Site Assessment Report

City Life — 477 Anton Lembede Street, Durban CBD

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Meter supply partner: Precision Meters (Pty) Ltd

1. Executive Summary

Precept Systems conducted a site visit at City Life, 477 Anton Lembede Street, Durban CBD on 29 January 2026. The building is a 27-storey residential high-rise owned by Mosaic Group (2,500+ residential units, 7,000+ tenants across multiple brands). The scope covers the first 12 floors (576 units at 48/floor). The upper floors accommodate a different tenant type and are excluded from this phase.

The building has no individual water metering. Tenants pay a flat R400/month; Mosaic Group absorbs the full municipal water bill (~R1.2M/month). The client requires **576 unit meters** (15mm), **12 bulk floor meters** (50mm), automated telemetry, and ERP integration.

> **Recommendation:** Precision Meters Ultrasonic 15mm (576x) and Ultrasonic 50mm (12x) with pulse output, each connected to a Precept-designed LoRaWAN telemetry node. Private LoRaWAN network (868 MHz, EU863-870, ChirpStack) with 4 gateways using the building's existing UniFi ethernet for backhaul. Total: 588 meters + 588 nodes, phased rollout.

2. Building Profile

Building	City Life
Address	477 Anton Lembede Street, Durban CBD
Owner	Mosaic Group
Total floors	27
Floors in scope	12 (first 12)
Units per floor	48
Total units	576
Building age	~60 years
Construction	Reinforced concrete, brick, steel
Floor slab	Est. 200–300mm RC (1960s-era)

3. Water Infrastructure

Municipal supply	110mm, ground level
Supply path	Rooftop tanks → gravity-fed riser
Main riser	75mm (single, full building)
Floor branch	50mm (at each floor)
Unit feed	16mm (to each apartment)
Feed type	Single riser (not ring)
Isolation	Per unit valve + per riser/floor
Meter location	Passage ceiling, above front door

Mosaic Group's portfolio includes City Life (2,500+ units), Ole (student housing), Luna (furnished apartments). Success here may extend to other properties.

4. Current Water Operations

Municipal bill	**R1.2M/month** (all 27 floors)
Tariff	R65.91/kL
Consumption	~10,500 kL/month (entire building)
Tenant charge	Flat R400/month (no usage basis)
Leak detection	Visual/reported only
Estimated loss	Unknown — no measurement

5. Problems Identified

1	No usage visibility per unit
2	No tenant incentive to conserve
3	No leak detection (hidden leaks)
4	Manual reading of 576 meters impractical
5	Building bears full cost — no recovery
6	Water restrictions unenforceable
7	System silos — no ERP integration

6. Meter Requirements

Type	Application	Pipe	Qty	Purpose
Unit meter	Apartment feed	15mm	576	Per-unit consumption & billing
Bulk floor meter	Floor branch	50mm	12	Leak detection & water balance

Total	**588**

Site-Specific Constraints

Constraint	Implication
Durban water quality (sediment/grit)	Ultrasonic (no moving parts) strongly preferred over mechanical
Passage ceiling, mixed orientation	Position-independent (U0D0) meters essential
No straight pipe sections available	Eliminates meters requiring upstream/downstream runs
576 meters at scale	Battery >10 years, maintenance-free, no moving parts
Manual reading impractical	Automated telemetry via LoRaWAN nodes required — 576 meters cannot be read manually
Leak detection is primary driver	Low-flow sensitivity critical for bulk meters

7. Recommended Meter Selection

7.1 Unit Meters — Precision Meters Ultrasonic 15mm

Specification	Value	Site Relevance
Technology	Ultrasonic (no moving parts)	Resistant to Durban sediment/grit
Body length	110mm	Fits passage ceiling space
Qmin (Class C)	7.5 L/h	Detects very low flows
Sensitive to	1 L/h	Dripping tap detection
Installation	Any position (U0D0)	Mixed orientation in ceiling
IP rating	IP68	Fully submersible
Battery	>16 years	Exceeds 10-year horizon
Data logger	Hourly, daily, monthly	Resilience if comms fail
Standards	SANS 1529-1:2019 Class C/D	SA legal metrology compliant
Output	**Pulse output, NFC, data logger**	**Pulse connects to external LoRaWAN node for telemetry**

> **Key advantage:** Each meter's pulse output connects to a Precept-designed LoRaWAN node (RAK3172-based). This gives full control over firmware, transmit intervals, payload format, and future valve integration. The meter's own battery (>16 years) powers metering independently; the node has a separate Li-SOCl2 battery (6–15 year life). Leak, burst, backflow, and tamper alarms are detected by the meter and relayed via the node.

7.2 Bulk Floor Meters — Precision Meters Ultrasonic 50mm

Same ultrasonic range recommended for 12 bulk meters. The 32–50mm spec sheet's third column (higher flow rates, 255mm body) has been confirmed as the 50mm variant.

7.3 Why Not Woltmann for Bulk? Why Not ASM Polymer for Unit?

Bulk meter factor	Ultrasonic 50mm	Woltmann 50mm
Qmin	**72 L/h**	**240 L/h**
Leak sensitivity	3.3x better	Misses small leaks
Telemetry	Pulse output → external node	Pulse output → external node
Moving parts	None	Turbine bearings

A running toilet at ~100 L/h: detected by ultrasonic, missed by Woltmann.

Unit meter factor	Ultrasonic 15mm	ASM Polymer 15mm
Moving parts	None	Rotary piston
Qmin	7.5 L/h	15 L/h
Telemetry	Pulse output → external node	Pulse output → external node
Enclosure needed	No (IP68)	Yes (legal req.)
Sediment resilience	Excellent	At risk

8. Communications Architecture — Why LoRaWAN

8.1 The Challenge

Reliably collect data from 588 meters across 12 reinforced concrete floors, with 10+ year battery life, no new cabling (rejected by client), no interference with tenant WiFi, and support for future valve control.

8.2 868 MHz LoRaWAN Signal Analysis for This Building

Material (868 MHz)	Attenuation
RC floor slab (150–250mm)	18–25 dB
RC slab (1960s-era, denser)	22–28 dB

Link Budget	Value
TX power	+14 dBm (ICASA limit)
RX sensitivity (SF12)	-137 dBm

Brick/masonry wall (110mm)	3–5 dB
Steel fire door	15–18 dB
Plumbing riser (metal)	5–10 dB

Sources: ITU-R P.2040, field studies in 1960s-era buildings.

Max link budget	**~157 dB**
Atten. per slab (conservative)	23 dB
Floors per gateway	**3 (at SF7, battery-optimal)**

Gateway	Location	Primary
GW-1	Floor 3	Floors 1–3
GW-2	Floor 6	Floors 4–6
GW-3	Floor 9	Floors 7–9
GW-4	Floor 12	Floors 10–12

Four gateways with deliberate overlap zones (67% dual-gateway coverage). ChirpStack handles deduplication. Meters and nodes are in passage ceilings (open corridors), not inside sealed apartments — vertical penetration through floor slabs only.

8.3 LoRaWAN vs WiFi vs Ethernet

Factor	LoRaWAN (868 MHz)	WiFi (2.4 GHz)	Wired Ethernet
Building penetration	Excellent (sub-GHz)	Poor in concrete	N/A (wired)
Node battery life	**6–15 years**	**6–18 months**	No battery (PoE)
Spectrum congestion	None (dedicated band)	Severe (13–15 APs/floor)	None
10-year battery cost (576)	**R0–R90K**	**~R864,000**	R0
Infrastructure cost (12 floors)	R28–36K (4 gateways)	~R0 (existing APs)	R145K–R200K
Reliability	High (CSS, below noise floor)	Low (contention, interference)	Very high
Client acceptance	**Accepted**	Possible	**Rejected** (cost)

> **Critical factor:** Each meter connects to a Precept-designed LoRaWAN node via pulse output. The meter battery (>16 years) powers metering; the node battery (Li-SOCl2, 6–15 years) powers the radio. WiFi nodes would require battery replacement every 12–18 months at ~R172,800 per cycle.

8.4 Private LoRaWAN (ChirpStack) vs Public Networks

Factor	ChirpStack (Private)	Public (TTN, Loriot, etc.)
Monthly subscription	R0	R0 (TTN, limited) or R15–45/device
10-year cost (588 devices)	~R50,000 (hosting)	R0 (TTN) or R1M–R3M
Data sovereignty	Full (SA-hosted, POPIA)	EU/US cloud
Downlink (future valves)	Full (Class A/B/C)	Limited (TTN: 10/day)
Device limits	Unlimited	Fair Use or per-device

Precept Systems already operates ChirpStack in production for water monitoring deployments — proven and portable.

8.5 Architecture Summary

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Precision Meters Ultrasonic 15mm (576x) + 50mm (12x)
            |  Pulse output
            v
Precept LoRaWAN Nodes (588x) — RAK3172, Li-SOCl2 battery
            |  868 MHz LoRaWAN uplink (EU863-870)
            v
LoRaWAN Gateways (4x) — Floors 3, 6, 9, 12
PoE from existing UniFi switches
            |  Ethernet (existing Cat6)
            v
ChirpStack Network Server (self-hosted, SA)
            |  MQTT / API
            v
Water Monitoring Platform (dashboard, billing, alerts)
            |  REST API / CSV / PDF
            v
Tenant Management / ERP Integration
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9. IT Infrastructure & Installation

Existing IT (no changes needed)

10. Installation Considerations

Network	Ubiquiti / UniFi managed
APs per floor	13–15
Internet	1 Gb fibre (Vox)
Cabling	Cat6 solid copper throughout
Switches	UniFi managed per floor (PoE)
VLANs	Available (Sumir can allocate)
UPS	Comms room + all switches
Rooftop	Power, ethernet, secure access

Each gateway needs one Cat6 to nearest switch. PoE provides power + data. No additional infrastructure.

Mounting	Passage ceiling, above front door
Isolation valve	Existing per unit
Orientation	Mixed — U0D0 meters required
Shutoff method	Per riser on each floor
Install time	~1 hour per unit
Window	10:00–14:00 preferred
Plumbing	Ryan (Mosaic, in-house)
IT support	Sumir (Mosaic, in-house)

Installation involves plumbing (meter) plus mounting and connecting the LoRaWAN node (pulse wire to meter). Nodes are pre-configured — no per-unit software setup required on site.

11. Phased Rollout Plan

Phase	Scope	15mm	50mm
Pilot	1 floor + 5 units	5	1
Phase 1	Complete pilot floor	+43	—
Phase 2	Floors 1–4	+192	+4
Phase 3	Floors 5–8	+192	+4
Phase 4	Floors 9–12	+192	+3
Total	**12 floors**	**576**	**12**

Gateway Rollout

Gateway	Phase	Location	Covers
GW-1	Pilot	Floor 3	Floors 1–3
GW-2	Phase 2	Floor 6	Floors 4–6
GW-3	Phase 3	Floor 9	Floors 7–9
GW-4	Phase 4	Floor 12	Floors 10–12

Pilot Design Principles

- Same meter model as full deployment
- Pilot gateway becomes permanent GW-1
- Production-grade platform from day one
- Recommended floor: **3 or 4**

12. Next Steps

#	Action	Owner
1	Review this site assessment and supporting documents (business case, technology validation)	Mosaic Group
2	Confirm scope and priorities for pilot phase	Mosaic Group / Precept
3	Agree on pilot floor selection (recommended: Floor 3 or 4)	Mosaic Group / Precept
4	Formal proposal with detailed pricing and timeline	Precept Systems
5	Pilot deployment upon agreement	Precept Systems / Ryan (plumbing)
6	Pilot validation and review before full rollout	Joint