

SECTION 4A:

**COUNCIL'S STANDARD TECHNICAL
REQUIREMENTS**

COPY

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SECTION 4

PART A: COUNCIL'S STANDARD TECHNICAL REQUIREMENTS

1. DEFINITIONS

Words and phrases used in the STANDARD TECHNICAL REQUIREMENTS shall have the same meaning as are assigned to them in Section 2 of the Memorandum of Agreement.

2. APPOINTMENT OF THE DEVELOPER'S ENGINEER

The Developer shall appoint an Engineering Firm registered with ACEN as defined herein to provide an Engineer (also referred to as the Developer's Engineer) for the Development which appointment shall be based on the following:

- a) The FIDIC Client / Consultant Model Services Agreement of 1998 or any applicable revisions.
- b) The Engineer shall be appointed to do the design, detailed supervision, quality assurance and execute all functions and duties of 'the Engineer' as defined in Clause 3 of the Client / Consultant Model Services Agreement. The Developer shall ensure that the Engineering Firm provide the Engineer, Resident Engineer and necessary assistants to carry out the above listed functions and duties.
- c) Prior to the appointment of the Engineer, the Developer shall request the approval of the Council's Representative, which approval shall not be withheld without a fair reason.

2.1. FEES

The Developer will be responsible for all the fees of the Engineering Firm and Contractors.

2.2. PROFESSIONAL INDEMNITY INSURANCE

The Engineer shall be a registered Professional or Incorporated Engineer registered with the Engineering Council of Namibia. The Engineering Firm employing or associated with the Engineer must have a valid Professional Indemnity Insurance cover to the value of at least 10% of the value of the Works. Proof shall be submitted to the Council's Representative.

2.3. QUALITY ASSURANCE

The Developer shall ensure that its Engineer note and accommodate the "Quality Assurance Procedures on Private Infrastructure Development Projects" as attached in Section 5 and the involvement of officials from Council under the direction of Council's Representative. The Developer shall be notified of the name(s) of the 'Quality Monitoring Official's (QMOs) within seven (7) days of the commencement of the execution of quality monitoring activities on behalf of Council. The Engineer shall co-operate with the QMO by providing access to the construction site and all quality assurance documentation of the Contractor and the Engineer. Should the QMO notify the Engineer of any quality related matter, the Engineer shall immediately investigate and arrange remedy in the event of substandard work, and report back to the QMO within 7 days of such notification.

All correspondence on matters relating to quality assurance under this Agreement shall be between the Developer's Engineer and the nominated QMO, with copies to the Council's Representative and the Developer's Representative.

The QMO may make use of the municipal soil's laboratory for purposes of quality monitoring testing. Such testing may be arranged by the QMO upon notification of

the Developer's Engineer that work is complete and before such work is covered up.

3. PLANNING STAGE

Prior to completion of the design phase, the Developer's Engineer shall arrange a meeting with the Council's Representative and the Developer, to explain and obtain agreement on the proposed designs of the Permanent Works, electricity, water and sewer services and roads and stormwater structures. Minutes of such meeting shall be prepared by the Developer's Engineer, and submitted within 7 days of such meeting to the other Parties.

3.1. CONTOUR PLANS

The Developer must note that contours on erf plans available from the Strategic Executive: Planning, Urbanisation & Environment's office of the Council cannot be guaranteed due to gravel mined on some erven, and due to accuracy tolerances in assembling these plans.

4. DESIGN STAGE

In addition to Clause 2.5 of the General and Particular Conditions contained in Section 2, the Developer shall submit Final Designs of all permanent works for approval to the Council Representative; prior to the commencement of construction. Such designs and drawings shall be approved and released for construction by Council before the Developer may issue such designs and drawings to the Developer's Contractor.

4.1. DESIGN CONDITIONS

The Developer shall be responsible for the design of all civil work (including detailed geometric and pavement design of streets) in compliance with the following conditions:

- 4.1.1 The Council's requirements form part of the Agreement, and shall be obtained by the Developer's Engineer from the relevant technical departments of the Council, prior to the completion of the designs and construction drawings. The Council's approvals of the said designs shall be obtained in writing before any work is started, a copy of which approval shall be submitted to the Council's Representative.
- 4.1.2 All relevant design manuals as used in the local engineering industry and considered 'best practice'.
- 4.1.3 All provisions and requirements contained herein.
- 4.1.4 The provisions of the FIDIC Client / Consultant Model Services Agreement of 1998 or any applicable revisions.
- 4.1.5 The Standard Municipal Design Criteria, as contained in this Agreement.
- 4.1.6 The Design shall be done on a CAD system in line with the Council's current CAD policy (current AutoCAD 2012, dwg file format, no dxf files will be accepted) and the information must be made available to the Council, electronically and on hard-copy.
- 4.1.7 All designs shall be based on the principle of 'fit for purpose'.
- 4.1.8 It should be noted that a minimum of thirteen (13) meter wide road reserve will be used for a residential street, in order to accommodate all services and a minimum of fifteen (15) meter wide road reserve will be used for Collector roads.
- 4.1.9 The Permanent Works shall be constructed to the standards and tolerances as set out in the relevant Sections of SABS 1200 or latest revisions thereof.

4.2. PRE-CONSTRUCTION STAGE

- 4.2.1. Prior to starting with the construction phase, the Developer's Engineer must arrange a further meeting with the Council's Representative, to discuss the Development Programme submitted under Clause 3.10 in Section 3 of the

Memorandum of Agreement and the proposed quality management system to be used during testing under Clauses 7 and 10 of the General and Particular Conditions (allowance to be made for the Council to do its own quality checks and testing, in addition to those carried out by the said Engineer but Council shall not be responsible for the quality of workmanship delivered under the construction contract, which responsibility shall rest with the Developer and its Engineer). Minutes of the said meeting shall be prepared by the Engineer of the Developer, and submitted within 7 days of such meeting to the Parties.

4.2.2. Should the as-built workmanship standards prove to be inadequate during Council's quality checks, all consequent checks performed by Council shall be at the cost of the Developer.

4.2.3. Quality Assurance Procedures and Council's Quality Monitoring Officials:

4.2.3.1 The Council has developed certain quality assurance procedures that shall be applied to ensure full compliance of the technical requirements and standards contained herein. The document named 'Quality Assurance Procedures on Private Infrastructure Development Projects (QAP)' shall be implemented by the Developer's Engineer and provision shall equally be made for such procedures in the Construction Contract between the Developer and its Contractor. The QAP document is included in Section 5 of the Memorandum of Agreement.

4.2.3.2 The Developer shall be notified of the name of the Council's Quality Monitoring Official nominated for the Project.

4.2.3.3 Quality Monitoring Official's (QMO's) shall be invited to all technical meetings between the Parties of the Construction Contract and the Engineer.

4.2.3.4 All quality assurance documentation as required to be generated under the Construction Contract shall be submitted by the Engineer to the QMO as provided herein.

4.3. EXECUTION AND CONSTRUCTION STAGE

4.3.1. In addition to the provisions of Sub-Clause 2.4.4 of Section 2, the Developer shall employ a Contractor meeting the criteria of the Council as follows:

Must have:

4.3.1.1. Relevant experience in respect of the proposed Permanent Works to be undertaken in respect of Township Extensions;

4.3.1.2. The available and suitable Plant at its disposal;

4.3.1.3. Qualified and experienced personnel involved within the performance of his contractual obligations;

4.3.1.4. Financial stability; and

4.3.1.3. A schedule of past commitments and projects fulfilled in terms of time and quality.

4.3.2. During the Construction Stage, the Council's Representative, its assistants and any other delegated staff member of Council that may be deemed necessary to attend site meetings, shall be invited to attend site meetings between the Developer's Engineer and the Developer's Contractor. Minutes of such meetings shall be prepared by the Developer's Engineer, and submitted within 7 days of such meeting to all the other Parties. In addition, the Council's Representative shall be entitled to request any tests results specified in the relevant SABS specification, or any applicable revisions from the Engineer, which shall be submitted within seven days of the request. The Council's Representative shall further be permitted full access to the site to perform inspections at any time during the Construction Stage together with relevant staff members from Council as may be required.

Construction Programme: shall be aligned with the Development Programme and submitted to the Council's QMO as soon as it is approved / accepted under the construction contract between the Developer and its Contractor.

- 4.3.3. The Engineer of the Developer shall perform detailed supervision of the Works and shall ensure that the construction is done according to the approved construction drawings and the laid down rules, regulations and standards of Council. Should the Engineer, in the opinion of the Council's Representative, not adhere to these requirements, Council shall have the right to submit a notice with reasons to have the Engineer replaced with a more competent Engineer. The replacement of the Developer's Engineer shall be at the Developer's cost.
- 4.3.4. The Developer shall undertake construction of all civil and electrical engineering works in accordance with the requirements of this Agreement as well as;
- 4.3.4.1. The relevant sections of the Standard Specifications: SABS1200, or any applicable revisions;
 - 4.3.4.2. The requirements of the Council;
 - 4.3.4.3. The requirements stated in the Project Specifications as drafted by the duly appointed Engineer of the Developer as accepted in writing by the Council's Representative;
 - 4.3.4.4. The provisions of the relevant General and Particular FIDIC Conditions of Agreement as per Section 2; and
 - 4.3.4.5. The directives of the Developer's Engineer, where these are not in conflict with any of the above.

4.3.5 Upon completion of construction and prior to the issue of the Take-Over Certificate, the Developer's Engineer shall submit to Council a complete set of as-built documents as per Clause 5.6 of the General and Particular Conditions in Section 2 (current AutoCAD 2012, dwg file format, no dxf files will be accepted.) electronically and on hard-copy which shall be submitted to the Council's Representative. This information shall be submitted before the final takeover of the services under Clause 10.1 of the General and Particular Conditions in Section 2 and the start of the 12 month retention period.

**4.4. THE TAKING OVER OF COMPLETED PERMANENT WORKS BY COUNCIL:
PROCEDURAL ARRANGEMENTS**

4.4.1. Once the Developer's Engineer has assured itself that the Developer's Contractor has completed the Works in accordance with the Construction Contract it shall certify that the services have been constructed according to the approved drawings and specifications, have been tested and are in accordance with all provisions and requirements hereof. The Developer shall thereafter be entitled to apply for Take-Over as set out in Clause 2.10 of Section 2 of the Agreement.

4.4.2. The Engineer of the Developer shall be responsible for the submission of the as-built drawings to the Council. Such drawings shall be checked by the Developer's Engineer and found to correct and accurate, and shall form part of the As-built Data.

4.4.3. The Take-Over procedure shall be as provided in Clause 2.10 of Section 2 of the Agreement after a Compliance Certificate has been issued by the relevant Departmental Heads, indicating that the relevant Works have been checked and found to be in accordance with the requirements.

4.4.4. The Quality Assurance Manual (QAM) as described in the 'Quality Assurance Procedures' contained in Section 5 shall be submitted as part of the As-built Data and shall have been brought up to date by the Developer's Engineer. The QAM shall be submitted to the Council's QMO at least 14 days prior to the Developer submitting a Notice requesting Taking-Over. Should the QAM be found to be

incomplete or contain errors or omission, the Notice for requesting Taking-Over shall not be considered until such time as the QAM has been updated and/or corrected, or, if applicable, sub-standard work has been remedied.

4.5. DEFECTS NOTIFICATION PERIOD

4.5.1 The Developer shall be responsible for a defects notification period as provided in Section 5 on all Permanent Works after take-over of the Works by the Council. The Developer shall remain responsible for the maintenance of the Permanent Works and / or the remedy of defects for such period, and it is advised that regular inspections are conducted during such period.

4.5.2 The defects notification period for a Section or Township extension of the development will start and end once the entire Township extension is taken over and not for portions or sections thereof only, unless otherwise agreed upon.

4.6. BUILDING PLANS, SECTIONAL TITLE PLANS AND BULK SERVICES CONNECTIONS

4.6.1 No building plans, Sectional Title Plans in respect of buildings to be constructed within a particular Township extension and/or connections to Council's bulk services network will be approved until Council has issued a Taking-Over Certificate. Service delivery (i.e. water and electricity) will only be switched on for construction testing purposes. If a Sectional Taking-Over Certificate has been issued, approval of the building plans may commence, for building situated in that Section.

4.6.2 In addition, no building plans in respect of a particular erf within a Township Extension or Section; and/or connection to Council's bulk services network will be approved unless the following has been provided:

4.6.2.1 access to a public street constructed and surfaced in accordance with Council standards;

- 4.6.2.2 a water connection or access to a water supply point or supply pipeline which has been approved by the Council in terms of the provisions hereof for use by that erf;
 - 4.6.2.3 a sewer connection or access to a sewage disposal system or sewer which has been approved by the Council in terms of the provisions hereof for use by that erf;
 - 4.6.2.4 beacons have been replaced according to the co-ordinates of the General Plan approved by the Surveyor General of that particular Township Extension or Section, except with the prior written consent of Council;
 - 4.6.2.5 Fire Water supply points have been installed as stipulated in SANS 10090; and
 - 4.6.2.6 an electricity connection or access to an electricity supply point or network which has been approved by the Council in terms of the provisions hereof for use by that erf.
- 4.6.3 The Developer must note that building line relaxation will only be considered once the street design plans are approved.

5 MAIN SERVICE CONNECTIONS

- 5.1 The Developer must provide all bulk and main services at his own risk and costs accordance to the specifications and standards as set out herein and must provide all reticulation network connection points to the main services, at the nearest point where sufficient network capacity exists, to the boundary of the Township Extension; and that the costs to connect from existing Council distribution points up to the boundary of the Property shall be paid by the Developer.
- 5.2 The location of these service distribution points shall be ascertained with the Council before planning or construction starts.

- 5.3 All connection points are to be approved in writing by the Council's Representative at the planning stage.
- 5.4 Should the Developer wish to cross a neighbouring development to reach main water or sewer services, the Developer itself would negotiate any servitudes and or agreements with the owner of the area concerned and submit such proposed written servitude agreement for approval of the Council's Representative.
- 5.5 Where applicable, the bulk water supply shall be negotiated between the Developer and the Namibia Water Corporation Ltd and any such agreement on the supply of bulk water shall be endorsed by Council whether such supply shall be done by NamWater or the Developer.
- 5.6 The Developer shall construct the bulk water infrastructure required for the water supply of the whole development to the satisfaction of the Council's Representative as per the specifications and standards attached herein.
- 5.7 Such Bulk Infrastructure will be considered for taking over by the Council upon completion of successful testing and commissioning, and the pump stations shall be subject to a defects notification period as stated in the Agreement Data after date of take-over. The Developer shall maintain the pump stations according to an approved maintenance plan to ensure that the pump stations are in a good state at handover.
- 5.8 The agreement between the Developer and NamWater for the bulk supply of water as endorsed by Council will be transferred to Council after take-over of the bulk water infrastructure.
- 5.9 Such Bulk Infrastructure with the land on which it is constructed shall be transferred to the Council free of charge.
- 5.10 Water meter applications for individual erven should be applied for directly with the Council.

5.11 Such applications can only be done once the water reticulation infrastructure has been taken over by the Council.

5.12 The water reticulation infrastructure within a Township Extension can only be taken over once the Bulk Water infrastructure has been taken over by the Council.

6 DESIGN CRITERIA, MATERIALS AND CONSTRUCTION STANDARDS FOR WATER AND SEWER RETICULATION

6.1 GENERAL

6.1.1 The Developer hereby notes and undertakes to comply with the Design criteria (unless otherwise specified herein) which are to be in accordance with the “The Guidelines for human settlement, planning and design” as published by the Council of Scientific and Industrial Research (CSIR) and is available on-line at http://www.csir.co.za/Built_environment/RedBook. (This document is hereinafter referred to as the “Red Book”) and in addition be in accordance with the “Guidelines for the Provision of Engineering Services for Residential Townships” as published by the Department of Community Development in 1983. (This document is hereinafter referred to as the “Blue Book”). “Latest” means the latest available edition should one have been published before the commencement of the project.

6.1.2 The Developer hereby notes that Materials and construction standards (unless otherwise specified herein) must comply with the latest edition of SABS 1200, or any applicable revisions.

6.1.3 The Developer hereby notes that the information contained herein applies to normal developments and is of a general nature. Increased and/or reduced standards might be applicable where appropriate.

6.1.4 The Developer hereby notes that the following Council of Windhoek Standard Drawings shall be used for designs and during construction:

- Typical Details of Manholes, Service Connections, Markers and Rodding

Eyes - Drwg. No. SDG 52

- Typical Details of Thrust Blocks, Valve Chambers, Trench Excavation, Valves and Hydrants - Drwg. No. SDG 53

6.2 BACKFILLING OF TRENCHES

6.2.1 BEDDING

The Developer hereby notes that sand bedding shall be in accordance with SABS 1200 LB, or any applicable revisions.

6.2.2 INITIAL BACKFILL

The Developer hereby notes that initial backfill (selected granular material used for bedding) shall consist of clean sand or gravel material passing through a 19 mm screen, hand compacted around and above the pipes to the levels shown on the contract drawings. Road-crossings, where so instructed in writing by the Engineer, must be compacted by the addition of water, i.e. the compaction must be moist. All initial backfill shall be in accordance with SABS 1200 LB, or any applicable revisions.

6.2.3 NORMAL BACKFILL

The Developer hereby notes that Normal backfill (selected fill) shall consist of selected excavated material with no stones larger than 30mm. Normal backfill shall be placed in 300 mm thick layers and compacted with a vibrating plate type compactor. SABS 1200 L or any applicable revisions is applicable in this case.

6.2.4 CONCRETE SURROUND (ENCASING)

The Developer hereby notes that Class 20 concrete shall be placed as pipe encasement as and when required in places indicated on the drawings or alternatively as directed by the Engineer.

6.3 SEWERAGE

6.3.1 INVESTIGATIONS

The Developer hereby notes that Preliminary examination of existing systems is required for the purpose of determining subdivision layouts. This must include investigation of existing and future flows as well as pipe and pump station conditions and capacities.

6.3.2 HYDRAULIC DESIGN

The Developer hereby notes that Flow charts which are based on unrealistically low friction factors such as those provided by some PVC pipe manufacturers may not be used in design. Flow formulae and coefficients as listed in the Blue Book are to be adopted.

Minimum gradients shall be as follows:

DIAMETER (mm)	NO OF DWELLINGS	MINIMUM GRADIENT
110	1 (house connection)/erf	1:60
110	1 to 100	1:105
160	101 to 400	1:160
200	401 to 700	1:200
250	701 to 1100	1:250
300	1101 to 2300	1:300
350		1:350
400		1:400
450		1:450
500		1:500
550		1:550
600		1:600

6.3.3 PIPES

The Developer hereby notes that Minimum cover is to be determined according to available falls, strength of pipe and loading and shall not be less than 800mm (1000mm at road crossings). In cases where less cover is provided and is subject to possible erosion, concrete encasement should be considered. The depth of house connections shall generally be 1.0 m (invert level to ground level) but this must be increased to allow for slope and size of plots where necessary.

The following types of pipes are acceptable (for township gravity reticulation up to and including 250 mm diameter):

Vitreous clay (SANS 559 Class 2)

uPVC (SANS 791 Heavy Duty)

Wherever possible materials used in extensions to existing systems must match those already installed. Structured Wall uPVC (SANS 1601 Class 400) pipes are not acceptable at present due to suspected vulnerability of walls to erosion by jet cleaning equipment in situations where sand has entered system.

Minimum pipe internal diameter 100 mm (100 mm for individual house connections). uPVC 110mm diameter pipe size minimum.

Anchor blocks must be provided for each pipe for slopes exceeding 1:10.

All pipes and fittings must comply with the relevant SABS specifications, or any applicable revisions.

The Corflo pipes SHALL NOT be used.

While laying pipes the Developer / Contractor shall remove all solid matter (sand and clay inclusive) from each pipe before putting it in position. Each open pipe end shall be closed at the end of each pipe laying operation. Water pipes shall be flushed before taking these into operation.

6.3.4 RIGID PIPES WITH FLEXIBLE JOINTS

The Developer hereby notes that Pipes in this category include clay pipes, asbestos cement pipes, concrete pipes (*), cast-iron (*) and similar pipes. The pipes should have factory applied moulded compression plastic joints, field applied couplings and similar jointing arrangements. All such pipes and fittings shall be to the approval of the COW and such material and jointing shall comply with the latest SABS specifications, or any applicable revisions and the Contract Drawings. Pipes marked (*) shall have inner protective coatings.

6.3.5 FLEXIBLE PIPES

The Developer hereby notes that Pipes in this category include uPVC pipes and HDPE pipes. uPVC pipes and fittings shall be fitted with spigot and socket rubber ring joints and shall comply with the relevant requirements of SANS 966, SANS 791 and SANS 1601. Polyethylene (HDPE) pipes and fittings shall comply with the relevant requirements of SANS 533. **Corflo pipes SHALL NOT be used.**

6.4 MANHOLES

The Developer hereby notes that all pipes and fittings must comply with the relevant SABS specifications, or any applicable revisions.

Manhole to manhole maximum length 80 m.

Manholes in roads are to be located in the middle of the lanes. Manholes located elsewhere are to be accessible by maintenance vehicles wherever possible.

Only insitu concrete manholes according to standard drawings (SDG52) will be allowed subject to further requirements as follows:

Maximum depth 4 m (deeper to be specially motivated and approved).

In the case of large diameter (over 200mm) pipelines manhole covers are to be located directly above point of intersection of main pipe runs (for bucket cleaning).

Benching to be vertical up to full height of pipe then 1:6 to wall of manhole. Benching to consist of Grade 20 mass concrete with no voids or sand fill.

External back drops are favoured. The base of backdrops must be cast monolithically with the manhole base slab. Internal backdrops may only be used in the case of new connections to existing deep trunk sewers. Details are to comply with those indicated on the attached standard drawing.

6.4.1 MANHOLE COVERS AND FRAMES

The Developer hereby notes that all manhole covers shall be of type SECUREX Y 560 C or SECUREX Z 600 D in roads, made from ductile iron with secure non removable hinges. Alternatively, manhole covers and frames conforming in all respects to SANS 558 may be used subject to the approval by the Council of Windhoek. (NB: All hinges shall face upstream when manholes are constructed in riverbeds).

6.4.2 STEP IRONS

The Developer hereby notes that Galvanised malleable cast iron step irons shall conform in all respects to SANS 1247, each having a weight of not less than 1.59 kg. After installation, the step irons are to be painted with two coats of epoxy tar paint. Step irons to be provided where manhole depths exceed 1.2 m.

6.4.3 MANHOLE CHANNELLING

The Developer hereby notes that only vitrified clay (VC) channels shall be used. For larger diameter sewers, where VC channeling is not available, industrial tiles cut in to 50mm strips, shall be used together with sewer resistant joint filler.

6.4.4 AGGREGATES

The Developer hereby notes that Dolomitic Aggregate shall be used instead of normal aggregate for all waste water treatment concrete works.

6.4.5 GENERAL

The Developer hereby notes that mid-block sewers are to be avoided as far as possible but where used these must be accessible and the depth may not exceed 2.0 m.

Pipes and manholes shall be subjected to visual inspection. Pipes shall also be air tested before and after backfill.

Saddles for erf connections are not permitted. Y-junctions shall be used.

Erf connections are to be provided with end caps and marked by means of marker pipes that shall be laid vertically from the end cap up to 100 mm above the natural ground level (Refer Drwg. No. SDG 52). DPC cut into strips (200 mm wide; 375 micron) shall be tied to the end caps and these strips must protrude 200 mm above ground level. The position of erf connections must also be dimensioned on "As-built" drawings.

Electrical connections to sewage pump stations and waste water treatment plants are to be arranged by Developer on Council's behalf. All costs of connections and consumption up to the time of handover are to be borne by the Developer.

6.5 SEWAGE TREATMENT WORKS

6.5.1 The Developer notes that any additional sewer requirement for the proposed development will be for the Developer's account and that future sewer infrastructure comply with the standard conditions similar to this Agreement.

6.5.2 The quality of effluent released from the Developer's new sewage treatment facility shall comply with the Water Quality Effluent Standards prescribed by the DWAF of

2008.

6.6 WATER SUPPLY

The Developer hereby notes that design criteria are to follow the recommendations of the Blue Book except as follows:

- Where flexible pipes are used the minimum size shall be determined according to hydraulic requirements.
- Minimum pipe class shall be Class 9 (SANS 966) in the case of uPVC pipes. System pressures are to be determined and higher classes used where necessary.

Materials and construction methods are to be in accordance with the COW Standard Specification and standard drawings (SDG 53) and SANS 1200L. Fibre Cement pipes shall not be used.

The location of water meters (inside or outside of erf boundaries) is subject to local practice. Infrastructure - Bulk and Waste Water must be consulted in this regard.

Where the requirements of the various documents are in conflict the requirements of this document shall prevail.

6.6.1 MEDIUM-PRESSURE PIPELINES

Material Minimum strength of pipe installed = Class 9

6.6.2 STEEL PIPES, FITTINGS AND SPECIALS

6.6.2.1 General

The Developer hereby notes that all steel pipes and fittings shall be manufactured from Grade B mild steel welded and manufactured in accordance with the latest

edition of SANS 719. All flanges to match existing (i.e. SANS 1123, table 1000-3, 1600-3, etc.). All flanges shall be complete with bolts, nuts, washers and gaskets.

Steel pipes and fittings shall be protected as specified, and where buried, shall be protected with a petrolatum mastic and tape such as Denso or similar. The application shall be carried out strictly in accordance with the manufacturer's instructions.

6.6.3 CORROSION PROTECTION

6.6.3.1 MS Pipes

The Developer hereby notes that all steel pipes and specials to be hot dip galvanised in accordance with SANS 763 (1988).

6.6.4 VALVES

6.6.4.1 Gate valves

The Developer hereby notes that all gate valves shall be **AVK** or similarly approved by the Council and shall conform to the following specifications:

Body and bonnet:	Ductile iron.
Wedge:	Ductile iron, fully encapsulated with rubber internally and externally so as to prevent corrosion and rubber failure.
Wedge Nut:	Must be of the fixed nut concept.
Coating:	Electrostatically applied fusion bonded epoxy resin (± 250 micron) – internally and externally prior to assembly.
Approvals:	The valve shall conform to the dimensional and Performance specifications of SANS 664.
Warranty:	The valve shall be backed by a written 10 (ten) year replacement warranty under normal working conditions.
Visual inspection:	Should the quality of the valve be suspect, the Engineer be approached for approval.

Other Valves used shall comply with the following:

6.6.4.2 Resilient Seal Gate Valves:

The Developer hereby notes that -

- AVK valves or similar are to be approved by the Council to suit specifications;
- Shall close clockwise;
- Have a non-rising spindle, and fitted with a cap top or hand wheel as applicable;
- Has to be Class 16 and comply with the requirements of SANS 664:1974;
- Must be Highly resistant to corrosion and abrasion;
- Must have parts manufactured from the following materials:
 - * Spheroidal graphic iron: Body gate, bonnet and hand wheel
 - * Stainless steel: Spindle
 - * Plastic: Bush, Friction rings
 - * Nitrite rubber: All "O"-rings, profile ring, scraper ring and sealing ring
 - * Bronze: Spindle nut
- Must all receive an electrostatic epoxy powder coating as surface protection – internal and external.

6.6.4.3 Butterfly Valves:

Butterfly valves shall be of the wafer type suitable for installation between two flanges and shall close clockwise.

The materials shall be:

Make: COMPACT or similar and approved by the Council
Body: Cast Iron with nitrile rubber liner
Disc: Spheroidal graphite with nylon coating
Shaft: Stainless steel with shaft mounted replaceable O – rings

Gearbox: Weatherproof with spoked hand wheel. Gear ration 30:1 minimum.

All valves to be suitable for water of a corrosive nature.

6.6.4.4 Denso Wrapping:

Flanged MS pipe connections fixed with bolts and nuts which are buried in the ground shall be Denso Protected with a Denso product or approved similar. The bolts and nuts shall be covered with Denso Mastic Putty pressed around the bolts and nuts to displace all air, and then covered with a Denso Tape wrapped over the Mastic and the MS pipe and flanges. To protect the Denso Tape, the entire flanged pipe connection shall be double wrapped in a PVC sheet 150 micron thick, held in place with binding wire.

6.7 HYDRANTS

The Developer hereby notes that Fire hydrants must comply with the following:

- (a) They will be suitable for working pressure of 16 kPa (16 Bar)
- (b) Flanges will be raised face and drilled to SANS 1123, Table 1000-3 or BS 4504, Table 10.
- (c) Inside diameters will be either 65 mm or 80 mm.
- (d) Stopper mechanism will be of mushroom type encapsulated with EPDM rubber (Flat type stopper fitted with a nylon or flat rubber washer is not acceptable).
- (e) Spindles will be right hand closing, non-rising type and fitted with cap tops.
- (f) An electronic epoxy coating to DIN 30677 internally and externally as surface protection will be applied.
- (g) Bayonets will be fitted with a dust cap, which will be attached to the body by means of a cable, chain or strap.
- (h) Material utilized in the manufacturing of hydrants will be as follows:
 - *Ductile iron (BS 2789, grade 500 – 7): Body and bonnet
 - *Cast iron (BS 1452, grade 220:225): Cap and bayonet

*Stainless steel (DIN x 20 Cr 13):	Stem
*NBR rubber:	All "O" rings
*EPDM rubber:	Stopper rubber
*Gun metal (BS 1400, LG 2-C):	or dezinctified resistant brass Spindle and nut
*Stainless Steel:	All washers, clamps, circlips and seat screws

6.8 FITTINGS AND ANCILLARY ITEMS

6.8.1 VIKING-JOHNSON FLANGE ADAPTERS

The Developer hereby notes that Viking Johnson type flange adapters are to be equal to Klamflex or similar and approved by the Council and are to be provided as shown. The tie rods are to be secured to weld on restraining flanges being part of the pipe work. Four nuts per tie rod shall be provided one at each side of the flange and one at each side of the restraining flange. The number and size of the tie rods to be based on the design water pressure and approved by the Council.

6.8.2 NUTS, BOLTS AND GASKETS

The Developer hereby notes that all nuts shall receive a washer.

The bolt assembly material shall be SABS 1700 Grade 4.8 steel. Bolts, nuts and washers shall be hot dipped galvanised (zinc).

6.8.3 AIR RELEASE AND VACUUM BREAKER VALVES

The Developer hereby notes that Air release valves shall be installed at the points as indicated on the drawings unless otherwise specified by the Engineer. The make of air release valves shall be "VENTOMAT" series RBX unless otherwise approved by the Council.

6.8.4 ACTUATOR

The Developer hereby notes that all actuators to be of type EI-O-Matic ELQ Series or equivalent with the specifications as follows:

- Power supply: 24V DC
- Communication Input/Output: 4 – 20 mA
- Protection: IP 68 or better

6.8.5 FLOW METERS

Type: Electromagnetic Flowmeter
Flanges: 16 Bar (BS5404)
Lining: Must be suitable for potable water
Water temp (max): 60°C
Enclosure: IP 67
Electrodes: Stainless steel
Meter uncertainty: $\pm 0.25\%$ from 0.5m/s up to 10m/s or better

6.8.6 SIGNAL CONVERTER

Transmitter: Remote mounted
Enclosure: IP 67 to ICE 529 and DIN 40050
Power supply: 11- 40 VDC
Display: 3 Line display
Output: Current output 4-20 mA for forward and reverse flow
Pulse output on potential free contact 24V DC/0.5A max
for forward and reverse flow
Pulse width 50ms
Pulse adjustable 1pulse = 1 m³ and 1 pulse = 0.1 m³
All outputs must be separately for forward and reverse
flow

6.8.7 CABLE

50m Control cable to be supplied with each flowmeter.

Basic Settings

Q max	m ³ /h
Totalizer units	m ³
Low flow cut off	0 - 10%
Empty pipe detection	on/off
Ambient Temperature:	During Operation -20 to + 50 0 C

7 DESIGN CRITERIA AND SPECIFICATIONS FOR ELECTRICAL RETICULATION

The Developer hereby notes that the provision of all electrical services shall comply to the National Rationalised standard (NRS) and all the SABS standards, or any applicable revisions, made reference to in the following:

- **SANS 507-1 (ED-1)/NRS 034-1(ED-4): 2007, Electricity distribution - Guidelines for the provision of electrical distribution networks in residential areas Part 1: Planning and Design of distribution systems.** (This standard covers the planning and design of economical residential electrical distribution systems that are capable of meeting probable demands with safety and reliability, whilst maintaining the voltage within the prescribed limits. A general guide to good technical practice for economical overhead and underground systems.)

NOTE: *the above standard does not make use of the load modeling statistical parameters of the Gaussian probability density function (pdf) but rather the Beta pdf parameters a, b and c. These parameters essential for design can be obtained from the NRS Load Survey project. The Council of Windhoek, Electricity Department has obtained load data for the Namibian context and can provide design parameters based on the Namibian context.*

- **NRS 034-2-3: 1997, Electricity distribution - Guidelines for the provision of electrical distribution networks in residential areas Part 2-3: Preferred methods and materials for the installation of overhead power lines.** (This standard covers preferred methods and materials used for the installation of low-voltage and medium-voltage overhead power lines in residential areas, and should be read in conjunction with NRS 033.)

The following section of Part 2 of NRS 034 -2 shall also be considered:

- Section 1: Preferred Methods and Material for Substations
- Section 4: Preferred Methods and Material for Area Lighting
- **NRS 033-2-3:1996 Electricity distribution - Guidelines for the application design, planning and construction of medium voltage overhead power lines up to and including 11 kV, using wooden pole structures and bare conductors.** (This standard Guidelines for the application design and construction of medium voltage overhead power lines up to and including 11 kV, using wooden pole structures. Provides an example of overhead line design that complies with professionally accepted practices and the OHS Act, 1993, as amended.)
- **SANS 10142-1:2006 The wiring of premises Part 1: Low-voltage installations.** (Applies to electrical installations of residential premises, commercial premises, public premises, industrial premises, prefabricated buildings, fixed surface installations on mining properties, construction and demolition site installations, agricultural and horticultural premises, caravan sites and similar sites, marinas, pleasure craft and house boats, medical locations, exhibitions, fairs and other temporary installations, extra low voltage Lighting installations, electrical installations for street lighting and street furniture, and equipment enclosures (structures that provide physical and environmental protection for telecommunication equipment). Covers circuits supplied at nominal voltages up to and including 1 000 V a.c. or 1 500)

- **SANS 10098-1:2007 Public lighting Part 1: The lighting of public thoroughfares.** (Lays down the fundamental principles that govern the lighting of public thoroughfares including motorways, arterial routes, residential roads, town and city centre's and pedestrian-oriented areas. Has been limited to methods of providing adequate public lighting that give good results within acceptable economic limits.)
- **SANS 10098-2:2005 Public lighting Part 2: The lighting of certain specific areas of streets and highways** (Lays down recommendations for the lighting of road areas of special importance and where normal conventional street lighting techniques in accordance with SANS 10098-1 might not apply.)
- Electricity Supply Regulation (Section 94(1))of the Local Authorities Act, 1992 (Act No. 23 of 1992)
- Municipal Council of Windhoek Electricity Distribution and Protection Philosophies

7.1 ELECTRICAL SERVICES

- 7.1.1 Bulk supply of electricity must be arranged with the Council on account of the Developer to the satisfaction of the Council Representative as per the specifications and standards included herein.
- 7.1.2 All Electricity meter applications for individual erven should be applied for directly with the Council.
- 7.1.3 As the license holder for supply and distribution of electricity the Council shall remain responsible for the sale of electricity to the Township Extension and the third party transferee.
- 7.1.4 Electricity meter applications can only be done once the electrical reticulation infrastructure has been taken over by the Council.

- 7.1.5 Any electrical supply required prior to the completion of construction and prior to the takeover, shall be metered at the main supply point at the cost of the Developer.
- 7.1.6 All services installed over private land, which have to be taken over by Council, shall be protected by servitudes registered in favour of Council. Such costs shall be for the Developer's account.
- 7.1.7 The Developer will be responsible for the provision of all internal electricity distribution and street lights (electrical services) at own cost to the satisfaction of the Council's Representative, as per the specifications and standards attached herein.
- 7.1.8 The design and construction of all electrical services are to be done according to the Council's requirements and standard specifications as per the Electricity Supply Regulations and laws, and all designs must be approved by the Developer's Engineer and accepted by the Council in writing before any work is started.
- 7.1.9 The design and construction of electrical services for each of the respective Township Extensions must adhere to the following:
- 7.1.9.1 Compliance to Council's standards, regarding the establishment of Distribution Substations, primary and secondary 11kV Ring networks, Local Substations/Miniature Substations, LV distribution networks, service connections to main DB and street lighting.
 - 7.1.9.2 Compliance with Council's Distribution philosophy, Protection and Automation scheme philosophy, SCADA & Telemetry, Metering and Street lighting standards.
 - 7.1.9.3 All procured electrical equipment shall comply with Council's standardised electrical equipment requirements.
 - 7.1.9.4 The electrical installation shall comply with the Electricity Supply Regulations No.19 of 1999 of the Local Authorities Act No. 23 of 1992 and applicable section of the Electricity Act No. 4 2007.

- 7.1.9.5 All electrical related construction work is to be done under the supervision of a Professional Engineer (Electrical), to be appointed by the Developer to the reasonable satisfaction of the Council's representative.
- 7.1.10 Prior to completion of the design phase, the duly appointed Engineer of the Developer shall arrange a meeting with the Council's Representative and the Developer, to explain and obtain agreement on the proposed designs of the internal electrical services and their compliance to Council's standards to be agreed. Minutes of such meeting shall be prepared by the Developer's Engineer, and submitted within 7 days of such meeting to the other Party.
- 7.1.11 Final Designs shall be submitted for approval to the Council prior to construction. Workmanship standards shall be specified to be in accordance with Council's standards.
- 7.1.12 During the construction phase, the Council's Representative or his delegate within the Council's Electricity Department who may deem necessary to attend site meetings shall be invited to attend site meetings between the Developer's Engineer and the Developer's Contractor. Minutes of such meetings must be prepared by the said Engineer, and submitted within 7 days of such meeting to all the other Parties. The take-over procedure shall be as provided in Chapter 10 of the General Conditions and Particular Conditions in Section 2.
- 7.1.13 All electrical designs are to be done on a CAD system in line with the Council's current CAD policy (current AutoCAD 2012, dwg file format, no dxf files will be accepted) and the information be made available to the Council's Representative, and
- 7.1.14 A complete set of As-built documents (current AutoCAD 2012, dwg file format, no dxf files will be accepted) shall be submitted to the Council prior to the final takeover.
- 7.1.15 Ducts and Electrical cables shall be installed before any street is tarred.

7.1.16 All street lighting installations must be completed before the sidewalks are finished off.

8 DESIGN CRITERIA AND SPECIFICATIONS FOR ROADS AND STORMWATER STRUCTURES

8.1 GENERAL

8.1.1 The Developer hereby notes that Design criteria (unless otherwise specified herein) are to be in accordance with the "The Guidelines for human settlement, planning and design" as published by the Council of Scientific and Industrial Research (CSIR) and is available on-line at http://www.csir.co.za/Built_environment/RedBook/. This document is hereinafter referred to as the "Red Book".

8.1.2 The Developer hereby notes that Materials and construction standards (unless otherwise specified herein) are to comply with the latest edition of SABS 1200, or any applicable revisions.

8.1.3 The information contained herein applies to normal developments and is of a general nature. Increased and/or reduced standards might be applicable where appropriate.

8.1.4 The Developer and its Engineer shall note that once a design (drawings) has been submitted to the Council and has been accepted, no amendments to the designs will be entertained during the construction stage.

8.2 STANDARD DRAWINGS

The following Council Standard Drawings shall be used for designs and during construction:

8.2.1 Flood line information that is enforced by legislation from Government

8.2.2 The Red Book as detailed above

- 8.2.3 The SABS set of documents, or any applicable revisions
- 8.2.4 Set of TRH documents
- 8.2.5 Service development guidelines
- 8.2.6 Specific requirements as communicated and agreed to in consultation meetings with Developer's Engineer.

8.3 CIVIL ENGINEERING WORKS: ROADS AND STORMWATER STRUCTURES

The DEVELOPER shall be responsible for:

- 8.3.1 The design and to construct to the satisfaction of the Council of all roads and stormwater structures, including all costs thereof and professional fees, necessary to ensure the reasonable access to the entirety of each approved Township Extension of all future residents and occupants assuming maximum permitted development and sale of all erven within each approved Township Extension.

The following shall further be ensured by the DEVELOPER:

- 8.3.2 The Developer shall ensure that the minimum width of all constructed roads at the turning circle is at least 25 metres (10.5 metre radius with 2 metre sidewalk).
- 8.3.3 The Developer shall provide services (electricity, water and sewerage) sufficient to supply the maximum needs of all future residents and occupants of each approved Township Extension, assuming maximum permitted development and sale of all erven within each approved Township Extension. Such services shall be provided to the satisfaction of Council representative in accordance with municipal specifications and standards attached herein.
- 8.3.4 The Developer shall ensure that all stormwater from the streets shall be accommodated in a stormwater system approved by the Council for the purpose of carrying stormwater through the erven to the river, all to the satisfaction of the Council Representative.
- 8.3.5 The Engineer of the Developer shall evaluate the road network and advise on

access control measures at intersections together with plans submitted for any new Township Extension, to accommodate traffic growth experienced with the development of a Township Extension.

8.3.6 The Developer shall be responsible for corresponding proposed changes including the installation of traffic lights.

8.3.7 Further requirements and standards regarding civil engineering works (roads and stormwater):

8.3.7.1 Streets are to be surfaced with Bitumen or paving blocks (interlocks) or as specified by the Council's Representative. All roads in excess of 15% slope shall be paved.

8.3.7.2 All submissions of designs for Council's approval shall include evidence that a proper pavement design has been done, and that available materials have been taken into account.

8.3.7.3 That in specific cases (limited to residential streets only) a 'light pavement design' in terms of TMH 14 and which includes a subbase of specification standard G5(R) can be accepted, where 'R' signifies a relaxed strength standard G5 material. The strength requirement for the G5(R) shall be a minimum CBR of 35 at 95% compaction.

8.3.7.4 Allowance for higher compactive effort as provided for in the COLTO Standard Specification will be considered in isolated cases, and only upon the Engineer's prior motivation to the Council's QMO.

8.3.7.5 The Developer is herewith informed that material strength in the Windhoek basin area may be marginal, and the availability and strength of material will need to be taken into account during the pavement design. Modification of materials to achieve the required strength may be necessary;

8.3.7.6 The street name posts, road signs and road markings are to be done according to the design plan approved by the Council.

- 8.3.7.7 Road gradients and cul-de-sac-street-reserve widths shall be in accordance with the Standard Municipal Design Criteria, as specified herein or alternatively as approved by the Strategic Executive: Infrastructure.
- 8.3.7.8 The Developer must ensure that the width of the streets/roads should be sufficient to accommodate refuse trucks and turning circles in cul-de-sacs should be designed in such a way that such trucks can turn easily.
- 8.3.7.9 Soils laboratory to be used on the Project for purposes of testing materials or workmanship, either for process control or acceptance control. Except in the case of 'approved laboratories' as defined in SABS 1200, it is a requirement that such laboratories are regularly exposed to a proficiency testing regime approved by the Council's representative.