 2 x three phase split energy dispensers or 150 A CT metering
 Drawing is not to scale	Glass-fibre Enclosure (slide lid) 1 x three phase credit meter 100A or 1 x three phase split energy dispenser
 Drawing is not to scale	Glass-fibre Enclosure (slide lid) 1 x single phase credit meter or 1 x single phase split energy dispenser 1 x 80 A curve 1 circuit breaker and 1 x 50 A curve 2 circuit breaker and 1 x 40 A curve 2 circuit breaker * } * Split for 2nd dwelling

 Drawing is not to scale	Glass-fibre Enclosure (slide lid) 1 x 60 A curve 1 circuit breaker with neutral/earthing bar or Line tap for live conductor only (if fed by means of a distribution kiosk) and a neutral/earthing bar
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Annex C: Earthing Systems for Customer Connections

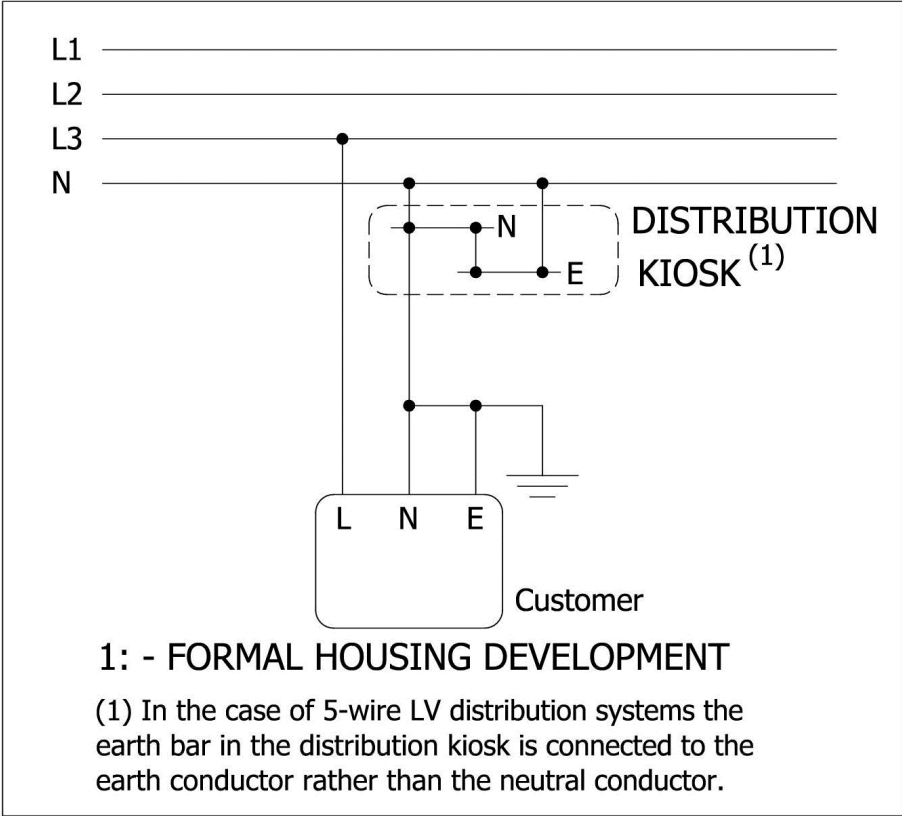


Figure C1: Formal Housing Development

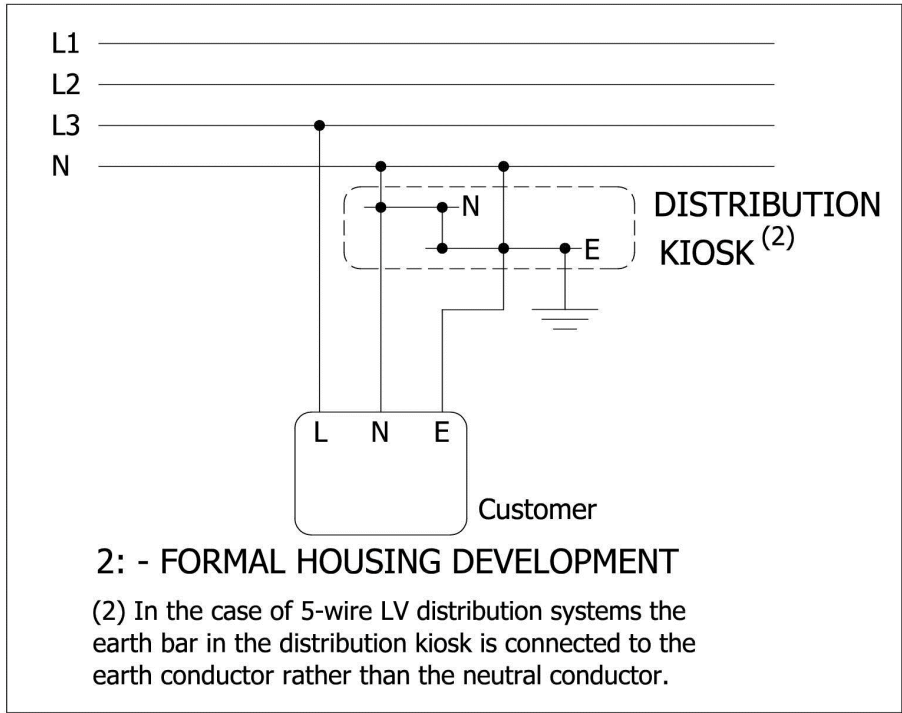


Figure C2: Informal Housing Development

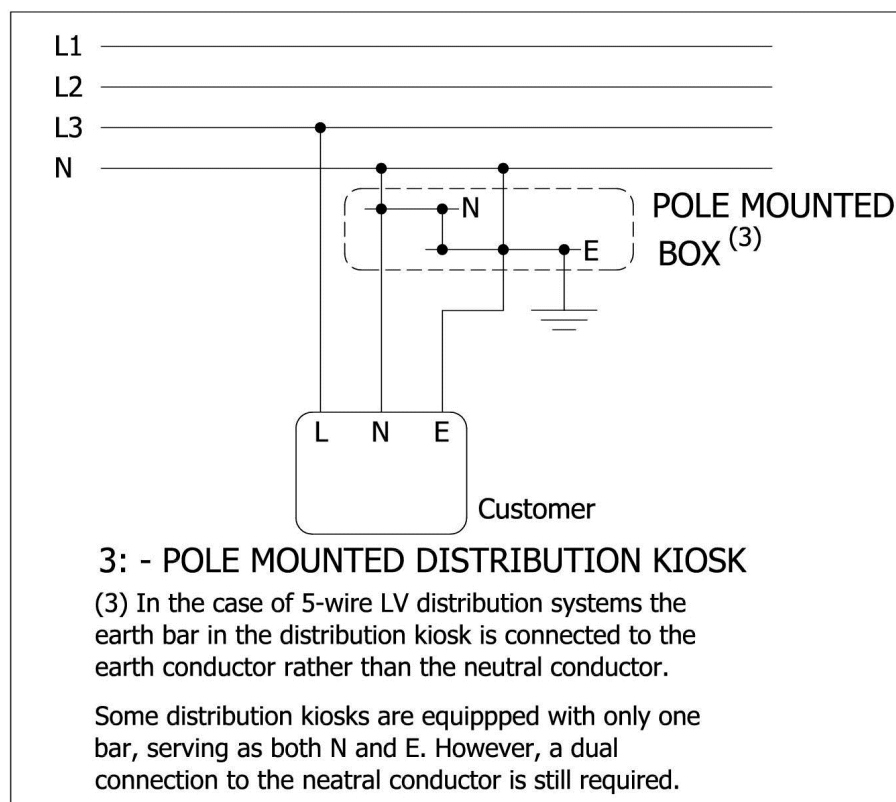


Figure C3: Pole-mounted Distribution Box

Annex D: Installation Earthing Requirements

Circuit Breaker Rating	Minimum Number of Earth Electrodes	Earth Electrode Diameter	Cross-sectional Area of Copper Conductor Forming Earth Mat	Cross-sectional Area of Copper Connection to Earth Electrode (Note 1)	Cross-sectional Area of Trench Earth (Note 2)	Maximum Earth Resistance (including electrode) (Note 3)
A		mm	mm²	mm²	mm	ohm
25 – 80	1	16	16	10	10	20
81 – 150	2	16	16	35	35	20
151 – 350	-	16	16	70	70	5
351 – 750	-	16	16	70	70	5

Note 1: The insulated conductor must be installed in a separate 20 mm diameter PVC pipe.

Note 2: The size of the copper conductor to be laid as trench earth and connected to the earth electrode.

Note 3: The maximum ground resistance with the earth electrode connected. The contractor is responsible for measuring this resistance but the result will be checked by the ESD Installation Inspector.

Annex E: Typical Earthing Arrangements for Supplies Exceeding 150 A

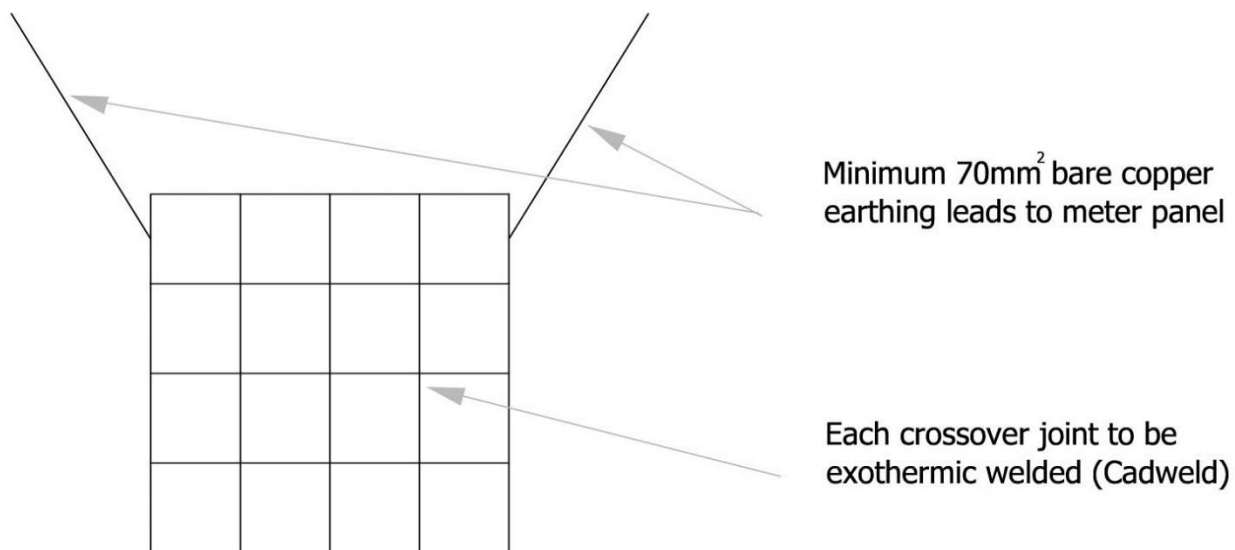


Figure E1: Earth Mat

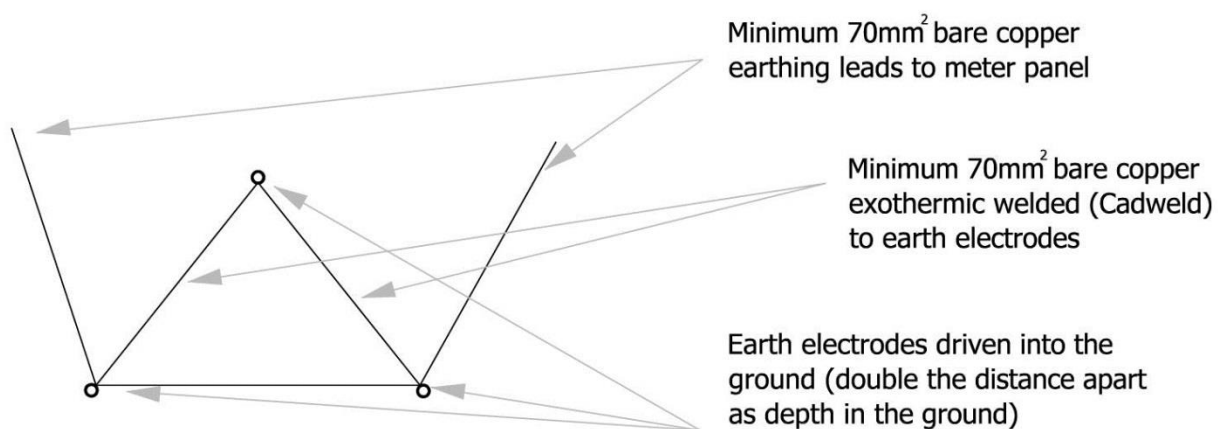


Figure E2: Earth Electrodes in Triangular Formation

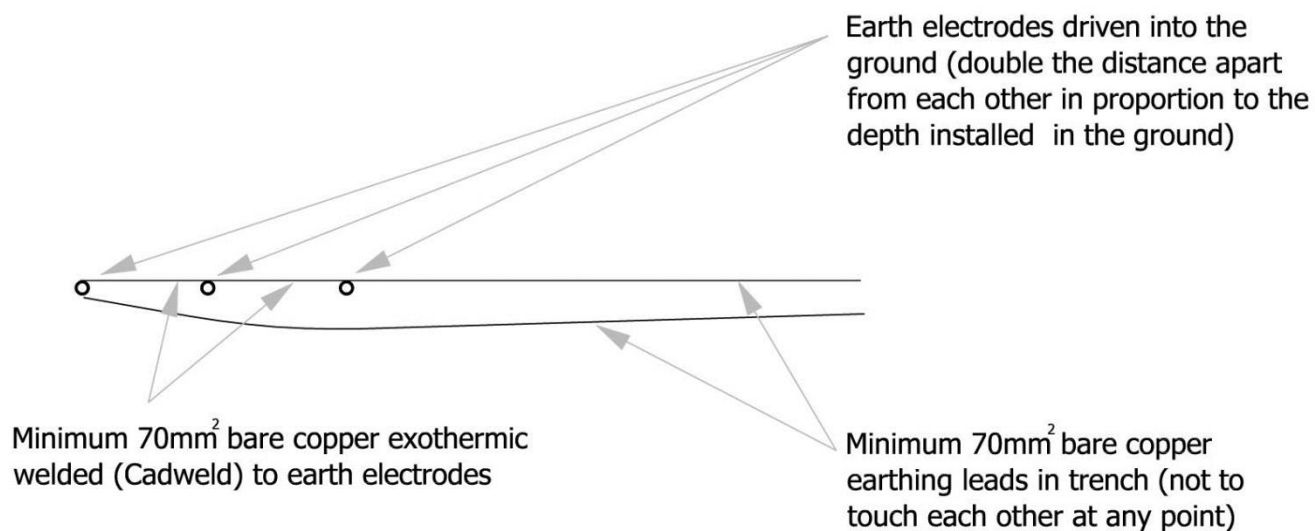


Figure E 3: Earth Electrodes in Straight Line

Note: Only to be used when space is limited



Figure F1: Unauthorized Entry Sign (Type PV3 to SANS 1186-1)



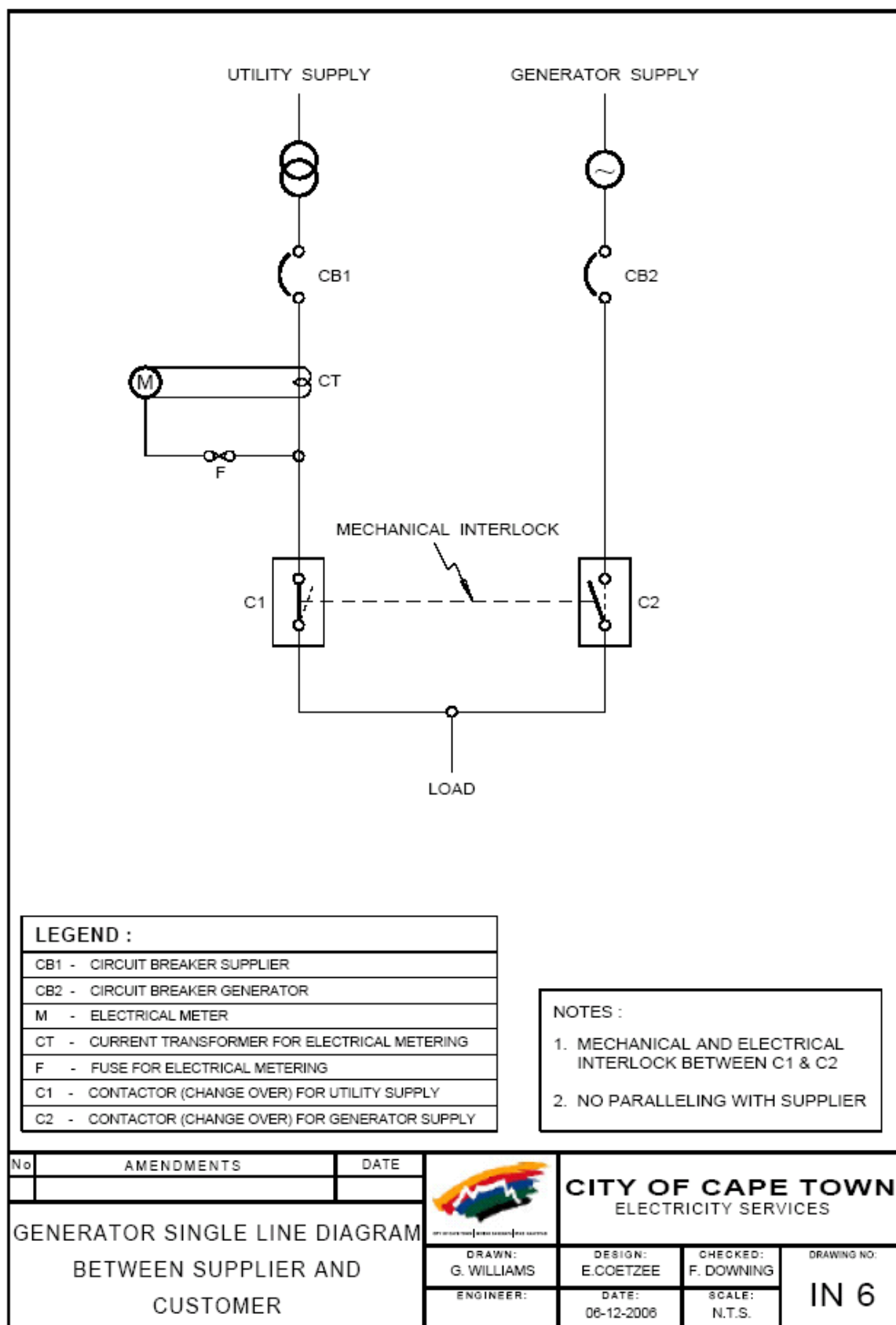
Figure F2: Danger Sign (Type WW7 to SANS 1186-1)



Figure G1: Generator Warning Sign

Note: Notice to be a minimum of 150 mm high.

Annex H: Connection of Standby Generator



Annex I: Customer Support Centres

1. Customer Support Services Offices: Customers, consultants, electrical contractors, etc. requiring specific interactions with the Electricity Services Department can visit one of the following City of Cape Town Electricity customer support centres

Office	Location
ESD Head Office	Bloemhof Road, Bellville
Wynberg Depot	Rosmead Avenue, Wynberg
Vanguard Depot	Klipfontein Road, Vanguard Estate

2. Customers may obtain or submit application forms at the following City Revenue offices

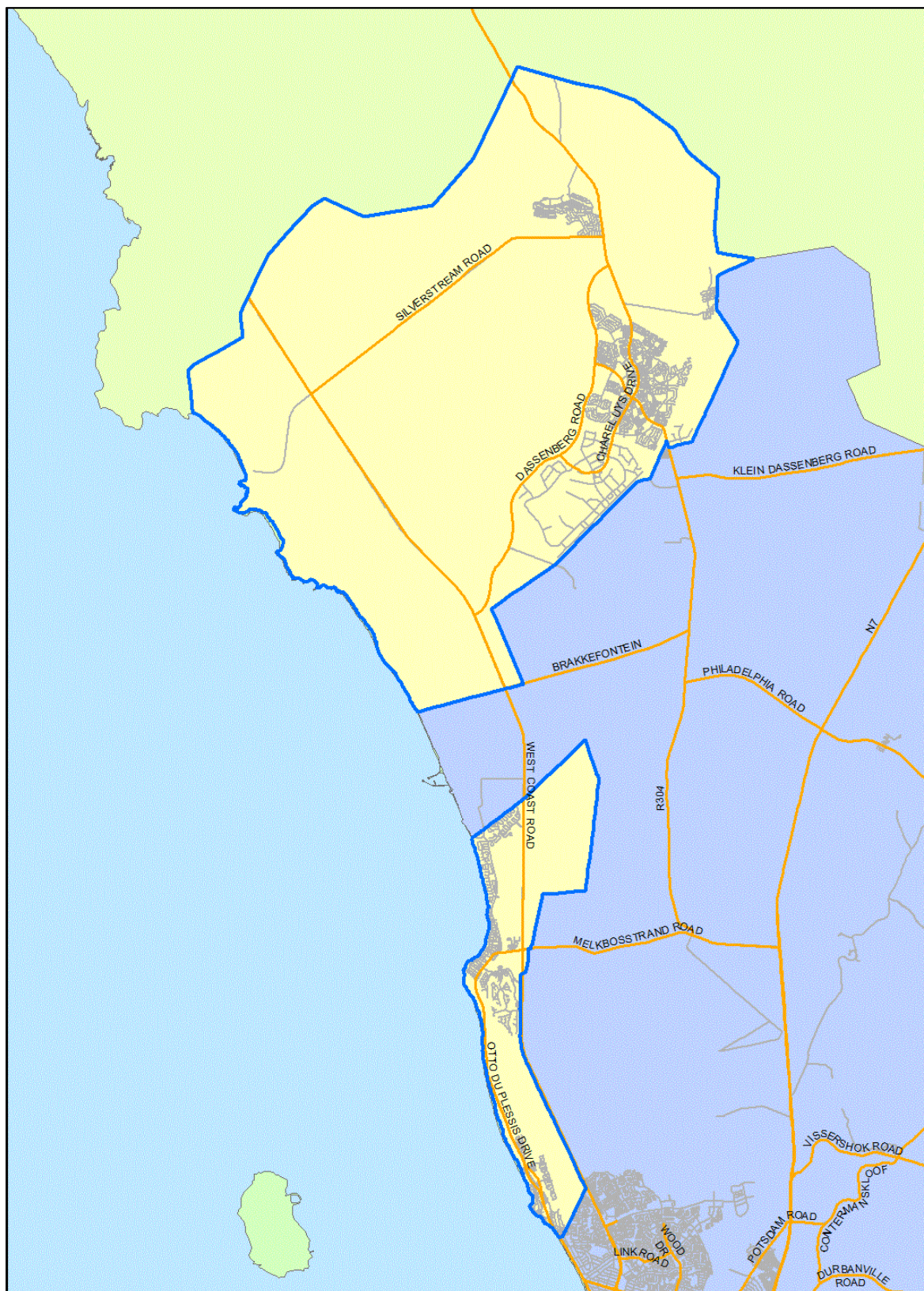
Office	Location
Athlone Office	Civic Centre, Protea Street, Athlone
Atlantis Office	Wesfleur Centre, Wesfleur Circle, Wesfleur
Belhar Housing Office	Huguenot Square, Belhar
Bellville Office	Civic Centre, Voortrekker Road, Bellville
Bellville South Office	Community Centre, Kasselsvlei Road, Proteaville
Beacon Valley Office	42 Chrysler Crescent, Mitchells Plain
Blaauwberg Office	Pienaar Road, Milnerton
Bloekombos Office	Civic Centre, Sam Njokozela Avenue, Bloekombos
Brackenfell Office	Municipal offices, cnr. Paradys & Old Paarl Road, Brackenfell
Cape Town Office	Civic Centre, 2 nd floor podium, Hertzog Boulevard, Cape Town
Delft Office	Cnr. Delft & Voorburg Roads, Delft

Office	Location
Durbanville Office	Civic Centre, cnr. Queen & Oxford Street, Durbanville
Fezeka Office	Municipal office, Lansdowne Road, Gugulethu
Fish Hoek Office	Municipal office, Recreation Road, Fish Hoek
Goodwood Office	Municipal offices, Voortrekker Road, Goodwood
Kraaifontein Office	Municipal offices, Brighton Road, Kraaifontein
Kuils River Office	Civic Centre, cnr Van Riebeek Road & Carinus Street, Kuils River
Langa Office	Washington Street, Langa
Lentegeur Office	Municipal offices, Merrydale Street, Lentegeur
Macassar Office	Municipal offices, Bind Avenue, Macassar
Manenberg Office	Cnr Lansdowne, Vygiekraal & Wye Roads, Manenberg
Mfuleni Office	Main Road, Mfuleni
Milnerton Office	Municipal offices, 35 Pienaar Road, Milnerton
Nyanga Office	Municipal offices, New Eisleben Road, Nyanga
Parow Office	Civic Centre, Voortrekker Road, Parow
Plumstead Office	Old Plessey Building, cnr. Main & Victoria Road, Plumstead
Resource Centre	Makhabeni Street, A Section, Lingeletu, Khayelitsha
Rocklands Office	Municipal offices, cnr. Spine & Caravelle Roads, Rocklands

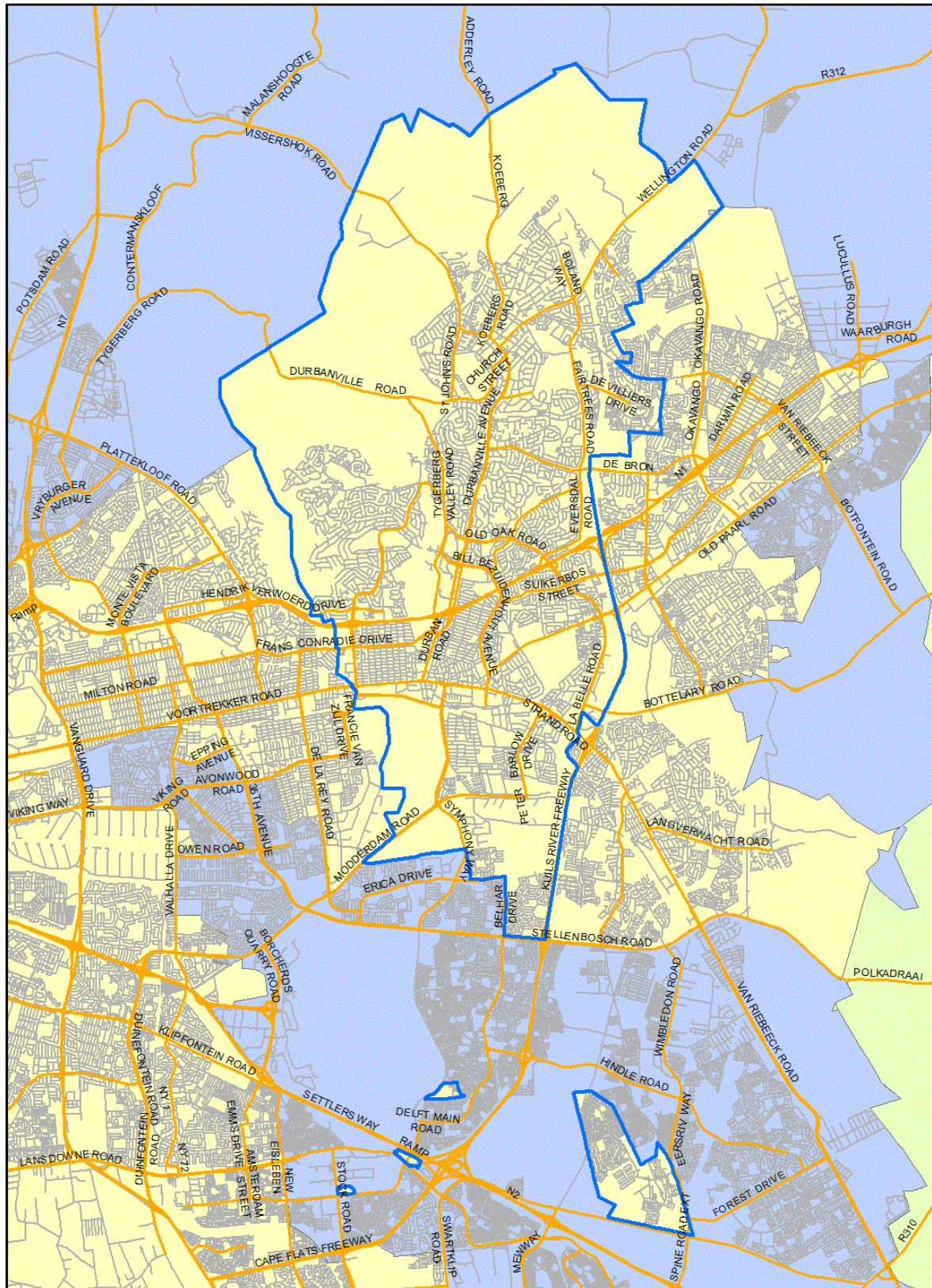
Office	Location
Site B Office	Bonga Drive, Khayelitsha
Stocks & Stocks Office	Ntlazane Street, Litha park, Khayelitsha
Strand Office	Municipal offices, cnr. Fagan & Main Road, Strand
Somerset-West Office	Municipal offices, cnr. Andries Pretorius & Victoria Road, Somerset-West
Tuscany Glen Office	203 Blue Downs Road, Blue Downs
Westridge Office	Municipal offices, cnr. Simon Sig & Wespoort Roads, Westridge

Annex J: ESD District Supply Areas

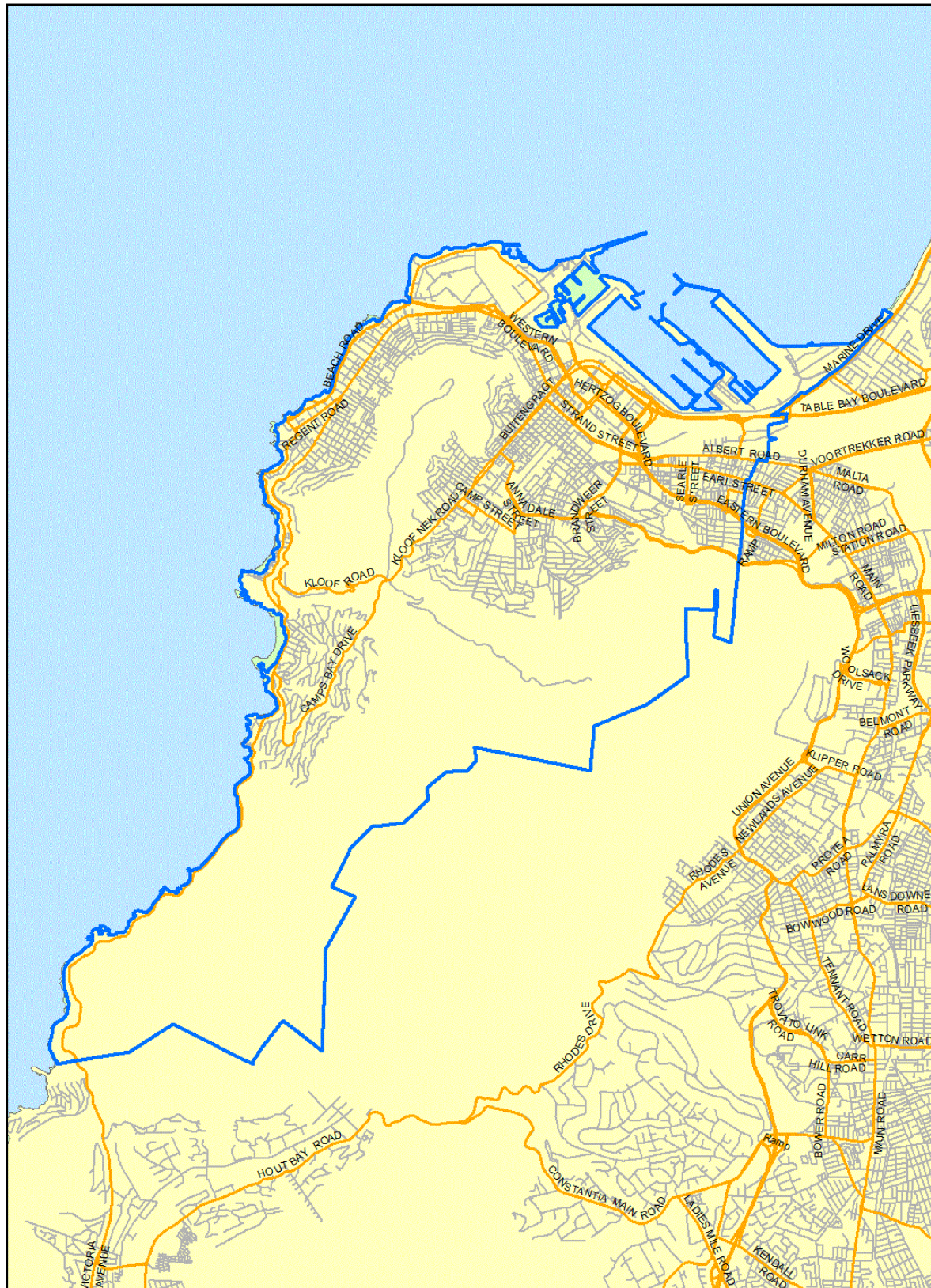
1. Atlantis Depot supply area



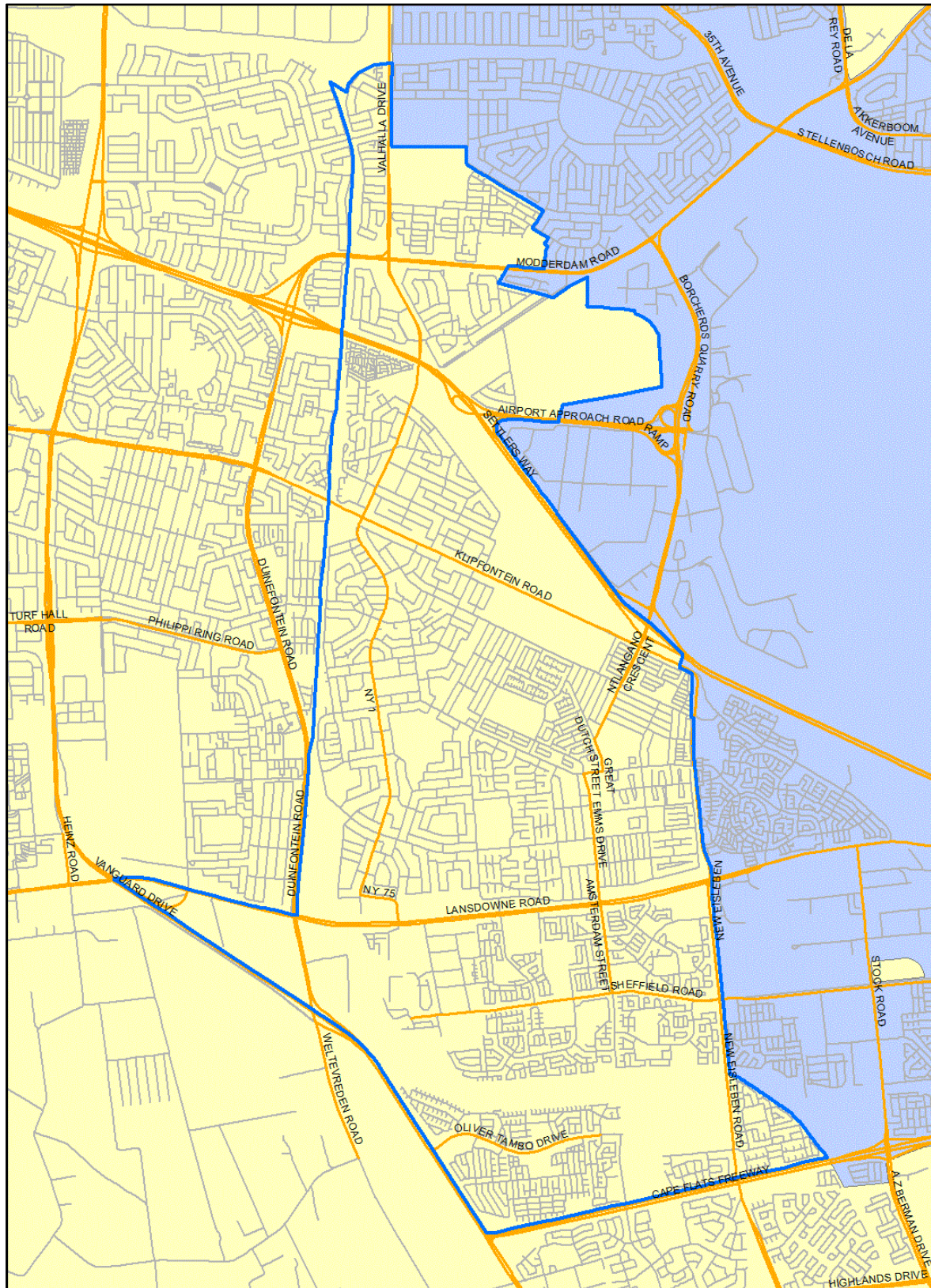
2. Bloemhof Depot supply area



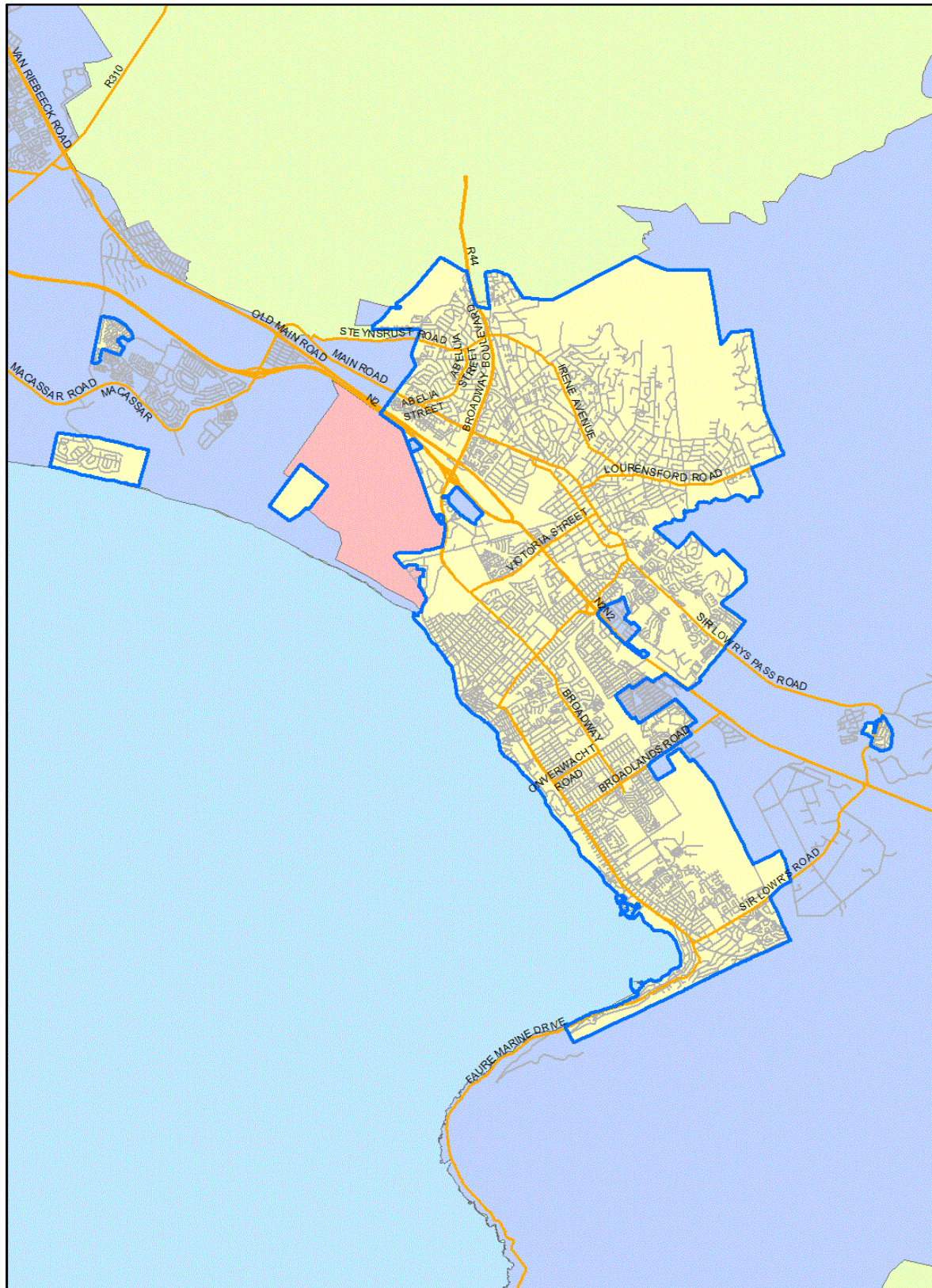
3. City Depot supply area



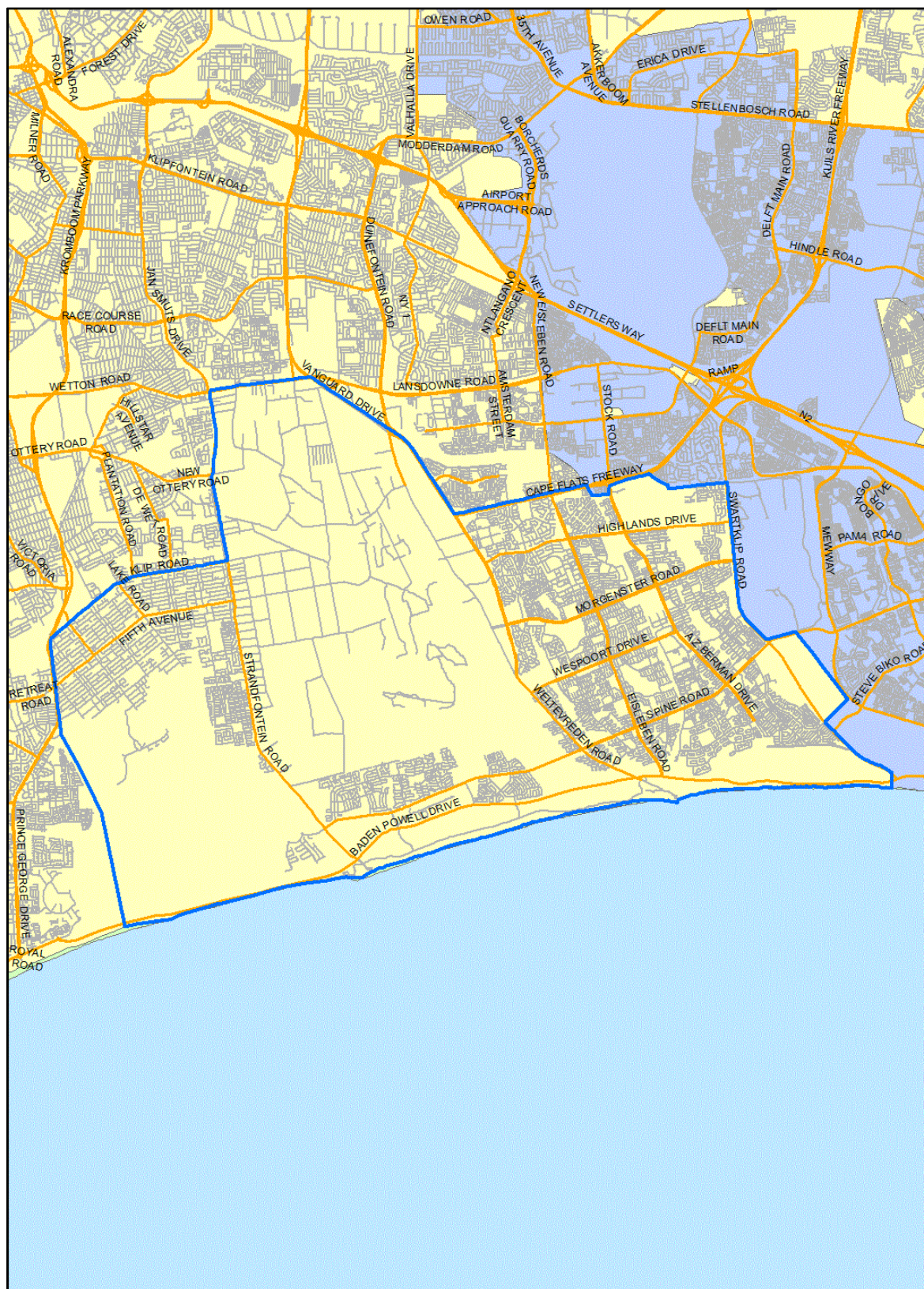
4. Gugulethu Depot supply area



5. Helderberg Depot supply area



6. Mitchell's Plain Depot supply area



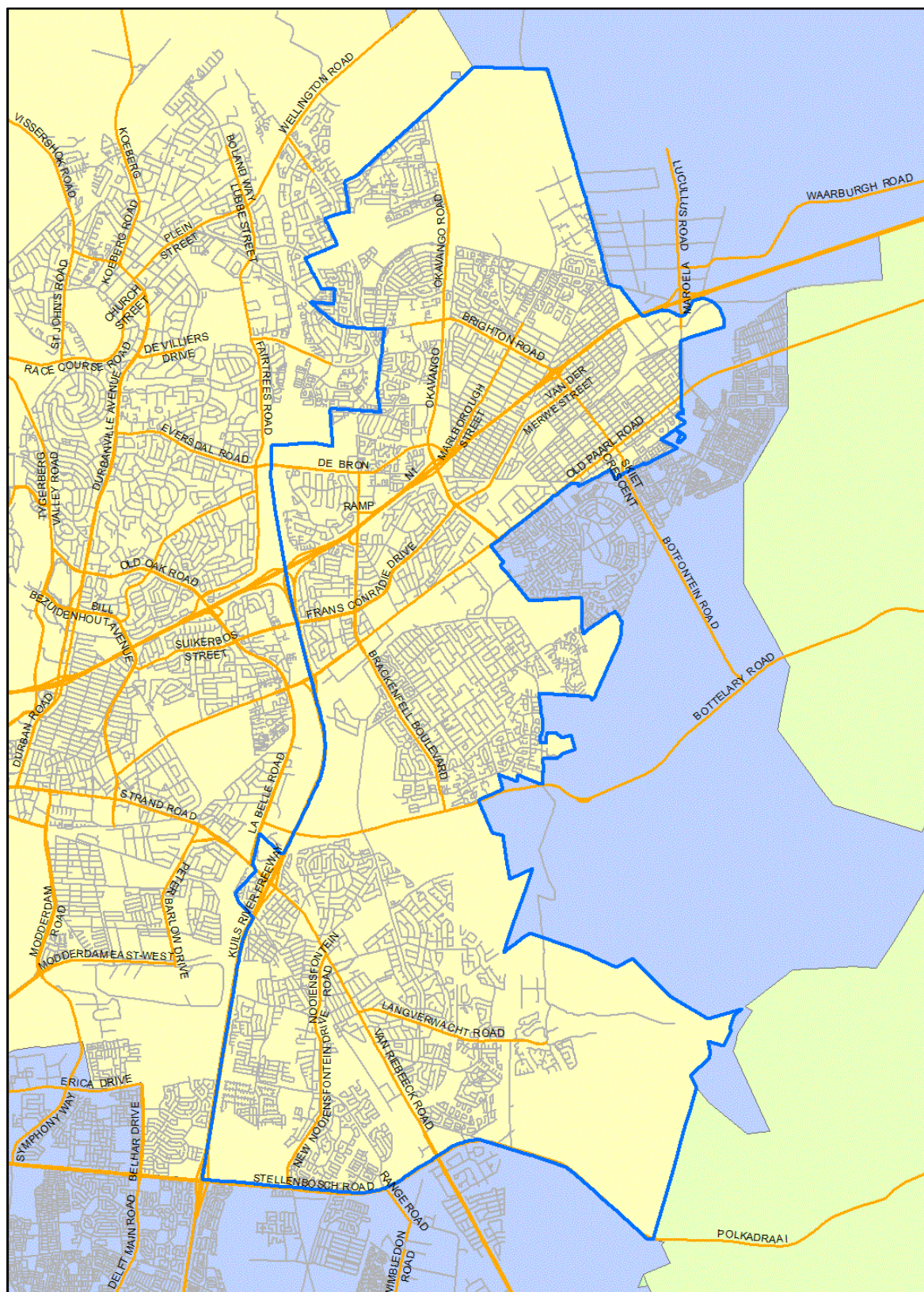
7. Mowbray Depot supply area



8. Muizenberg Depot supply area

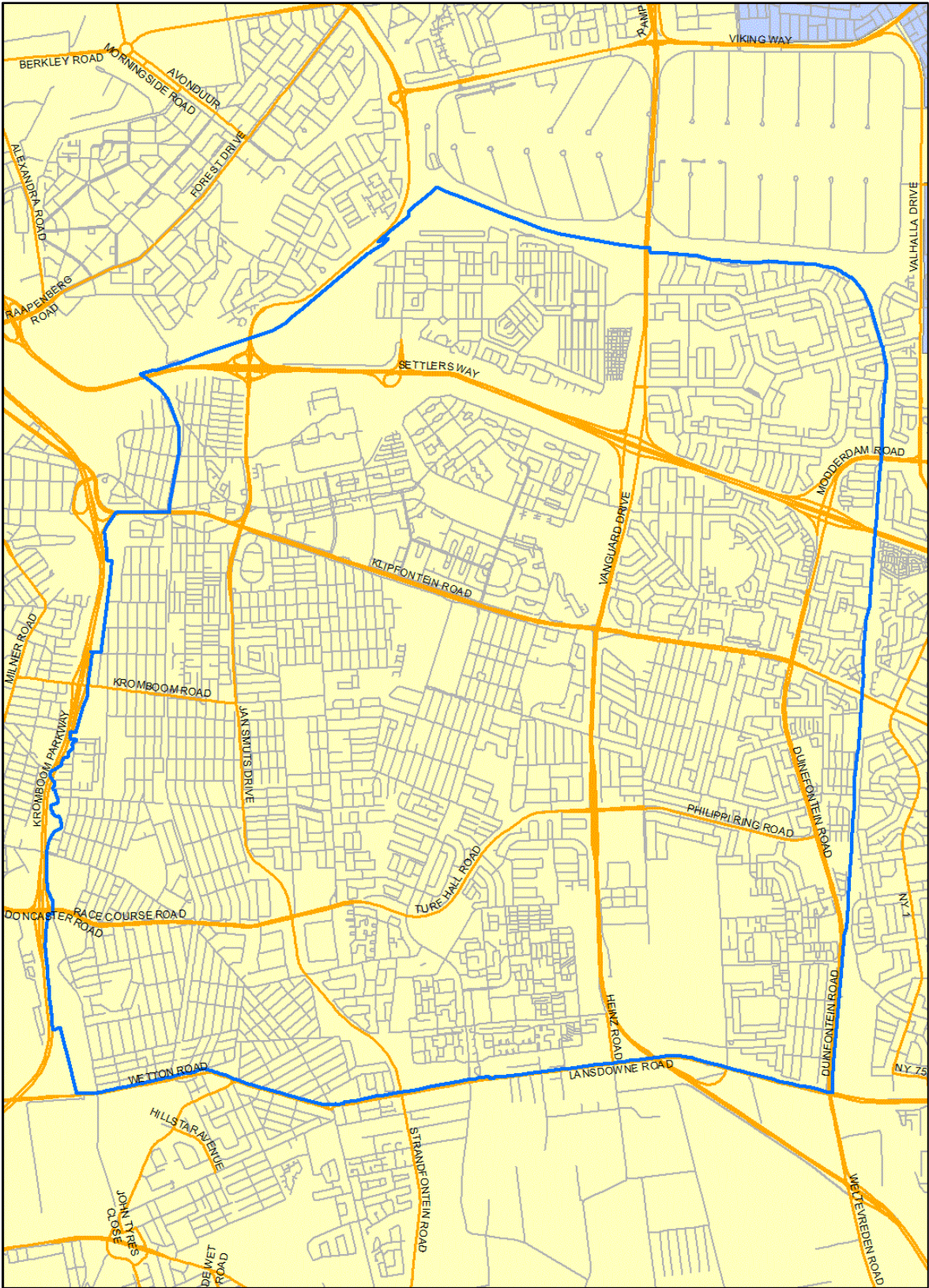


9. Oostenberg Depot supply area



[illegible]

11. Vanguard Depot supply area



12. Wynberg Depot supply area



Annex K: Inspector Contact Details

DISTRICT	NAME	EMAIL ADDRESS	OFFICE TELEPHONE	ADMIN TELEPHONE	FAX
Vanguard	Edward Abrahams	Edward.Abrahams@capetown.gov.za	021 630 1107	021 630 1100	021 638 3280
City	Mustapha Banderker	Mustapha.Banderker@capetown.gov.za	021 488 1345	021 488 1359	021 488 1355
Helderberg	Leon Bothma	Leon.Bothma@capetown.gov.za	021 840 2608	021 840 2612	021 840 2580
Mowbray	Joseph Dongo	Joseph.Dongo@capetown.gov.za	021 514 4284	021 506 4820	021 514 4290
Parow	Dennis Bronkhorst	Dennis.Bronkhorst@capetown.gov.za	021 417 4811	021 938 8111	086 576 0879
Bloemhof	Steven De Vries	StevenAlan.DeVries@Capetown.gov.za	021 918 7068	021 918 7062	021 918 7505
Muizenberg	Edwin Dodgen	Edwin.Dodgen@Capetown.gov.za	021 788 8964	021 788 8961	086 546 2996
Oostenberg	Jacques Maree	Jacques.Maree@capetown.gov.za	021 417 0627	021 417 0629	021 417 0633
Mowbray	Moegsien Mohamed	Moegsien.Mohamed@capetown.gov.za	021 514 4266	021 506 4820	021 514 4290
Guguletu	Mzoxolo Mzamo	MzoxoloGiven.Mzamo@capetown.gov.za	021 380 5027	021 380 5001	021 386 7651
Helderberg	Ian Pollock	Ian.Pollock@capetown.gov.za	021 840 2613	021 840 2612	021 840 2580
Wynberg	Clive Samuels	Clive.Samuels@capetown.gov.za	021 763 5625	021 763 5691	021 763 5707
Atlantis	Hermias Schreuder	HermiasCornelius.Schreuder@capetown.gov.za	021 573 7007	021 573 7014	086 530 1662
City	Wayne Scott	Wayne.Scott@capetown.gov.za	021 488 1346	021 488 1359	021 488 1355
Parow	James Strauss	James.Strauss@capetown.gov.za	021 417 4812	021 938 8111	086 576 0878
Mitchell's Plain	Ricardo Williams	Ricardo.Williams@capetown.gov.za	021 371 6151	021 371 5161	021 371 0640