LOWE Environmental Impact

Development & Ownership Models *for* Community-Scale Systems

A practical development pathway for community-scale wastewater schemes

Brian Ellwood

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

Governance

Body Corporate, Management Company, or Council ownership with professional operation contracts

Collection
Std or low flow fixtures. Pressure sewers or gravity reticulation from development to WWTP

Treatment
Activated sludge or alternative biological treatment processes at centralized plant

Storage
Equalization and wet-weather storage buffering for operational flexibility

Land Application
Subsurface drip or sprinkler irrigation to commissioned land treatment areas

Development Pathway from Concept to Consent

Step 1: Regulatory Framework
Soil testing, nutrient assessment, staged consent with flow triggers and land-based caps

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Procurement strategy, tender evaluation, staged construction aligned with demand

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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

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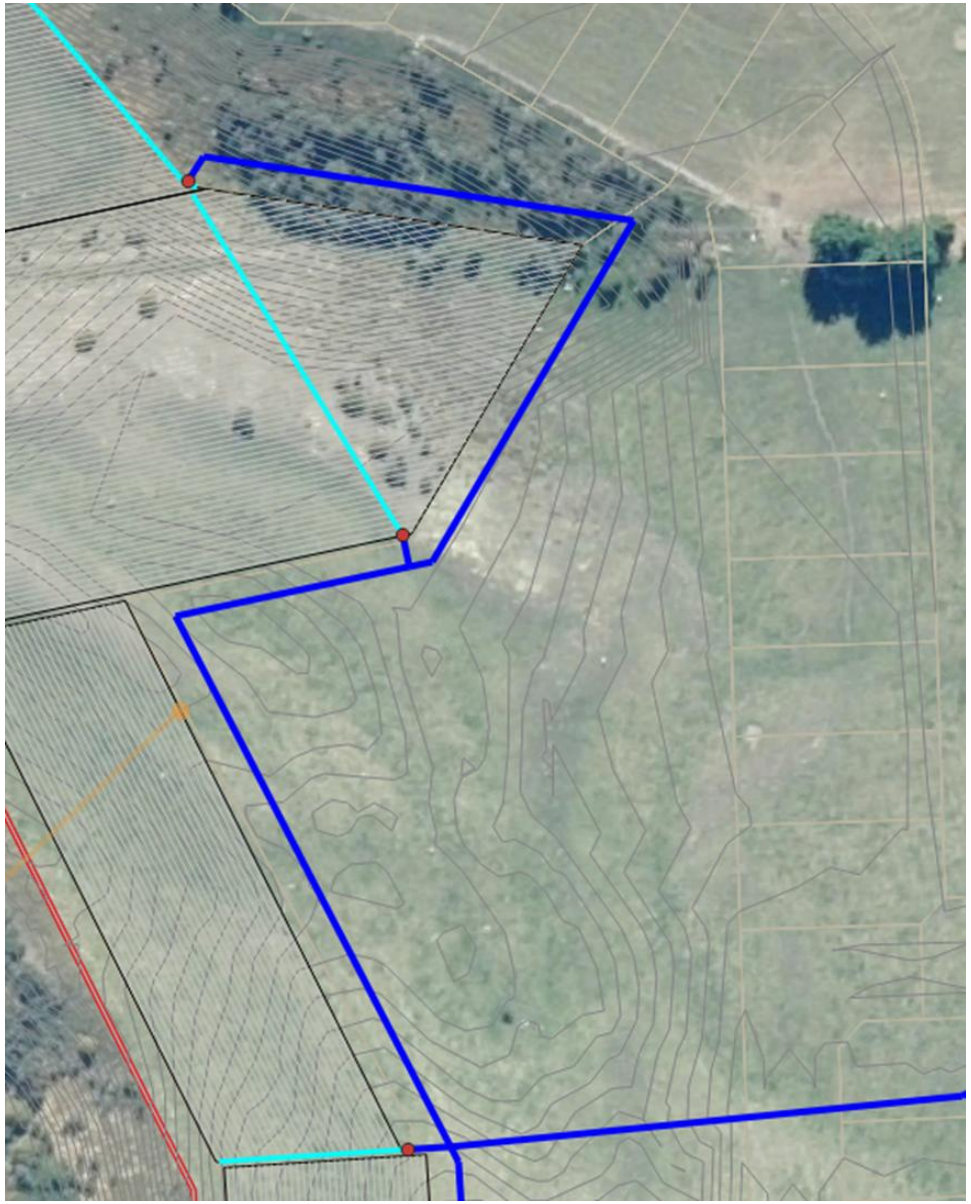
Consented Flow: Regulatory Limit for Discharge Consent

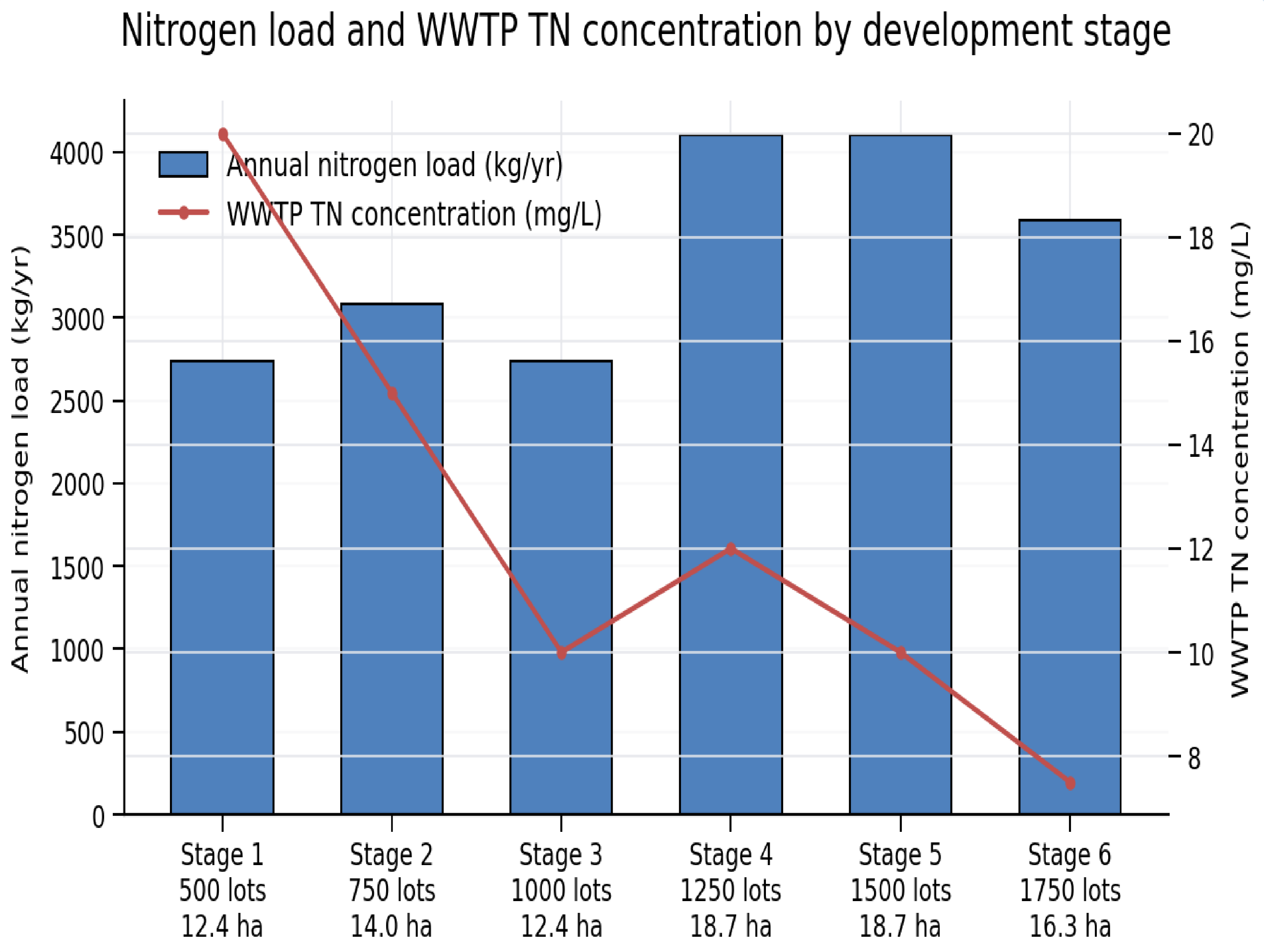
- Max discharge: often peak wet weather flow + infiltration & inflow
- Regulatory ceiling; monitoring & reporting for compliance
- Staged developments: ultimate capacity = flow triggers to phase commissioning

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



System Integration
- Soil Hydraulics, Staging, Monitoring

Integrated Treatment Train

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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
- Use
- Embed

Key Lessons

Secure

Secure land access early in masterplanning

Use

Embed

Key Lessons

Secure — Secure land access early in masterplanning

Use — Use conservative flow and loading assumptions for consenting

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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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office@lei.co.nz | www.lei.co.nz | 06 359 3099