



Development & Ownership Models *for* Community-Scale Systems

A practical development pathway for
community-scale wastewater schemes

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Infrastructure Challenges

- **Rural/peri-urban:** complex terrain + dispersed homes with limited access to reticulated networks
- **Conventional wastewater:** costly/complex - long conveyance distances, operational complexity & capacity constraints
- Network capacity limits drive need for **alternative models**

Why Land Treatment for Community-Scale Schemes

Infrastructure
Challenges

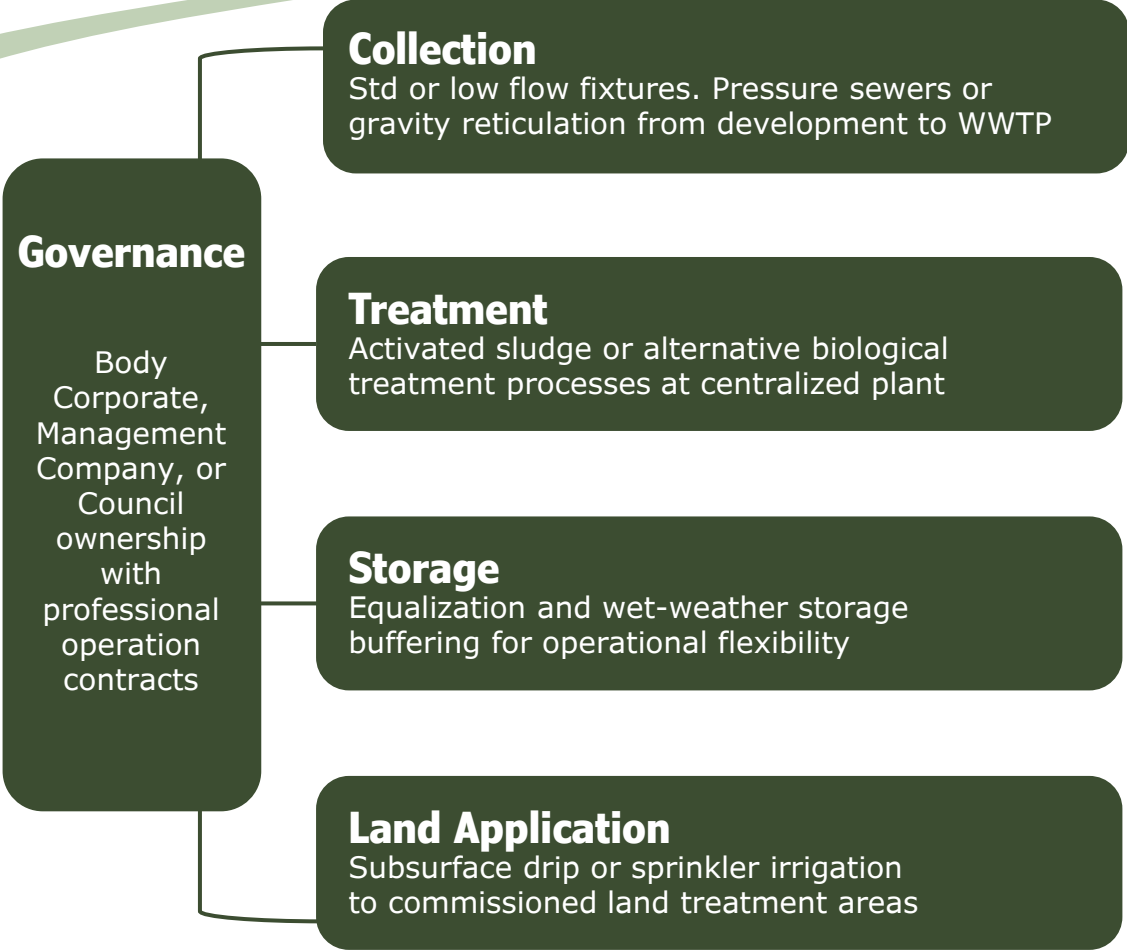


Land Treatment Benefits

- *Land treatment: central/semi-central WWTP + land discharge; soil & vegetation*
- Supports **staged build-out**: expand with development to reduce upfront capital while staying within loading limits
- **Operational flexibility** for compliance: WWTP performance + available land treatment capacity
- **Ownership** can vary (body corporate, Residents association, developer, hybrid, council) while achieving same environmental outcomes with robust operational controls



System Components Overview



Development Pathway from Concept to Consent

Step 1: Regulatory Framework

Soil testing, nutrient assessment, staged consent with flow triggers and land-based caps

Step 2: Physical Delivery

Procurement strategy, tender evaluation, staged construction aligned with demand

Step 3: Governance Models

Ownership structure, O&M manuals, professional contracts, title obligations ensuring certainty



Flows as the Foundation

Flow Parameter	Value / Description
Population Basis	Per-person rate × occupancy × dwelling count
Standard Per-Person Rate	250 L/person/day (conservative design basis)
Typical Occupancy Assumption	3 persons/dwelling (residential), 2 persons/hotel key
Average Occupancy Factor	80% to 100% for annual average flow calculations
Peak Wet Weather Flow	1.3 to 2× design flow (I&I allowance for pressure or gravity sewers)

Design vs Consented Flow - Critical Distinction



Design Flow: WWTP Sizing Basis

- Expected peak daily flow for sizing
- Sewer network = instantaneous flow
- Engineering basis for equipment
- LTA = daily flows
- Calculated as peak dry weather flow



Consented Flow: Regulatory Limit for Discharge Consent

- Max discharge: often peak wet weather flow + infiltration & inflow
- Regulatory ceiling; monitoring & reporting for compliance
- Staged developments: ultimate capacity = flow triggers to phase commissioning

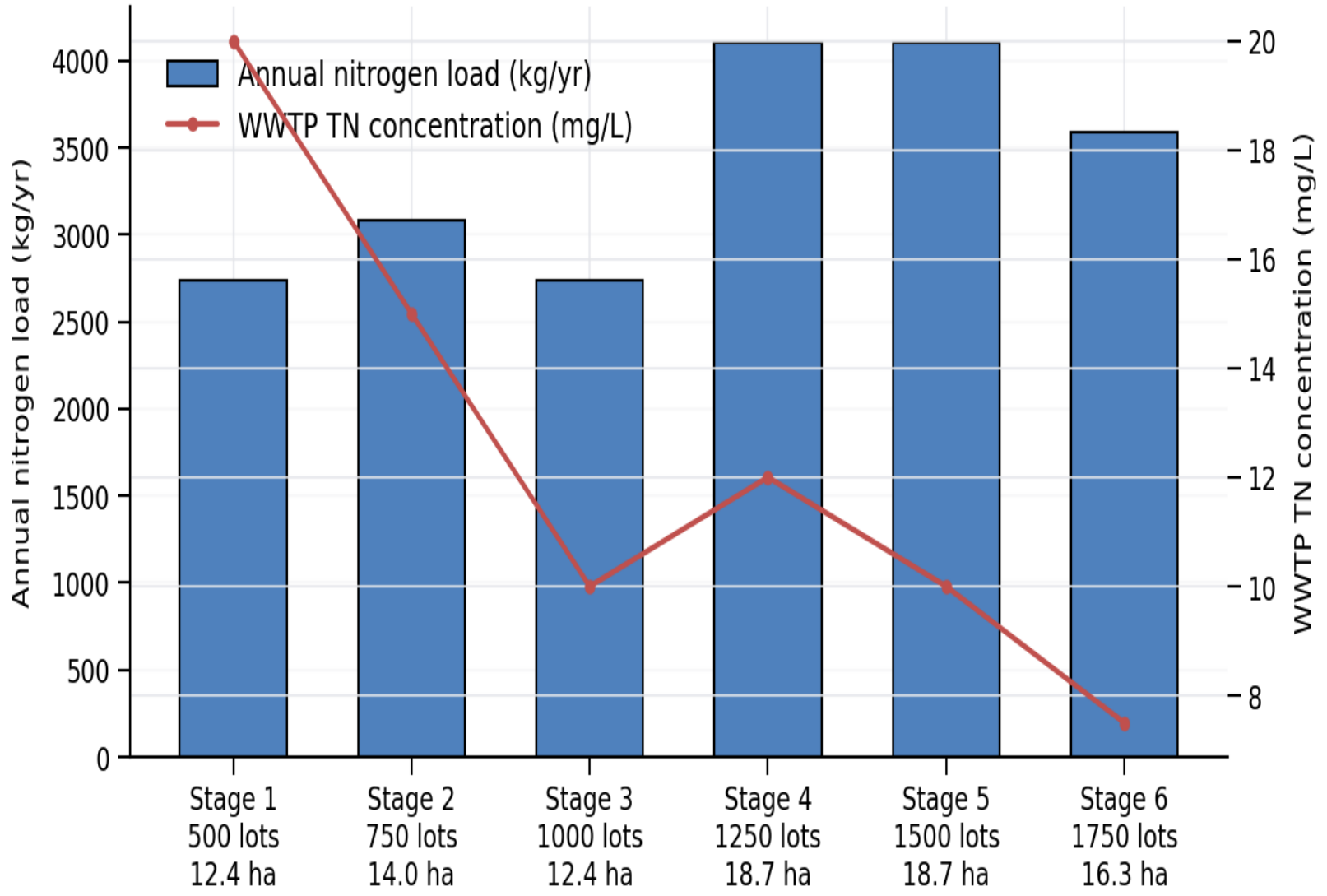
Land Area Planning - Hydraulic Loading Framework

Methodology Component	Description
Soil Testing Methods	Plate permeameter, double-ring infiltrometer, laboratory testing
Application Rate Setting	Align with limited factor unsaturated/saturated conductivity to maintain root zone treatment benefit while staying below saturated limits
Typical Hydraulic Loading	3-25 mm based on return periods
Setback Requirements	Minimum distances from waterways, property boundaries, bores, and sensitive areas
Protection Zones	Reserve areas for future expansion, buffer zones, and operational flexibility



Nutrient Loading - The Critical Constraint

Nitrogen load and WWTP TN concentration by development stage



System Integration

- Soil Hydraulics, Staging, Monitoring

Soil Hydraulics

Field testing informs application rates respecting unsaturated storage benefits and saturated intake limits

Staged Expansion

Flow-based triggers link WWTP upgrades and LTA commissioning to measured flows and actual build-out

Integrated Treatment Train

Performance Monitoring

Commissioning verification, ongoing compliance monitoring, and reporting requirements for each stage

Operational Controls

O&M manuals, irrigation scheduling, maintenance routines, and contingency response procedures

Collective Governance - Not Individual Onsite Systems

Governance Model	Example Key Characteristics
Resident Association (Jacks Point)	Resident-owned, professional operation, 650 m ³ /day capacity
Developer-Owned (Homestead Bay)	Private ownership with future vesting flexibility, staged to 2005 m ³ /day
Hybrid Model (Cardrona Valley)	Developer-led consents transitioning to council ownership and operation, 600 m ³ /day capacity
Council Ownership (Kingston Village)	Public ownership from start or post-transition, full operational responsibility

Key Lessons

Secure

Secure land access early in masterplanning

Use

Use conservative flow and loading assumptions for consenting

Embed

Embed staging in consent structure





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