Interactive Map

Lake Bennett Estate - Operations and Maintenance Manual ## Overview

This comprehensive manual serves as the official documentation for the Lake Bennett Estate, providing essential information for property owners, residents, and estate management. The manual covers all aspects of the estate's infrastructure, services, rules, and maintenance requirements to ensure the sustainable operation and preservation of this unique Northern Territory community.

Download the full manual as a PDF

Table of Contents

> **Note:** This documentation is currently under development. Sections 1-4 are available, with additional sections being added progressively.

1. Introduction

2. Site Plan and Layout

3. Infrastructure Services

4. Roads and Access

Getting Started

Visit our Getting Started guide to begin your journey.

How to Use QR Codes

Each page in this documentation includes a QR code that you can scan to quickly access the content on your mobile device. Look for the QR code at the bottom of each page.

Contributing

We welcome contributions to our documentation. Please see our contribution guidelines for more information.

Getting Started

This guide will help you get started with using our documentation effectively.

Navigation

The documentation is organized into several sections:

1. **Top Navigation**: Use the navigation tabs at the top to switch between major sections
2. **Side Navigation**: Use the sidebar to find specific pages within each section
3. **Search**: Use the search bar at the top to find specific topics quickly

Using QR Codes

Every page in our documentation includes a QR code that you can use to:

1. Quickly access the page on your mobile device
2. Share the page with others
3. Save the page for offline reference

Simply scan the QR code with your mobile device's camera to open the page.

Dark Mode

We support both light and dark modes:

1. Click the theme toggle button in the top right corner
2. Your preference will be saved for future visits
3. The theme will automatically match your system preferences

Search Tips

Our search functionality supports:

- Exact phrase matching using quotes: "exact phrase"
- Keyword combinations
- Automatic suggestions as you type

Need Help?

If you need any assistance:

1. Use the search function to find relevant topics
2. Check the FAQ section
3. Contact our support team

Interactive Map

The Lake Bennett Estate Master Site Map provides a comprehensive view of the entire estate, including all lots, infrastructure, and natural features. This document serves as the primary reference for understanding the estate's layout and development.

Interactive Map Module (Leaflet + KMZ)

Overview - Embeddable Leaflet map for MkDocs pages via a simple

. - Satellite basemap (Esri World Imagery). - Toggleable overlays loaded from KMZ/KML/GeoJSON. - Popups display feature attributes (name, description, all properties). - Responsive: height controlled via data-height (e.g. 60vh).

Usage 1) Ensure mkdocs.yml includes the CSS/JS (see Integration below). 2) Place your overlay files under docs/assets/maps/overlays/ (or any path MkDocs serves). 3) In a Markdown page, add a container div:

```
<div class="lb-map"
     data-center="-12.916,131.300"
     data-zoom="14"
     data-height="60vh"
     data-overlays='[
       {"name":"Water Mains","url":"/assets/maps/overlays/water-mains.kmz"},
       {"name":"Sewer Lines","url":"/assets/maps/overlays/sewer.kmz"}
     ]'>
</div>
```

Data Attributes - data-center: "lat,lng" (optional) - data-zoom: number (optional) - data-height: CSS size (e.g. 480px, 60vh). Default 60vh - data-autofit: true/false (default true) to fit bounds to overlays - data-overlays: JSON array of { name, url, type? } where type is kmz|kml|geojson (optional; auto-detected from extension) - data-kmz: Comma-separated list of KMZ URLs (fallback if data-overlays not provided)

Integration (mkdocs.yml) Add the following:

```
extra_css:
  - https://unpkg.com/leaflet@1.9.4/dist/leaflet.css
  - assets/maps/leaflet-map.css

extra_javascript:
  - https://unpkg.com/leaflet@1.9.4/dist/leaflet.js
  - https://cdnjs.cloudflare.com/ajax/libs/jszip/3.10.1/jszip.min.js
  - https://unpkg.com/@tmcw/togeojson@5.8.0/dist/togeojson.umd.js
  - assets/maps/leaflet-map.js
```

Notes - KMZ is handled in-browser by unzipping (JSZip) and converting KML to GeoJSON (toGeoJSON). - For very large KMZ, preprocessing to GeoJSON is recommended (see kmz_to_geojson.bat). - Ensure overlay URLs are same-origin (served by MkDocs) to avoid CORS issues. - Esri World Imagery is used for satellite basemap; review Esri terms if deploying publicly.

Optional Preprocessing (Windows) Use kmz_to_geojson.bat with GDAL ogr2ogr installed (e.g., OSGeo4W):

```
kmz_to_geojson.bat input.kmz output.geojson
```

Interactive Map Module (Leaflet + KMZ)

Overview - Embeddable Leaflet map for MkDocs pages via a simple

. - Satellite basemap (Esri World Imagery). - Toggleable overlays loaded from KMZ/KML/GeoJSON. - Popups display feature attributes (name, description, all properties). - Responsive: height controlled via data-height (e.g. 60vh).

Usage 1) Ensure mkdocs.yml includes the CSS/JS (see Integration below). 2) Place your overlay files under docs/assets/maps/overlays/ (or any path MkDocs serves). 3) In a Markdown page, add a container div:

```
<div class="lb-map"
     data-center="-12.916,131.300"
     data-zoom="14"
     data-height="60vh"
     data-overlays='[
       {"name":"Water Mains","url":"/assets/maps/overlays/water-mains.kmz"},
       {"name":"Sewer Lines","url":"/assets/maps/overlays/sewer.kmz"}
     ]'>
</div>
```

Data Attributes - data-center: “lat,lng” (optional) - data-zoom: number (optional) - data-height: CSS size (e.g. 480px, 60vh). Default 60vh - data-autofit: true/false (default true) to fit bounds to overlays - data-overlays: JSON array of { name, url, type? } where type is kmz|kml|geojson (optional; auto-detected from extension) - data-kmz: Comma-separated list of KMZ URLs (fallback if data-overlays not provided)

Integration (mkdocs.yml) Add the following:

```
extra_css:
  - https://unpkg.com/leaflet@1.9.4/dist/leaflet.css
  - assets/maps/leaflet-map.css

extra_javascript:
  - https://unpkg.com/leaflet@1.9.4/dist/leaflet.js
  - https://cdnjs.cloudflare.com/ajax/libs/jszip/3.10.1/jszip.min.js
  - https://unpkg.com/@tmcw/togeojson@5.8.0/dist/togeojson.umd.js
  - assets/maps/leaflet-map.js
```

Notes - KMZ is handled in-browser by unzipping (JSZip) and converting KML to GeoJSON (toGeoJSON). - For very large KMZ, preprocessing to GeoJSON is recommended (see kmz_to_geojson.bat). - Ensure overlay URLs are same-origin (served by MkDocs) to avoid CORS issues. - Esri World Imagery is used for satellite basemap; review Esri terms if deploying publicly.

Optional Preprocessing (Windows) Use kmz_to_geojson.bat with GDAL ogr2ogr installed (e.g., OSGeo4W):

```
kmz_to_geojson.bat input.kmz output.geojson
```

1.1 Purpose of This Manual

Purpose Statement

This manual serves as the definitive guide for the Lake Bennett Estate, providing comprehensive documentation of all operational, maintenance, and regulatory requirements. It is designed to ensure consistent management and preservation of the estate’s unique character and infrastructure.

Key Objectives

1. **Standardization of Operations**
   - Establish clear procedures for estate management
   - Define maintenance requirements and schedules
   - Ensure consistent service delivery across the estate
2. **Resource Management**
   - Document water, power, and infrastructure systems
   - Provide guidelines for sustainable resource usage
   - Outline maintenance responsibilities and procedures
3. **Compliance and Safety**
   - Detail regulatory requirements specific to NT
   - Establish safety protocols for residents and visitors
   - Document emergency procedures and contacts
4. **Property Owner Guidance**
   - Clarify owner responsibilities and rights
   - Provide development and maintenance guidelines
   - Outline estate rules and regulations

Target Audience

- Property owners and residents
- Estate management staff
- Contractors and service providers
- Local authorities and regulatory bodies
- Prospective buyers and developers

Document Status

This is a living document that will be updated as required to reflect: - Changes in regulations and requirements - Updates to infrastructure and systems - New policies and procedures - Community feedback and improvements

How to Use This Manual

1. Refer to the Table of Contents for specific topics
2. Use the search function to find particular information
3. Follow the QR codes for mobile access to specific sections
4. Contact estate management for clarification if needed

Version Control

Current Version: 1.0 Last Updated: [Current Date] Next Review Date: [Date + 6 months]

1.2 Scope and Application

Legal Framework

Land Title Act 2005

The Lake Bennett (Land Title) Act 2005 establishes the legal framework for the estate, including:

Key Provisions

- Creation and registration of property instruments
- Development and planning controls
- Easement rights and obligations
- Water usage and management
- Property ownership restrictions
- Unit title provisions

Section 1252 Specific Requirements

- Maximum of 64 dwellings in condominium development
- All development must be single storey
- Height restriction of 5 meters
- Waste water and septic facilities must be sited at least 100m from the full supply level of the lake
- No domestic livestock permitted
- Recreational easement rights over lake and foreshore
- Service easement requirements for utilities

Real Property (Unit Titles) Act 1975

The Unit Titles Act governs the management of section 1252, including:

Key Provisions

- Body corporate constitution and management
- Unit entitlements and ownership
- Common property management
- Unit title registration
- Development controls
- Maintenance responsibilities

Specific Requirements

- Body corporate administration
- Unit entitlement certification by valuer
- Common property maintenance
- Service infrastructure management
- Recreational facility access
- Development approval processes

Manual Coverage

This manual covers all aspects of the Lake Bennett Estate operations and maintenance, including:

Infrastructure Management

- Water supply and distribution systems
- Power and telecommunications networks
- Service roads and access infrastructure
- Drainage and environmental systems
- Service easements and utility corridors
- Common property infrastructure

Property Management

- Lot development guidelines
- Building requirements and height restrictions
- Landscape maintenance
- Property access and security
- Recreational facility management
- Unit title administration

Environmental Management

- Natural resource protection
- Wildlife conservation
- Fire management
- Waste management

- Lake and foreshore protection
- Water quality management

Community Management

- Estate rules and regulations
- Community facilities
- Emergency procedures
- Maintenance responsibilities
- Recreational access rights
- Body corporate operations

Application Areas

Geographic Scope

- All properties within Lake Bennett Estate boundaries
- Common areas and facilities
- Infrastructure corridors
- Conservation zones
- Lake and foreshore areas
- Section 1252 condominium development

Development Zones

- Condominium development area (section 1252)
- Lake and foreshore areas (sections 1254-1255)
- Common property areas

Limitations

Exclusions

- Individual property internal systems
- Private business operations
- Personal property maintenance
- Commercial development specifics
- Internal unit management
- Individual unit internal affairs

External Dependencies

- Northern Territory Planning Act 1999
- Water Act 1992
- Building Act 1993
- Real Property (Unit Titles) Act 1975
- Environmental protection laws

Regulatory Framework

Applicable Legislation

- Lake Bennett (Land Title) Act 2005
- Real Property (Unit Titles) Act 1975
- Northern Territory Planning Act 1999
- Water Act 1992
- Building Act 1993

Development Controls

- Height restrictions (8.5m for most areas, 5m for section 1252)
- Lot size requirements (minimum 8ha with 1ha unconstrained land)
- Building permit requirements
- Environmental protection measures
- Recreational facility guidelines
- Unit title development controls

Compliance Requirements

- Development approvals
- Environmental permits
- Infrastructure certifications
- Safety standards
- Land title requirements
- Water usage licenses
- Body corporate regulations

Implementation

Application Process

- New property development
- Infrastructure modifications
- Maintenance activities
- Emergency response
- Compliance procedures
- Recreational facility management

- Unit title administration

Enforcement

- Compliance monitoring
- Violation procedures
- Appeal processes
- Resolution mechanisms
- Legal requirements
- Environmental protection measures
- Body corporate rules enforcement

Updates and Revisions

Review Process

- Annual comprehensive review
- Quarterly minor updates
- Emergency amendments
- Community feedback integration
- Legal compliance updates
- Development control reviews
- Body corporate regulation updates

Change Management

- Update procedures
- Notification requirements
- Implementation timeline
- Training requirements
- Legal documentation
- Community consultation
- Body corporate approval process

Version Control

Current Version: 1.0 Last Updated: [Current Date] Next Review Date: [Date + 6 months]

Related Documents

- 1.1 Purpose of This Manual
- 1.3 Estate Overview
- 1.4 Contact Information
- Lake Bennett (Land Title) Act 2005
- Real Property (Unit Titles) Act 1975
- Northern Territory Planning Scheme
- Water Act 1992
- Building Act 1993

1.3 Estate Overview

Location and Setting

Lake Bennett Estate is situated in the Northern Territory, approximately 80km southeast of Darwin CBD. The estate is characterized by its unique natural setting, featuring:

- Lake Bennett as a central natural feature
- Native bushland and vegetation
- views of the surrounding landscape
- Natural watercourses and drainage systems

Estate Characteristics

Physical Attributes

- Section 1252 (Condominium Development Area):
  - Maximum of 64 dwellings
  - Single storey development only
  - Maximum height restriction: 5 meters
  - Located on the eastern side of Lake Bennett
  - Connected to reticulated potable water supply
  - Connected to centralized effluent disposal system

Natural Features

- Lake Bennett (permanent water body)
- Native vegetation zones
- Bushland reserves
- Recreational easement rights over lake and foreshore

Climate

- Tropical savanna climate
- Distinct wet and dry seasons
- Average annual rainfall: 1,500-2,000mm
- Temperature range: 20-35°C
- High humidity during wet season (November to April)

Development Status

Current Status

- Section 1252 Development:
  - Existing 64 dwellings
  - All dwellings must be single storey
  - Minimum 3m separation between dwellings
  - 5m setback from access driveway required

Future Development

- Infrastructure upgrade schedule
- Community facility development

Infrastructure Overview

Essential Services

- Water supply system:
  - Reticulated potable water supply
  - Connection to centralized effluent disposal system
  - Waste water facilities sited at least 100m from lake full supply level
- Power distribution network
- Telecommunications infrastructure
- Service Roads
- Drainage systems

Community Facilities

- Common property areas
- Recreational facilities
- Emergency services access
- Maintenance facilities
- Pontoon access rights (subject to conditions)

Environmental Management

Conservation Areas

- Fire management areas
- No domestic livestock permitted

Sustainability Initiatives

- Water conservation programs
- Waste water management
- Environmental monitoring
- Lake protection measures
- Native vegetation preservation

Community Profile

Demographics

- Maximum 64 dwellings in condominium development
- Mix of existing and new residents
- Body corporate management structure
- Community facilities access

Lifestyle Features

- Recreational opportunities:
  - Lake access rights
  - Pontoon usage (subject to approval)
  - Common property access
  - Recreational easement rights
- Community events
- Local amenities
- Access to services

Estate Management

Governance

- Body corporate management structure
- Unit title provisions under Real Property (Unit Titles) Act 1975
- Common property management
- Service easement management
- Recreational easement administration

Services

- Maintenance programs
- Security arrangements
- Emergency response
- Community support

- Body corporate services

Future Vision

Development Goals

- Infrastructure maintenance and upgrades
- Environmental protection
- Community facility enhancement
- Recreational access improvement

Strategic Objectives

- Sustainable development
- Community growth within limits
- Environmental preservation
- Quality of life enhancement
- Lake and foreshore protection

Contact Information

For more detailed information about specific aspects of the estate, please refer to the relevant sections of this manual or contact:

- Body Corporate Management: [contact details]
- Emergency Services: [contact details]
- Maintenance Services: [contact details]
- Community Services: [contact details]

Version Control

Current Version: 1.0 Last Updated: [Current Date] Next Review Date: [Date + 6 months]

1.4 Contact Information

Estate Management Office

General Inquiries

- Address: [Estate Office Address]
- Phone: [Main Office Number]
- Email: [General Email]
- Hours: Monday to Friday, 8:00 AM - 4:00 PM

Management Team

- Estate Manager: [Name and Contact]
- Operations Manager: [Name and Contact]
- Maintenance Coordinator: [Name and Contact]
- Community Services: [Name and Contact]

Emergency Contacts

Immediate Emergencies

- Police: 000
- Fire Brigade: 000
- Ambulance: 000
- Estate Security: [24/7 Number]

Estate Emergencies

- Water Supply: [Emergency Number]
- Power Outages: [Emergency Number]
- Road Access: [Emergency Number]
- Security Issues: [Emergency Number]

Maintenance Services

Regular Maintenance

- General Maintenance: [Contact]
- Water Systems: [Contact]
- Electrical Services: [Contact]
- Road Maintenance: [Contact]

Contractors

- Water Systems: [Company and Contact]
- Electrical Services: [Company and Contact]
- Road Maintenance: [Company and Contact]
- Landscaping: [Company and Contact]

Utility Providers

Water Services

- Provider: [Company Name]
- Emergency: [Number]
- Billing: [Contact]

Power Supply

- Provider: [Company Name]
- Emergency: [Number]
- Billing: [Contact]

Telecommunications

- Provider: [Company Name]
- Technical Support: [Number]
- Billing: [Contact]

Local Authorities

Council Services

- Local Council: [Name]
- Planning Department: [Contact]
- Environmental Services: [Contact]
- Building Services: [Contact]

Government Agencies

- NT Planning: [Contact]
- Water Resources: [Contact]
- Environmental Protection: [Contact]
- Emergency Services: [Contact]

Community Services

Health Services

- Nearest Hospital: [Details]
- Medical Center: [Details]
- Emergency Medical: [Details]
- Veterinary Services: [Details]

Education

- Schools: [Details]
- Childcare: [Details]
- Adult Education: [Details]
- Community Programs: [Details]

Business Services

Local Businesses

- General Store: [Details]
- Fuel Station: [Details]
- Restaurants: [Details]
- Professional Services: [Details]

Transport

- Taxi Services: [Details]
- Bus Services: [Details]
- Airport Shuttle: [Details]
- Car Rental: [Details]

After-Hours Contacts

Estate Management

- After-Hours Contact: [Number]
- Security: [Number]
- Maintenance: [Number]
- Emergency Coordinator: [Number]

Utility Emergencies

- Water: [Number]
- Power: [Number]
- Telecommunications: [Number]
- Gas: [Number]

Communication Channels

Online Services

- Estate Website: [URL]
- Online Portal: [URL]
- Email Notifications: [Details]

- Social Media: [Details]

Community Communication

- Newsletter: [Details]
- Notice Board: [Location]
- Community Meetings: [Schedule]
- Feedback System: [Details]

Version Control

Current Version: 1.0 Last Updated: [Current Date] Next Review Date: [Date + 6 months]

Related Documents

- 1.1 Purpose of This Manual
- 1.2 Scope and Application
- 1.3 Estate Overview
- Appendices B. Emergency Contact Numbers

2.1 Master Site Map

Overview

The Lake Bennett Estate Master Site Map provides a comprehensive view of the entire estate, including all lots, infrastructure, and natural features. This document serves as the primary reference for understanding the estate's layout and development.

Interactive Map

Use the map below to view satellite imagery with toggleable overlays loaded

- 2.2 Lot Numbering and Addresses
- 2.3 Zoning and Land Use
- 2.4 Easements and Rights of Way
- 8.1 Civil Drawings

2.2 Lot Numbering and Addresses

Addressing System

Lot Numbering Scheme

- Primary lot numbers
- Subdivision identifiers
- Section numbers
- Block references
- Historical lot numbers

Address Format

- Street names
- Lot numbers
- Section identifiers
- Postal codes
- Address validation

Property Identification

Lot Classification

- Residential lots
- Commercial lots
- Conservation lots
- Common property
- Special purpose lots

Address Components

- Street address
- Lot number
- Section number
- Estate identifier
- Postal details

Street Naming

Naming Convention

- Street types
- Naming themes
- Historical references
- Cultural significance
- Approval process

Street Directory

- Primary roads
- Secondary roads
- Access tracks
- Private roads
- Emergency routes

Property Access

Access Points

- Main entrances
- Secondary access
- Emergency access
- Service access
- Pedestrian access

Address Visibility

- Street signage
- Lot markers
- Property numbers
- Directional signs
- Emergency markers

Postal Services

Mail Delivery

- Postal addresses
- Mail collection points
- Delivery schedules
- Special delivery
- Parcel services

Address Verification

- Official records
- Property titles
- Council records
- Utility connections
- Emergency services

Emergency Services

Location Identification

- Emergency access
- Property location
- Access restrictions
- Special requirements
- Response protocols

Address Requirements

- Visibility standards
- Signage requirements
- Access information
- Contact details
- Response times

Development History

Lot Evolution

- Original subdivision
- Subsequent divisions
- Lot amalgamations
- Boundary changes
- Historical records

Address Changes

- Historical addresses
- Change documentation
- Update procedures
- Notification requirements
- Record keeping

Digital Systems

Address Database

- Property records
- Owner information
- Development history
- Access details
- Special requirements

Online Resources

- Digital maps
- Address lookup
- Property search
- Development status
- Access information

Maintenance

Signage

- Street signs
- Lot markers
- Directional signs
- Emergency markers
- Maintenance schedule

Records

- Address database
- Property records
- Change history
- Access information
- Update procedures

Version Control

Current Version: 1.0 Last Updated: [Current Date] Next Review Date: [Date + 6 months]

Related Documents

- 2.1 Master Site Map
- 2.3 Zoning and Land Use
- 2.4 Easements and Rights of Way
- 8.3 Site Surveys and Lot Boundaries

2.3 Zoning and Land Use

This section outlines the zoning regulations, land use policies, and development controls applicable within the Lake Bennett Estate. It covers specific requirements for condominium development, infrastructure zones, community facilities, general development controls like building and fire safety, environmental management, compliance processes, and special considerations for heritage and cultural significance.

For detailed information, please refer to the following subsections:

- 2.3.1 Zoning Overview
- 2.3.2 Infrastructure Zones
- 2.3.3 Community Facilities
- 2.3.4 Development Controls
- 2.3.5 Environmental Management
- 2.3.6 Compliance and Enforcement
- 2.3.7 Special Considerations

Version Control

Current Version: 1.0 Last Updated: [Current Date] Next Review Date: [Date + 6 months]

Related Documents

- 2.1 Master Site Map
- 2.2 Lot Numbering and Addresses
- 2.4 Easements and Rights of Way
- 6.1 Building and Development Conditions
- 9.1 Local Council Regulations

2.3.1 Zoning Overview

Section 1252 (Condominium Development)

Information for this section is derived from the LAKE BENNETT (LAND TITLE) ACT 2005.pdf. The Articles of Corporation for Units Plan 97/026 (see Articles_200520.pdf) provide additional specific rules and covenants applicable to this section.

- **Permitted Use:** With consent, Section 1252 may be used only for a condominium development (Schedule 5, Part 2, Clause 12(1)).
- **Dwelling Limit:** No more than 64 dwellings (Schedule 5, Part 2, Clause 12(1)). Development Permit DP04/0022 allows for up to 15 new dwellings in addition to the existing 49.
- **Building Specifications:**
  - **Height:** All development must be single storey (Schedule 5, Part 2, Clause 12(2)(a)). Maximum building height is 5m (Schedule 5, Part 3, Clause 16(3)(b)).
  - **Style (New Dwellings):** Must be similar in style, height, and building materials to existing dwellings on units 17 to 54 (inclusive) (Schedule 6, Condition 4).
  - **Separation (New Dwellings):** Must provide a separation of at least 3m between dwellings (proposed and existing) (Schedule 6, Condition 3).
  - **Setbacks (New Dwellings):** A 5m setback from the access driveway is required for new dwellings (Schedule 6, Condition 3). The general 10m boundary setback for other lots (Schedule 5, Part 3, Clause 21(2)) does not explicitly apply to Section 1252 development under its specific clauses.
  - **Flood Level (New Dwellings):** Floor level must be a minimum of 200mm above the one-in-one-hundred-year flood level (Schedule 6, Condition 5).
  - **Air Conditioning (New Dwellings):** Condensers are to be appropriately screened from public view and located so as to minimise thermal and acoustic impacts on neighbouring properties (Schedule 6, Condition 6).
  - **Additional Specifications (from Articles of Corporation, Units Plan 97/026):**
    - **Corporation Approval:** All improvements (including buildings, verandahs over Lake Bennett, and landscaping) require submission of plans and specifications to,

and approval by, the Corporation (Article 5.1).
        - **General Design & Aesthetics:** Improvements must be of high standard, not detrimental to the amenity of other units, and harmonious with the landscape in bulk and form (Article 5.2.1).
        - **Uniformity:** Construction must be in sympathy with other existing and proposed improvements, considering siting, alignments, footpaths, verandahs, finishes, and roofing (Article 5.2.2).
        - **Roofing Materials:** Roofs must use materials with an exterior surface that does not have high light reflective qualities and is of a colour that blends with the landscape (Article 5.2.3).
        - **Height Clarification:** Improvements shall not exceed one storey or 5 metres in height, unless otherwise approved by the Corporation (Article 5.2.4).
        - **Side Setbacks:** Improvements must be constructed at least 1.5 metres from each side boundary (Article 5.2.5).
        - **Driveways and Footpaths:** Must use interlocking concrete block pavers or concrete (Article 5.2.6).
        - **Shadecloths and Awnings:** No shadecloth structures or external blinds/awnings are permitted without written consent from the Corporation (Article 5.2.8).
- **Utility Requirements:**
    - **Waste Water:** All waste water and septic facilities must be sited at least 100m from the full supply level of the lake, or outside its catchment, and designed so that no effluent flows into the lake (Schedule 5, Part 2, Clause 12(2)(b)). This is further reinforced by Article 6 of the Articles of Corporation (Units Plan 97/026) which prohibits any discharge of sewerage, waste, or fertiliser into Lake Bennett from a Unit. New dwellings must be connected to the effluent disposal system that services the existing unit development (Schedule 6, Condition 7).
    - **Water Supply:** New dwellings must be connected to a reticulated potable water supply (Schedule 6, Condition 8).
    - **Easements:** Any developments on or adjacent to any easements on site must be carried out to the requirements and satisfaction of the relevant service authority (Schedule 6, Condition 9).
- **Restrictions:**
    - **Domestic Livestock & Pets:** Domestic livestock must not be kept, exercised or trained on the land (Schedule 5, Part 2, Clause 12(2)(c)). However, each Proprietor is allowed to keep one domesticated pet on their Unit, provided it is kept on a leash while on common areas and does not create a disturbance to other Proprietors (Articles of Corporation, Units Plan 97/026, Article 11).
- **Associated Rights & Features (as per LAKE-BENNETT-LAND-TITLE-ACT-2005):**
    - **Pontoons:** The owner of an existing or proposed unit on section 1252 may, subject to the terms of the recreational easement, construct one pontoon on or partly on section 1255 (Schedule 5, Part 2, Clause 10(2)(c)).
    - **Common Property:** Section 1252 is the common property for the Lake Bennett units plan (Section 10(2)(c) of the Act). An easement benefits each of the adjoining lots and created section 1254 and burdens the common property easement area (part of created section 1252) for recreational purposes (Section 11(1)(a) of the Act & Schedule 3).
- **Governing Development Permit:** Development Permit DP04/0022, issued under section 21 of the Lake Bennett (Land Title) Act 2005, outlines specific conditions for the development area within Section 1252, particularly for the construction of new dwellings.

2.3.2 Infrastructure Zones

Utility Corridors

- Easement requirements
- Access provisions
- Maintenance requirements
- Development restrictions
- Safety considerations

Service Areas

- Facility locations
- Access requirements
- Operational needs
- Maintenance access
- Safety zones

2.3.3 Community Facilities

Public Spaces

- Recreation areas
- Common facilities
- Access requirements
- Maintenance responsibilities
- Usage guidelines

Special Purpose Areas

- Community buildings
- Emergency facilities
- Maintenance depots
- Service centers
- Access requirements

2.3.4 Development Controls

Building Control Areas (Northern Territory)

The Northern Territory government outlines specific requirements for building control areas. Lake Bennett is designated as a **Tier 1 Building Control Area**.

- **Certification Requirements:** Full certification requirements apply for all building work in Tier 1 areas. This includes adherence to the National Construction Code (NCC) and the necessity to obtain occupancy certification at the end of the construction process.
- **Further Information:** For detailed requirements, refer to the official NT government website:
    - Requirements in building control areas | NT.GOV.AU
    - Building Control Areas Search | NTLIS

Fire Break Requirements (Northern Territory)

Maintaining adequate firebreaks is a legal requirement for property owners in the Northern Territory to protect property and provide safe access for emergency services.

- **Definition:** A firebreak is an area clear of flammable materials such as vegetation and bush.
- **Standard Requirements (within Emergency Response Areas - ERAs):**

    - Must be free from vegetation, or grass must be maintained at a height no taller than 50mm.
    - Must be established along the entire boundary of the property.
    - Must be at least 4 meters wide.
- **Recommendations:**
    - An 8-meter wide firebreak is recommended around houses and any other permanent structures, stationary engines, or flammable material.
- **Maintenance:** Firebreaks must be maintained all year round.
- **Gamba Grass:** Specific management for Gamba grass is required:
    - Must be controlled within 15 meters of all property boundaries, driveways, and structures.
    - Parcels of land less than 3 hectares must be working towards the eradication of all Gamba grass.
- **Further Information:**
    - For properties within an Emergency Response Area (ERA), refer to NT Police, Fire & Emergency Services: https://pfes.nt.gov.au/fire-and-rescue-service/fire-safety/firebreaks
    - For properties outside an ERA, contact Bushfires NT: https://nt.gov.au/emergency/bushfire/managing/bushfires-nt
    - For Gamba Grass management: Visit nt.gov.au/gamba

Landscaping

- General vegetation requirements, including the submission of a suitably descriptive landscaping plan to the Corporation for approval as part of any improvement plans (Articles of Corporation, Units Plan 97/026, Article 5.1).
- All fences and screens must be comprised of mass planting of palms and other plants only (Articles of Corporation, Units Plan 97/026, Article 5.2.7).
- Water management strategies
- Enhancing visual amenity
- Ongoing maintenance standards

Native Plant Selection

- Prioritising the use of Northern Territory native species is encouraged to promote biodiversity, reduce water consumption, and provide habitat for local wildlife.
- **Resources for Native Plants:**
    - FloraNT Website: For plant identification, distribution, and conservation status.
    - NT Herbarium Plant Identification Service: For assistance in identifying native plants (free for non-commercial use).
    - Territory Native Plants: Nursery specializing in NT native species.
    - Top End Native Plant Society: Local society with resources and information.
    - NT Threatened Plants List: Information on protected species to consider during planning.

Weed Control and Management

- Effective weed management is crucial to protect native ecosystems and maintain property values.
- Landowners are responsible for managing declared weeds on their property in accordance with NT legislation.
- **Resources for Weed Control:**
    - NT Weed Management Handbook: Comprehensive guide to weed management, including control methods for specific weeds and herbicide information (PDF download available).
    - NT Government Weeds Information: General information on weeds in the NT, their impacts, and management strategies.
    - Weeds and the Law (NT): Outlines legal obligations for weed control.
    - Weed Management Branch Contacts: For advice and reporting.

2.3.5 Environmental Management

Protection Measures

- Vegetation protection
- Water quality
- Soil conservation
- Wildlife protection
- Fire management

Sustainability Requirements

- Energy efficiency
- Water conservation
- Waste management
- Environmental monitoring
- Compliance reporting

2.3.6 Compliance and Enforcement

Development Approvals

- Application process
- Assessment criteria
- Approval conditions
- Appeal procedures
- Compliance monitoring

Enforcement

- Inspection procedures
- Violation penalties
- Rectification requirements
- Appeal processes
- Record keeping

2.3.7 Special Considerations

Heritage Areas

- Heritage listings
- Protection measures
- Development restrictions
- Maintenance requirements
- Access controls

Cultural Significance

- Cultural sites
- Protection measures
- Access requirements
- Management protocols
- Consultation requirements

2.4 Easements and Rights of Way

Easement Overview

Types of Easements

- Utility easements
- Access easements
- Drainage easements
- Conservation easements
- Emergency access easements

Legal Framework

- Easement creation
- Registration requirements
- Legal documentation
- Rights and obligations
- Maintenance responsibilities

Utility Easements

Water Supply

- Pipeline easements
- Access requirements
- Maintenance rights
- Construction standards
- Safety zones

Power Distribution

- Power line easements
- Access requirements
- Safety clearances
- Maintenance access
- Construction standards

Telecommunications

- Network easements
- Access requirements
- Maintenance rights
- Construction standards
- Safety considerations

Access Easements

Road Access

- Access rights
- Maintenance responsibilities
- Construction standards
- Usage restrictions
- Emergency access

Pedestrian Access

- Walking track easements
- Access rights
- Maintenance requirements
- Usage guidelines
- Safety considerations

Drainage Easements

Stormwater

- Drainage easements
- Access requirements
- Maintenance rights
- Construction standards

- Flood protection

Watercourses

- Waterway easements
- Access requirements
- Maintenance rights
- Environmental protection
- Safety considerations

Conservation Easements

Environmental Protection

- Conservation areas
- Access restrictions
- Management requirements
- Protection measures
- Monitoring requirements

Wildlife Corridors

- Corridor easements
- Access controls
- Management protocols
- Protection measures
- Monitoring requirements

Emergency Access

Fire Access

- Fire trail easements
- Access requirements
- Maintenance standards
- Usage restrictions
- Emergency procedures

Emergency Services

- Service access easements
- Access requirements
- Maintenance standards
- Usage restrictions
- Emergency procedures

Maintenance Requirements

Regular Maintenance

- Inspection schedules
- Maintenance procedures
- Access requirements
- Safety protocols
- Record keeping

Emergency Maintenance

- Emergency access
- Response procedures
- Safety requirements
- Notification process
- Documentation

Rights and Obligations

Property Owners

- Rights of access
- Maintenance responsibilities
- Usage restrictions
- Compliance requirements
- Dispute resolution

Service Providers

- Access rights
- Maintenance responsibilities
- Construction requirements
- Safety obligations
- Compliance requirements

Documentation

Legal Documents

- Easement agreements

- Registration documents
- Survey plans
- Maintenance records
- Compliance certificates

Records Management

- Document storage
- Access requirements
- Update procedures
- Retention periods
- Security measures

Version Control

Current Version: 1.0 Last Updated: [Current Date] Next Review Date: [Date + 6 months]

Related Documents

- 2.1 Master Site Map
- 2.2 Lot Numbering and Addresses
- 2.3 Zoning and Land Use
- 4.1 Internal Roads
- 5.1 Stormwater Drainage
- 8.1 Civil Drawings

3.1 Water Supply System Overview

This document provides an overview of the potable water supply system at Lake Bennett Estate, consolidating the key details from the supporting sub-pages for Bore and Pump Systems, Storage Tanks, Chlorine Dosing, Reticulation, and Water Conservation.

System Status

Current Assessment: The water supply system is operational and fit for purpose when operated and maintained per this manual. Primary supply is via bore water with on-site storage, disinfection, and a reticulation network that provides distribution and isolation control across the estate.

Capacity Overview

Source Capacity

- **Bore System Output:** ~100 L/min (see 3.1.1 Bore and Pump Systems)
- **Bores:** Bore 1 (RN43075), Bore 2 (RN32812), plus a legacy bore (RN31076 – retained, not in use)

Storage Capacity

- **Total On-site Storage: ≈ 449,250 L** (see 3.1.2 Storage Tanks)
  - Steel Tank (Rhino RT-310): ~309,250 L
  - Poly Tanks 2–5: ~120,000 L total (≈30,000 L each)
  - Poly Tanks 6–7: ~20,000 L total (≈10,000 L each)

Distribution Network

- **Primary Main:** 110 mm line from hill-top tanks to central distribution box
- **Key Isolation:** Central box valves segment supply to units (#40–#58, west side, #17–#39, #1–#16); additional isolation near Unit #17 and in western easement after lake crossing (see 3.1.4 Reticulation Network)

Treatment and Controls

- **Chlorination:** Inline dosing triggered by a pulse output from a mechanical water meter; delivered by a Prominent Beta 4 dosing pump to the injection point downstream of the meter (see 3.1.3 Chlorine Dosing System)
- **Control Hub:** Green shed with wire-mesh doors housing the Kelco F60 digital pump controller, bladder pressure tank, mechanical and ultrasonic flow meters, alarms, and mode switches (see 3.1.1)
- **Over-pressure Protection:** Automatic relief valve installed upstream of the chlorination point

Water Quality and Monitoring

- **Standards:** Complies with Australian Drinking Water Guidelines (NHMRC 2011) and NT Health reporting
- **Key Targets:** pH 6.5–8.5; Turbidity < 4 NTU; Chlorine residual 0.2–5.0 mg/L (if chlorinated); Microbiological: 0 E. coli/100 mL
- **Testing Cadence:** Daily spot checks (pH/turbidity/chlorine where applicable); Weekly aesthetic checks; Monthly microbiological; Quarterly chemical (incl. metals); Annual comprehensive review
- **Sampling:** Conduct per documented procedures (see Collecting Water Samples); utilise chain-of-custody and QA documentation

System Components

Detailed specifications are provided on the following sub-pages:

Primary Supply and Controls

- 3.1.1 Bore and Pump Systems

Storage and Distribution

- 3.1.2 Storage Tanks
- 3.1.4 Reticulation Network

Treatment

- 3.1.3 Chlorine Dosing System

Demand Management

- 3.1.5 Water Conservation Measures

Operations and Maintenance

Routine Tasks

- Inspect pumps, manifolds, and isolation valves
- Verify F60 controller modes/alarms; confirm flow meters operational
- Test water quality per schedule and report to NT Health
- Exercise isolation valves and flush lines as scheduled (incl. bore flush valve)

Responsibilities

- **Estate Management:** Operate system, coordinate maintenance, monitor quality, respond to incidents
- **Property Owners:** Maintain individual tanks/fixtures, comply with usage and conservation guidelines, report leaks

Risks and Improvements

- Maintain bunding and ventilation in chlorination area; verify low-level cut-out functionality
- Periodically verify over-pressure protection and dosing integrity (bleed/prime as needed)
- Expand smart metering/leak detection and enhance record-keeping for preventative maintenance

---

Reference Documentation

- DRINKING WATER GUIDELINES
- Collecting Water Samples

Version Control

Current Version: 1.0 Last Updated: 2025-10-06 Next Review Date: 2026-04-06

Related Documents

- 3.1.1 Bore and Pump Systems
- 3.1.2 Storage Tanks
- 3.1.3 Chlorine Dosing System
- 3.1.4 Reticulation Network
- 3.1.5 Water Conservation Measures

3.1.1 Bore and Pump Systems

□ System Overview

□□ Bore System

The bore system provides essential water supply infrastructure and includes production bores, a legacy bore, and various control and safety mechanisms.

□ Production Bores

- **Bore 1**
  - **Registration number:** RN43075
  - **Location:** nearest Bore to the green shed with wire-mesh door, secured in a wire-mesh cage
  - **Features:**
    - Isolating valve for head pressure regulation
    - Inline pressure gauge
    - Power outlet located **inside the green shed wire-mesh door**, connected to **white pump controller panel**
    - Secured in a mesh box

Boar 1 Setup - Placeholder

- **Bore 2**
  - **Registration number:** RN32812
  - **Location:** farest from the green shed with wire-mesh door, secured in a wire-mesh cage with green roof
  - **Features:**
    - Isolating valve
    - Inline pressure gauge
    - Power isolator switch on external pole
    - Connected via 3-phase power adapter
    - Enclosed in a metal security cage

Boar 2 Setup - Placeholder

Legacy Bore

- **Registration number:** RN31076
- **Location:** Inside the green shed with wire-mesh doors
- **Status:** Not in use
- **Features:**
  - Removable cover for pipe
  - Retained for reference or backup purposes

Legacy Boar (RN31076) - Placeholder

Specifications

- **System Capacity** – 100L per minute
- **Water Quality Parameters** – See Water Quality

Pump Systems

Overview

The pump system provides automated control and redundancy for continuous operation and includes advanced digital controllers, visual indicators, and fail-safes.

Electrical Supply

- **Three-phase power:**
  - Bore pumps (Bore 1 and Bore 2)
- **Single-phase power:**
  - F60 digital pump controller
  - Ultrasonic flow meter
  - Chlorine dosing pump
- Main power isolation is located inside the **white pump controller panel** in the green shed with wire-mesh doors

Green Shed with wire-mesh doors (Primary Control Hub)

- **Contains:**
  - F60 digital pump controller
  - Bladder pressure tank
  - Mechanical flow meter
  - Alarm system
  - Mode switches and indicators
  - Ultrasonic flow meter control box

Green Shed with wire-mesh doors Interior Overview - Placeholder

- External pipework contains:
  - **Ultrasonic flow meter sensors** mounted to vertical pipe section
  - **Flush valve** for maintenance and testing


POCO F5
10/09/2025 14:54

□□ Control Systems

□□ KELCO F60 Digital Pump Controller

- **Location:** On the pipe manifold in green shed with wire-mesh doors
- **Purpose:** Regulates pump operation with pressure, flow, and timer control
- **Features:**
  - Multi-voltage input: 220–240 VAC, 24 VAC/DC, 12 VDC
  - Real-time pressure display
  - Up to 15 programmable timers
  - 40 Amp solid-state switch
  - IP64 weatherproof housing
  - Suitable for 25 mm (1") pipe and larger
  - Remote input for external integration
  - Alarm light output and beacon interface
- **Documentation:**
  - F60 Installation Manual
  - F60 Programming Manual
  - KELCO Product Page
  - Online Manual (ManualsLib)

F60 Control Panel (Interior) - Placeholder

Control Panel Details

- **Mode Select Switches:**
  - Manual, Off, Auto for Bore 1 and Bore 2
- **Indicators:**
  - Green **"Run"** lights for each Bore (active in manual or auto)
  - Red **"No Flow"** and **"Overload"** lights (now abandoned)
  - **"No Flow Reset"** button (also abandoned)
- **System Status Lights:**
  - Red **"Power On"** light on panel top
  - **Flashing beacon** activated by F60 controller on alarm trigger

Control Panel Switches and Indicators - Placeholder

Manifold Area

- **Components Located in the Green Shed with wire-mesh doors:**
  - Mechanical water meter
  - Inline pressure gauge
  - Pipe manifold joining both Bore lines
  - Isolating valves
  - Bladder pressure tank (with isolating valve)

Manifold and Pressure Tank - Placeholder

Chlorination System (Second Green Shed)

- **Location:** Adjacent to green shed with wire-mesh doors
- **Contains:**
  - Chlorine dosing pump
  - Dosing tank
  - Chlorine chemical storage
- **Injection Point:** Installed in Bore line outsite at the easten end of shed
- **Monitoring Equipment:**
  - Secondary mechanical water meter
  - Sensor for dosing pump activation

Second Green Shed - Chlorine System - Placeholder

□□ Over-Pressure Emergency Valve

- **Purpose:** Prevent damage from pump/system failure or closed float valves
- **Activation:**
  - Opens automatically if system remains pressurized beyond safe limit
  - Prevents rupture or upstream damage due to over-pressurization
- **Location:** In-line just before chlorine dosing point

Over-Pressure Valve - Placeholder

□ Water Quality

□ Monitoring

- **Frequency:** Weekly
- **Parameters Tested:**
  - Turbidity
  - Chlorine residual
- **Reporting:** NT Health Department
- **Standards:** Aligned with Australian Standards
- **References:**
  - Drinking Water Guidelines (PDF)
  - Sampling Guide – Collecting Water Samples

See 3.1 Water Supply – Water Quality Parameters

□ Sampling Procedures

□ Bore Sampling

1. **Disinfect** tap outlet with 70% alcohol
2. **Flush** for at least 5 minutes until temperature and clarity stabilize
3. **Collect Samples:**
   - Microbiological samples first
   - Avoid touching bottle rims
   - Label immediately with location, date, and sampler ID

□ Distribution Point Sampling

1. **Tap Selection:** Use cold taps, avoid mixers or filters

2. **Flush and Disinfect:** Remove attachments, flush 5 minutes
3. **Sample Order:** Microbiological → Chemical → Physical
4. **Sterile Collection:** Use lab-approved containers and techniques

Handling and Transport

- Label samples clearly
- Complete sample ID forms and chain-of-custody records
- Deliver to lab within 24 hours

Key Parameters

Parameter	Target Value / Limit	Importance
pH	6.5 – 8.5	System performance, corrosion control
Turbidity	< 4 NTU	Impacts disinfection and filter efficiency
Iron	< 0.3 mg/L	Prevents taste and staining issues
Manganese	< 0.1 mg/L	Prevents black staining in fixtures
Hardness	Monitor only	Impacts scaling in pipes and pumps
Microbiological	0 E. coli/coliforms	Compliance with drinking water safety

---

Maintenance

Routine Tasks

- Pump and motor inspections
- Bore flushing and cleaning
- Control panel diagnostics
- Water quality testing and reporting
- Record keeping (logs, service reports)

Version Control

- **Current Version:** 1.0
- **Last Updated:** 2025-09-10
- **Next Review Date:** 2026-03-10

Related Documents

- 3.1 Water Supply
- 3.1.2 Storage Tanks
- 3.1.3 Chlorine Dosing System
- 3.1.4 Reticulation Network
- 3.3.2 Backup Power Systems
- 8.1 Civil Drawings

3.1.2 Storage Tanks – Technical Specification & Infrastructure Summary

This document outlines the full specifications and supporting infrastructure for the potable and emergency water storage system at Lake Bennett Estate. The tank farm includes a mix of steel and polyethylene tanks arranged for domestic supply, emergency reserves, and fire-fighting capacity.

System Summary

- **Total Storage Capacity:** ≈ **449,250 Litres**
  - **Tank 1 (Primary Steel Tank):** 309,250 L
  - **Tanks 2–5 (Poly, 30kL):** 120,000 L
  - **Tanks 6–7 (Poly, 10kL):** 20,000 L (Emergency reserves)
- **Water Source:** Bore feed
- **Tank Locations:** Refer to 8.1 Civil Drawings
- **Distribution System:** Gravity-fed manifold with isolation valves
- **Monitoring:** Mechanical and ultrasonic flow meters
- **Control Points:** Float valves, manual isolation taps, flush and air release valves

---

Tank Details

Tank 1 – *Rhino RT-310 Steel Storage Tank*

- **Quantity:** 1
- **Manufacturer:** Rhino Tuff Tanks (Kingspan Rhino Tanks)
- **Model:** RT-310
- **Total Capacity:** 309,253 L (Usable: ~309,250 L)
- **Dimensions:** Ø 11.65 m × H 2.9 m
- **Construction:** Corrugated galvanised steel with Polyethylene liner (Infinity Poly X)
- **Certifications:**
  - AS/NZS 4020 – Potable Water
  - AS/NZS 1170 – Structural
  - AS/NZS 4600 – Steel Structures
- **Warranty:** 20-year pro-rata (tank & liner)
- **Ancillary Equipment:**
  - Bore-fed inlet (poly pipe) with isolation tap

    - Internal float valve
    - Mechanical level indicator
    - Overflow safeguard pipe
    - Manhole access
    - Isolation valves at base
- **Primary Use:** Potable water supply and fire-fighting storage

Tank 1 – Rhino RT-310

Manufacturer Resources: - Kingspan Product Page - Installation Manual - Product Brochure

---

□ Tanks 2–5 – *Terracorp 30,000L Poly Tanks*

- **Quantity:** 4
- **Model (Approx):** WT30
- **Individual Capacity:** ~30,000 L
- **Total Group Capacity:** ~120,000 L
- **Dimensions (each):** Ø 3450 mm × H 3390 mm
- **Construction:** UV-stabilised, food-grade polyethylene (ribbed)
- **Warranty:** Typically 10 years
- **Ancillary Equipment:**
    - Bore-fed inlets with isolation taps
    - Internal float valves
    - Top-mounted level indicators
    - Overflow drains
    - Manhole access
    - Base manifold with individual tank isolation
- **Primary Use:** Potable water buffer/storage

Tanks 2–5

Manufacturer Resources: - Terracorp Tanks Overview - 30,000 L Tank - Installation Guide

---

Tanks 6 & 7 – *Terracorp 10,000L Poly Tanks*

- **Quantity:** 2
- **Model (Approx):** WT10
- **Individual Capacity:** ~10,000 L
- **Total Group Capacity:** ~20,000 L
- **Dimensions (each):** Ø 2400 mm × H 2220 mm
- **Construction:** UV-stabilised, food-grade polyethylene (ribbed)
- **Warranty:** Typically 10 years
- **Ancillary Equipment:**
  - Bore-fed via shared line
  - Linked by small manifold
  - Overflows & manhole access
  - No float valves installed
- **Primary Use:** Emergency and fire reserve

Auxiliary Tanks 6–7

Manufacturer Resources: - 10,000 L Tank - Installation Guide

Piping and Control Infrastructure

Manifolds & Isolation

- Tanks 2–5 connected at the base via a shared **poly manifold**
- Each tank has a **blue-handle isolation tap**
- Master tap installed at the end of the line

Manifold and Master Valve

Air Valve

- Installed on main gravity-fed line
- Equalises air pressure during tank isolation or line filling

Air Valve

□ Bore Inlet Isolation & Flush Valve

- **Flush Valve:** Installed on bore line, used biannually to clean the main supply line
- **Isolation Valve:** Full-bore manual tap to shut off bore feed during maintenance

Monitoring Systems

Mechanical Water Meter

- Located on main output line
- Tracks cumulative flow from all tanks

Mechanical Meter

Ultrasonic Flow Meter

- Digital display unit for live flow rate monitoring
- Installed in line after mechanical meter

Ultrasonic Meter

□□ Safety Systems

- **Overflow Pipes:** Installed on all tanks to prevent structural overfilling
- **Float Valves:** Tanks 1–3 include bore shutoff floats
- **Removable Ladder:** Used for access to Tank 1, stored off-system when not in use

---

□ Version Control

- **Document Version:** 1.0
- **Last Updated:** 2025-09-10
- **Next Review Due:** 2026-03-10

□ Related Documents

- 3.1 Water Supply
- 3.1.1 Bore and Pump Systems
- 3.1.3 Chlorine Dosing System
- 3.1.4 Reticulation Network
- 3.3.1 Grid Connection
- 8.1 Civil Drawings

3.1.3 Chlorine Dosing System

Chlorine Dosing System Documentation

Overview

This document outlines the installation, operation, and maintenance procedures for the chlorine dosing system located at the Lake Bennett Estate bore infrastructure. It includes a full breakdown of the system's components, control methodology, safety considerations, and troubleshooting steps.

Table of Contents

System Description

The chlorine injection system is an inline dosing mechanism connected to the bore supply line. It is triggered by flow-based pulse signals generated by a mechanical water meter. The system is designed to deliver precise chlorine dosing proportional to water usage, ensuring effective water treatment for potable and non-potable applications.

Component Overview

Water Meter and Pulse Sensor

A mechanical inline water meter generates electrical pulses relative to flow. These pulses are transmitted via low-voltage cable to the dosing pump located inside the chlorination shed.

Water Meter

Dosing Pump

A Prominent Beta 4 chlorine metering pump receives the pulse signal and dispenses chlorine solution accordingly. Key features include: - Serial No.: `371815956` - Adjustable dosing rate (0–100%) via front panel knob - Pulse source selector (internal/external) - Pulse ratio for higher flow accuracy - Power: 240V AC from GPO in chlorination shed - Continuous mode for priming or bleeding

Manufacturer Resources: - Prominent Website - Beta 4 Operating Instructions Manual

Dosing Pump

Chlorine Storage Tank

- Capacity: 100L UV-resistant plastic tank
- Features: Low-level float sensor cuts power to pump below ~10L to prevent dry running
- Filling: Manual via sealed top access cap
- Positioned within a bunded spill containment enclosure

Chlorine Tank

Injection Point

Chlorine is injected into the bore main just downstream of the flow meter. Tubing is secured and rated for high-pressure delivery.

Injection Point

Operating Principles

1. Water flows through the mechanical meter, generating electrical pulses.
2. Each pulse is received by the Beta 4 dosing pump.
3. Based on the pulse ratio and dosage rate, chlorine is injected into the bore line.
4. The system operates passively—chlorine delivery is fully synchronized with bore output volume.

Maintenance Procedures

- **Daly**
  - Confirm chlorine level is above the 10L cutoff
  - Check for signs of air in dosing lines
  - Confirm pump is responding to pulses
- **Weekly**
  - Test output concentration using water sampling
  - Visually inspect tubing and injection points
- **Monthly**
  - Check operation of the low-level sensor
  - Flush or replace any clogged sections of line
- **Quarterly**
  - Verify bund tank is clean and free of residues

Troubleshooting

Problem: Inadequate Chlorine Output

Symptoms:
- Low chlorine residual detected during routine testing
- Dosing pump appears to run, but injection is weak or inconsistent

Likely Cause:
- Air trapped in suction or discharge lines

Bleeding Procedure

□□ **Always wear full PPE including gloves and a face shield.**

1. **Confirm Chlorine Level**
   Open the top cap and visually inspect fluid level. If below 10L, refill (see Refill Procedure).
2. **Set Pump to Manual Prime**
   - Set dosing knob to 100%
   - Set pulse source to "Internal"
   - Set pulse rate to 100% (continuous operation)
3. **Bleed the Output Line**
   - Carefully disconnect the injection line **from the bore water main end**
   - Allow chlorine to pulse through until all air is purged
   - Observe strong, consistent pulses without bubbles
4. **Return to Normal Operation**
   - Reconnect output line securely
   - Set pulse source back to "External"
   - Adjust dosing knob to target setting (e.g. 25%)
5. **Verify Operation**
   - Observe LED pulse indicators (double flash confirms external sync)
   - Sample water post-injection and verify chlorine level

Safety and Containment

- The entire dosing system is mounted within a bunded containment enclosure to mitigate spills or leaks.
- Only trained personnel should handle chlorine. A full PPE kit (face shield, gloves, long sleeves) must be worn when:
  - Refilling chlorine
  - Bleeding the system
  - Performing maintenance
- Maintain clear access to the spill containment area for inspection and cleaning.
- Ensure the chlorination shed remains well-ventilated at all times.

PPE Safety

Chlorine Refill Procedure

1. **Wear PPE**
   Face shield, gloves, and long-sleeved protective clothing are mandatory.
2. **Open Fill Cap**
   Unscrew the large black lid atop the chlorine tank.
3. **Add Chlorine**
   Pour chlorine slowly from a sealed 20L drum supplied by Harvey Distributors. Top up to full capacity (100L).
4. **Secure Lid**
   Replace and tighten the tank cap to prevent evaporation and contamination.
5. **Inspect for Spills**
   Check bund for drips or overflow. Rinse and dilute if necessary.

□ **Recommended Product:**
Sodium Hypochlorite 12.5% (20L drums)
Supplier: Harvey Distributors
SDS and Product Datasheet: *[Insert link here]*

Appendix A – Equipment Specifications

Component	Model	Notes
Dosing Pump	Beta 4	Ser. No. 371815956, External pulse input
Chlorine Tank	100L HDPE	Bunded, with float switch
Water Meter	Mechanical Inline	Pulse output (2:1 ratio)
Tubing	Chemical-rated	Rated for chlorine and bore pressure
Power Supply	240V AC	GPO in chlorination shed

Version Control

Current Version: 1.0 Last Updated: [Current Date] Next Review Date: [Date + 6 months]

Related Documents

- 3.1 Water Supply
- 3.1.1 Bore and Pump Systems
- 3.1.2 Storage Tanks
- 3.1.4 Reticulation Network
- 3.1.5 Water Conservation Measures
- DRINKING WATER GUIDELINES
- Collecting Water Samples

Lake Bennett Estate Water Reticulation System

Overview

This document provides a technical summary of the water reticulation system for the Lake Bennett Estate. It includes details on the primary and auxiliary water mains, as well as key isolation valves and distribution points.

Primary Water Main

The primary water main is a 110 mm pipe that runs from the main water tanks situated on the hill.

- **Route:** The main descends the hill and crosses under the road via an easement between units #40 and #39.
- **Distribution Box:** It then feeds into a central in-ground distribution box.

Image Placeholder: Route of the Primary Water Main

Central Distribution Box

The central distribution box is a key node containing multiple isolation valves:

- **Valve for Units #40 to #58:** This valve isolates the supply to these units.
- **Western Side Isolation:** Another valve isolates the six units located on the western side of the lake.
- **Northern Shore and Mid-Range Units:** An additional valve isolates the segment of the main serving units #17 to #39, as well as the northern shore units #1 to #16.

Image Placeholder: Central Distribution Box and Valve Layout

Additional Isolation Points

- **Unit #17 Isolation Box:** A secondary isolation box is located near unit #17, allowing for further isolation of units #1 to #16.

Image Placeholder: Isolation Box Near Unit #17

- **Western Easement Isolation Valve:** In the infrastructure easement on the western side, there is an additional underground isolation valve that isolates the main just after it crosses the lake.

Image Placeholder: Western Easement Isolation Valve

3.1.5 Water Conservation Measures

Overview

Water conservation is a critical aspect of sustainable living at Lake Bennett Estate. This document outlines comprehensive water conservation measures, guidelines, and best practices for all residents and property owners.

Conservation Requirements

Mandatory Measures

- Installation of water-efficient fixtures (WELS 4-star rating or better)
- Regular leak detection and repair
- Compliance with water usage guidelines
- Participation in water conservation programs

Recommended Practices

- Smart irrigation systems
- Rainwater harvesting optimization
- Greywater reuse systems
- Water-wise landscaping

Residential Conservation

Indoor Water Use

1. **Bathroom Fixtures**
   - Low-flow showerheads (≤ 9L/min)
   - Dual-flush toilets (4.5L/3L)
   - Water-efficient taps (≤ 6L/min)
   - Automatic sensor taps in common areas
2. **Laundry**
   - Front-loading washing machines (WELS 4-star or better)
   - Full load washing only
   - Greywater collection systems
3. **Kitchen**
   - Water-efficient dishwashers
   - Water-saving aerators
   - Leak detection systems

Outdoor Water Use

1. **Landscaping**
   - Native and drought-resistant plants
   - Mulching (minimum 75mm depth)
   - Efficient irrigation systems
   - Smart irrigation controllers
2. **Garden Maintenance**
   - Early morning watering (before 8am)
   - Drip irrigation systems
   - Rain sensors for irrigation
   - Regular system maintenance
3. **Swimming Pools**
   - Pool covers when not in use
   - Regular maintenance to prevent leaks
   - Water level monitoring
   - Backwash water recycling

Community Initiatives

Estate-wide Programs

1. **Water Conservation Education**
   - Regular workshops
   - Information sessions
   - Best practice guides
   - Community newsletters
2. **Monitoring and Reporting**
   - Smart meter installation
   - Usage tracking
   - Regular reporting
   - Performance benchmarking
3. **Incentive Programs**
   - Rebates for water-efficient upgrades
   - Recognition for conservation efforts
   - Community challenges
   - Best practice sharing

Technology and Innovation

Smart Water Management

1. **Monitoring Systems**
   - Real-time usage tracking
   - Leak detection alerts
   - Usage pattern analysis
   - Automated reporting
2. **Smart Irrigation**
   - Weather-based controllers
   - Soil moisture sensors
   - Zone-based watering
   - Mobile app control
3. **Water Recycling**
   - Greywater treatment systems
   - Rainwater harvesting
   - Stormwater capture
   - Water reuse systems

Maintenance and Compliance

Regular Checks

1. **Property Inspections**
   - Monthly leak checks

    - Fixture efficiency audits
    - System maintenance
    - Usage pattern review
2. **System Maintenance**
    - Irrigation system checks
    - Tank cleaning schedules
    - Filter replacement
    - Pump maintenance

Compliance Requirements

1. **Documentation**
    - Water usage records
    - Maintenance logs
    - Upgrade certificates
    - Compliance reports
2. **Reporting**
    - Monthly usage reports
    - Conservation achievements
    - System performance
    - Incident reporting

Emergency Measures

Drought Response

1. **Water Restrictions**
    - Usage limits
    - Outdoor watering schedules
    - Essential use only
    - Community coordination
2. **Conservation Plans**
    - Emergency protocols
    - Communication procedures
    - Resource allocation
    - Community support

Resources and Support

Available Resources

1. **Technical Support**
    - Conservation specialists
    - System advisors
    - Maintenance services
    - Emergency response
2. **Educational Materials**
    - Conservation guides
    - Best practice manuals
    - Video tutorials
    - Online resources

Contact Information

- Conservation Coordinator: [contact details]
- Technical Support: [contact details]
- Emergency Response: [contact details]
- General Inquiries: [contact details]

Version Control

Current Version: 1.0 Last Updated: [Current Date] Next Review Date: [Date + 6 months]

Related Documents

- 3.1 Water Supply
- 3.1.1 Bore and Pump Systems
- 3.1.2 Storage Tanks
- 3.1.4 Reticulation Network

3.2 Sewerage and Wastewater System Overview

This document provides an overview of the On-site Wastewater Management (OSWM) system at Lake Bennett Estate, based on the “Review of Wastewater Treatment Facilities” report by Irwinconsult (14 October 2019, Job No: 18DA0418).

System Status

Current Assessment: The system is **not fit for purpose** and requires significant upgrades.

Capacity Analysis

Design vs. Actual Load

The system is substantially undersized for the 65 Bungalows, especially at full occupancy (estimated 48,000 litres/day hydraulic flow).

Septic Capacity Requirements

- **Required Capacity:** 73,600 Litres
- **Current Effective Primary Capacity:** ~18,000L
- **Shortfall:** 55,600 Litres (75% undersized)

Disposal Area Requirements

- **Required Area:** 2,285.7m (LTAR 15) to 3,428m (LTAR 10) of trenching
- **Current Area:** 140m of trenching
- **Assessment:** Grossly undersized

General Condition

Some components are reasonably maintained, but critical parts (disposal area, septic capacity) are inadequate, leading to system failure and public health risks.

System Components

Detailed specifications for each component of the OSWM system can be found on the following sub-pages:

Primary Treatment Systems

- 3.2.1 SSP1 - Main Septic Tank & Lift Well
- 3.2.2 SSP2 - Distribution Box & Lift Well
- 3.2.3 SSP3 - Transfer Pump Station
- 3.2.4 SSP4 - Everhard Septic Tank & Lift Well
- 3.2.5 SSP5 - Modified AquaTreat Systems & Lift Well

Distribution and Disposal Systems

- 3.2.6 Sewer Gravity Mains & Access Chambers
- 3.2.7 Rising Sewer Mains (Effluent)
- 3.2.8 Effluent Disposal Area (Land Application Area)

Related Infrastructure

- 3.2.9 Water Reservoir & Potential System Impact

Compliance Issues

Critical Non-Compliance Items

Based on the Irwinconsult Report, the following issues have been identified:

Capacity and Sizing

- Substantially undersized septic tank capacity
- Grossly undersized and failing effluent disposal area

Infrastructure Defects

- Incorrect HDPE pipework identification (effluent lines)
- Lift well covers not watertight
- Lack of proper venting on some lift wells
- Inadequate emergency storage in lift wells
- Unsealed pipe penetrations in lift wells
- Exposed/shallow rising mains

System Design Issues

- Septic tank installation depth exceeding code (SSP1)
- Incorrect discharge method into septic tank (SSP1 from SSP2)
- Groundwater infiltration into sewer system

Recommended Solutions

Immediate Action Required

Design and install a **Commercial Wastewater Treatment System (Modular / Containerised)**

Treatment Standards

- **Capability:** Producing secondary treated recycled water up to "A" Class
- **Reuse Applications:** Treated effluent for landscaping, irrigation, or other approved uses
- **Primary Benefit:** Substantially reduce the land application area required, addressing soil LTAR limitations

---

Reference Documentation

This overview is based on the "Review of Wastewater Treatment Facilities" by Irwinconsult, 14 October 2019. For complete details, refer to the full report: Report_Irwinconsult - Review of Waste Water Treatment Facilities - Rev 2.txt

3.2.1 SSP1 - Main Septic Tank & Lift Well

This section details the specifications for the Main Septic Tank and Lift Well, designated as SSP1.

Location and Overview

Location: Adjacent to the causeway, near access road to Bungalows 17-59

SSP1 Location

Primary Septic Tank

Tank Specifications

- **Type:** Precast concrete
- **Capacity:** ~18,000 Litres
- **Dimensions:** Approx. 2.4m diameter, 6.0m length
- **Depth:** Approx. 4.5m below surface (exceeds code allowance for soil cover)

Tank Condition

Appears fabricated from precast concrete. Evidence of surcharging (flooding) and ragging on ladder. Known to be submerged during flooding. Controller panel protected by bollards.

SSP1 Large tank Riser 1 - inside

SSP1 Large tank Riser 2 - Inside

Flow System

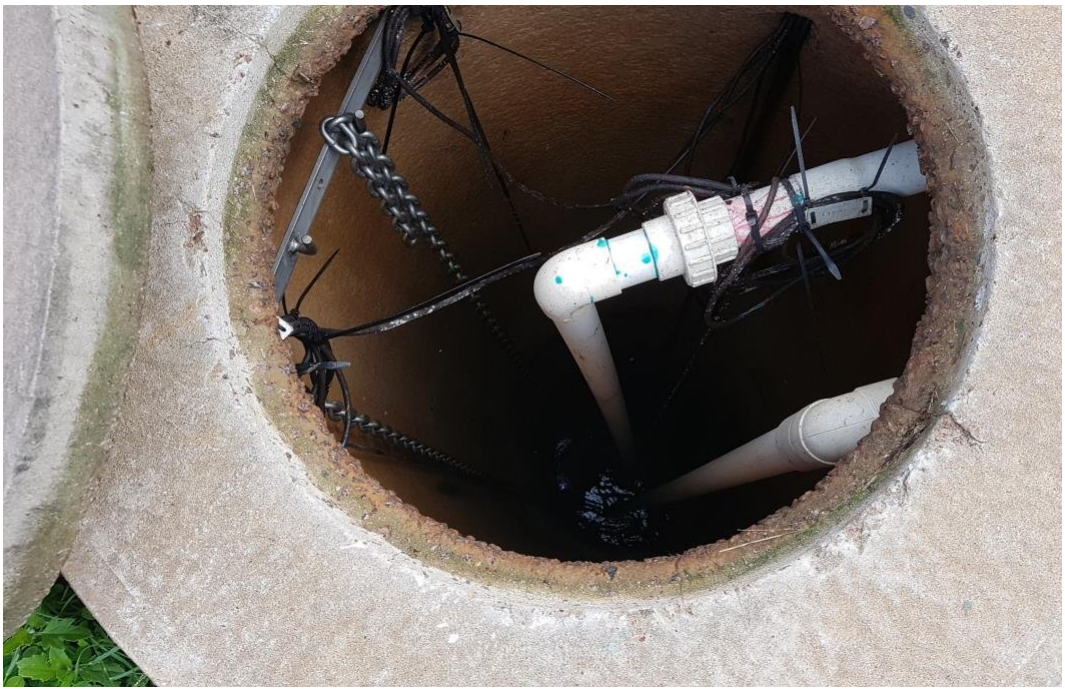
- **Inflow:** Receives gravity sewer from Bungalows 17-59 (DN150 common main) and pumped effluent from SSP2
- **Issue:** Pumped discharge from SSP2 enters incorrectly through the top crust

Lift Well System

Lift Well Structure

- **Type:** Precast concrete (appears to be 2.4m diameter pipes)

SSP1 Lift well



SSP1 Lift well-Inside

Pump System

- **Configuration:** Duty & Standby pump set
- **Type:** Xylem 3069 Series Submersible Pump
- **Manufacturer:** Xylem Water Solutions
- **Power:** 3.6 kW / 2.5 hp
- **Flow Rate:** Max 2640 lpm
- **Max Temperature:** 40°C
- **Power Supply:** Three-phase
- **Serial Numbers:** 3069 1720 1139 254 / 3069 1720 2446154
- **Installation:** 2 units
- **Manual:** Xylem 3069 Series Operating Manual

Control System

Controller

- **Type:** HydroStart Dual Pump Controller
- **Manufacturer:** MATelec Australia
- **System Status Indicators:** Power On, Enabled, Level Alarm
- **Pump Status (both pumps):** Auto/Manual, Pump On, Fault
- **Manual:** HydroStart Standard Manual

Float Switches

- **Quantity:** 2 units (pump activation and high level)
- **Model:** Kelco K10M
- **Specifications:**
  - **Voltage:** 0–240V, 15A resistive
  - **Type:** SPDT Float Switch
  - **Cable:** 10 m CPE rubber
  - **Note:** Blue wire is common
- **Documentation:** K-Series Installation Sheet
- **Manufacturer:** Kelco (Australia)

Alarm System

- **Features:** Visual & audible alarms
- **Main Board:** Visual alarm strobe for power status

Current Status

Condition

Risers appear in good condition. Redundant 50mm pipe penetration sighted. Current discharge pipe penetration not sealed against stormwater ingress.

Compliance Issues

- Cover not watertight
- No obvious venting
- Inadequate emergency storage

3.2.2 SSP2 - Distribution Box & Lift Well

This section details the specifications for the Distribution Box and Lift Well serving Bungalows 1-16, designated as SSP2.

Location and Overview

Location: Opposite side of the causeway from SSP1, eastern end of Bungalow 16

SSP2 Location

Distribution Box

Specifications

- **Type:** Concrete
- **Function:** Collects raw sewerage and (previously) distributed to two septic tanks (now removed)

Condition

Access chamber raised to ground level with Gatic type covers. Soil cover required revealing.

Lift Well System

Lift Well Structure

- **Type:** Concrete pump well with additional risers

Pump System

- **Configuration:** Dual pumps
- **Controller:** Matelec FPC-Series during inspection

Control System

Float Switches

- **Quantity:** 2 units (pump activation and high level)
- **Model:** Kelco K10M
- **Specifications:**
  - **Voltage:** 0–240V, 15A resistive
  - **Type:** SPDT Float Switch
  - **Cable:** 10 m CPE rubber
  - **Note:** Blue wire is common
- **Documentation:** K-Series Installation Sheet
- **Manufacturer:** Kelco (Australia)

Ventilation

A 100mm vent with a carbon filter has been installed.

Flow System

Discharge

Pumps effluent across the causeway to SSP1 septic tank via a 50mm PVC pipe through the riser chamber sidewall.

Current Status

Condition

Penetrations for electrical/float leads not sealed (risk of sewer gas escape).

Compliance Issues

- Cover not watertight

3.2.3 SSP3 - Transfer Pump Station

This section details the specifications for the Transfer Pump Station, designated as SSP3.

Location and Overview

Location: Western side of the lake

SSP3 Location

SSP3 Lift Well-Inside

Tank Specifications

- **Type:** Concrete baffle-less septic tank (similar to Darwin Pre-Cast vertical septic tank)
- **Capacity:** ~5,600 Litres (effective capacity reduced by ~1,200L as pumps suspended ~0.5m from bottom)

Pump System

Primary Pumps

- **Quantity:** Two Xylem Lowara SCUBA 3SC4/05 pumps
- **Model:** 3SC4/05/5 C / 3SC4/05/5 C G L20 (UK version with float)
- **Power:** 0.55 kW (≈ 0.75 HP), Single-phase 230V
- **Max Head:** ~45 meters
- **Flow Rate:** ~70 L/min (variant dependent)
- **Outlet:** 1¼" BSP Female
- **Cable:** 20 meters (in L20 variant)

Pump Construction

- **Material:** Stainless steel (AISI 304) body and shaft; technopolymer impellers; double mechanical seal system
- **Liquid Temp:** Max 40°C
- **Installation:** Vertical or horizontal, up to 17 m immersion depth
- **Notes:** Versions available with or without float switch. Suitable for clean or slightly abrasive water. Internal capacitor for single-phase operation.

Documentation

- **Manual:** Xylem Lowara SCUBA 3SC4/05 Manual
- **Technical Brochure:** SCUBA 50 Hz Technical Brochure

Control System

Controller

- **Type:** Matelec FPC-Series with visual & audible alarms
- **Features:** Main electrical sub-board has visual alarm strobe

Float Switches

- **Quantity:** 2 units (pump activation and high level)
- **Model:** Kelco K10M
- **Specifications:**
  - **Voltage:** 0–240V, 15A resistive
  - **Type:** SPDT Float Switch
  - **Cable:** 10 m CPE rubber
  - **Note:** Blue wire is common
- **Documentation:** K-Series Installation Sheet
- **Manufacturer:** Kelco (Australia)

Flow System

Inflow

Receives primary treated effluent from septic tanks at units 65-66 (via SSP4) and units 75-76 & 79-80 (via SSP5) through a 32mm blueline polyethylene pipeline.

Discharge

Pumps effluent under the lake to a gravity sewer access chamber on the eastern side. The original DN32 HDPE Blueline main (incorrect colour) has been upgraded to a **32mm Lilac poly pipe encased in a 100mm PVC pipe**. Pressure test of the original main was successful.

Old SSP3 Discharge Pipe Under Unit 40

SSP3 Discharge Pipe Location

Current Status

Condition

Tank appears in good condition.

Known Issues

- **Performance:** Low flow rates from pumps noted with the original pipe, likely due to length/size of discharge pipework
- **Flow Variation:** Fluctuating inflow noted

Compliance Issues

- Cover not watertight
- No obvious venting

- Inadequate emergency storage

3.2.4 SSP4 - Everhard Septic Tank & Lift Well

This section details the specifications for the Everhard Septic Tank and Lift Well serving Bungalows 65-66, designated as SSP4.

Location and Overview

Location: Between Bungalows 65 & 66

SSP4 Location

Septic Tank

Tank Specifications

- **Type:** Everhard 3,000 Litre plastic septic tank

Tank Condition

Appears of sound structure. XtraTreat septic tank outlet filter installed (was due for cleaning).

Lift Well System

Lift Well Structure

- **Type:** Polymer tank, approx. 500 Litres
- **Modification:** Original screw lid removed, compost bin installed as riser (join not sealed)

Pump System

- **Model:** Pentair Onga VF150
- **Type:** Cast Iron Vortex Submersible Drainage Pump
- **Applications:** Wastewater, rainwater, septic effluent, and grey water (neutral pH)
- **Solids Handling:** Up to 15 mm
- **Power:** Direct 240V supply, float activated (refer to manual for exact electrical details)
- **Net Weight:** 8.5 kg
- **Installation:** 1 unit
- **Manufacturer:** Pentair Onga (Australia)
- **Documentation:** VF150 Manual

Ventilation System

- **Issue:** Required vent not installed on pit
- **Alternative:** Low-level 100mm vent located ~30m away (connection unconfirmed)

Flow System

Discharge

Pumps to SSP3 via the common 32mm blueline polyethylene.

Current Status

Known Issues

- **Performance:** Pump fault found on one visit (high water level)
- **Alarm System:** High water alarm faulty

3.2.5 SSP5 - Modified AquaTreat Systems & Lift Well

This section details the specifications for the modified AquaTreat Systems and Lift Well serving Bungalows 75, 76, 79 & 80, designated as SSP5.

Location and Overview

Location: Adjacent to Bungalows 75, 76, 79 & 80

SSP5 Location

SSP5

System Configuration

Original Design

- **System Type:** Two AquaTreat Wastewater Treatment Systems (WWTS)

Current State

- **Modification:** Electrical components removed
- **Operation:** Systems operate as septic tanks with secondary tanks as settling chambers
- **Active System:** Only one system (adjacent to Bungalow 76) receives effluent from the bungalows

Septic Tank System

Active Unit Specifications

- **Type:** Primary concrete septic tank part of AquaTreat system
- **Capacity:** 3,000L, 4,000L, or 5,000L capacity depending on invert (actual size not specified for active unit, but report elsewhere mentions a 3,000L tank bypassed, implying this could be 3,000L)

System Condition

- **Active System:** CCTV confirmed southern system active
- **Inactive System:** Lack of scum layer in the unused (northern side) system

Lift Well System

Configuration

- **Location:** Part of the active AquaTreat unit's final pump out chamber
- **Function:** Pumps effluent to SSP3 transfer pump station

Pump System

- **Model:** Pentair Jung Pumpen PRIOX 300/9 M AUT
- **Type:** Submersible Effluent Vortex Pump for Dirty Water
- **Voltage:** 230–240V, 50 Hz
- **Cable:** 10 m CPE Rubber
- **Serial Number:** 94400470/0020
- **Installation:** 2 units

- **Manufacturer:** Pentair International S.a.r.l. (Made in Italy)
- **Documentation:** Pentair Download Center

Current Status

Active System Condition

- **Operation:** Functioning as intended

Inactive System Issues

- **Infiltration:** Tree root infiltration around inlet pipe
- **Water Ingress:** Possible stormwater infiltration (water levels varied between inspections)

Compliance Issues (Active System)

- Cover not watertight
- No obvious venting
- Inadequate emergency storage
- Septic may be subject to flooding

3.2.6 Sewer Gravity Mains & Access Chambers

This section details the specifications for the Sewer Gravity Mains and Access Chambers.

- **Bungalows 17-59:** DN150 PVC gravity main running parallel to access road, discharging to SSP1 septic tank. Two sewer access chambers noted:
  - Access Chamber 1: Located in the common area next to Bungalow 17.
  - Access Chamber 2: Located in the common area between Bungalows 39 and 40.
  - Access Chamber 3: Located in the common area between Bungalows 55 and 56.
  - **Issue:** Groundwater ingress through joins in one access chamber (nearest SSP1). Gaps between lids and riser pipes in both chambers.
- **Bungalows 1-16:** Gravity sewer main to distribution box for SSP2 (previously fed septic tanks, now removed).

3.2.7 Rising Sewer Mains (Effluent)

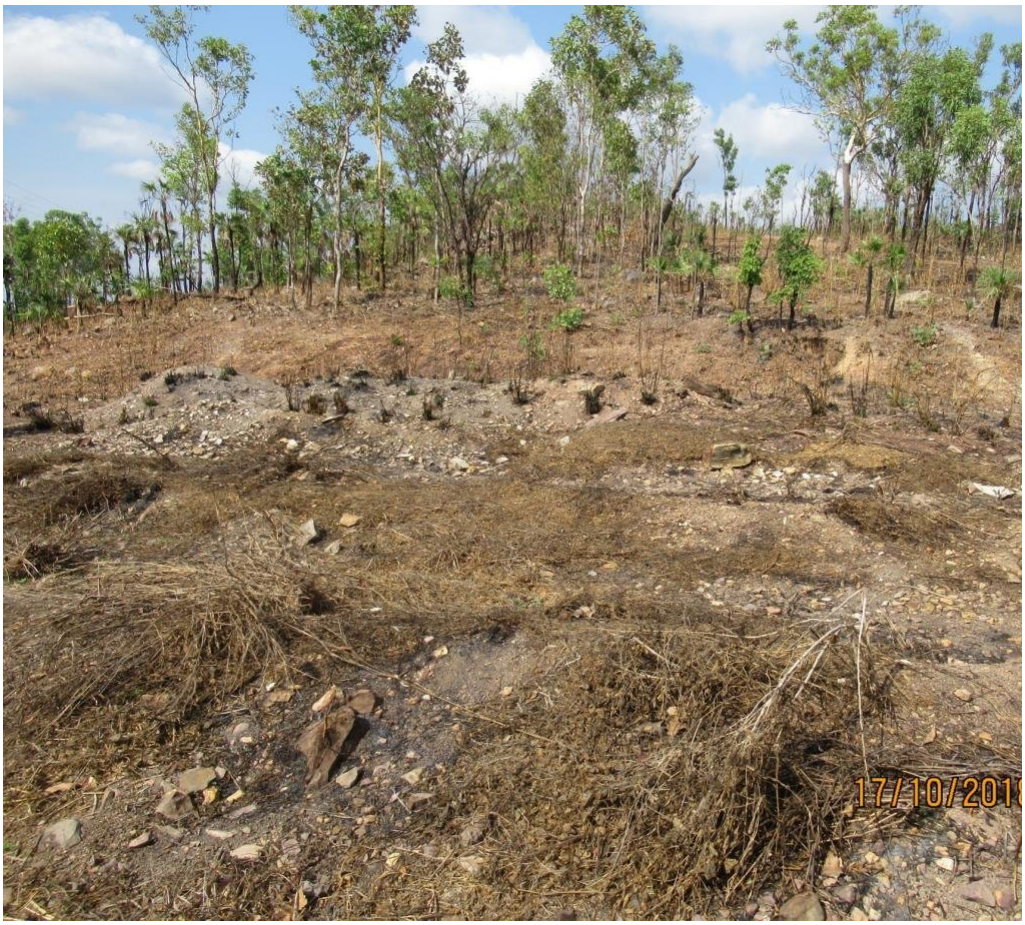
This section details the specifications for the Rising Sewer Mains used for effluent.

- **SSP3 to Eastern Gravity Main:**
  - **Pipe:** DN32 HDPE Blueline (incorrect colour) polyethylene pipe, runs under the lake. Upgraded to a **32mm Lilac poly pipe encased in a 100mm PVC pipe**.
  - **Length:** Approx. length not specified but noted as long.
  - **Test:** Pressure tested successfully (original pipe).
  - **Risk (Original Pipe):** Posed a high risk to the lake (potable water source for adjacent resort) and cross-contamination due to incorrect pipe colour.
  - **Recommendation (Original Pipe):** Re-route around the lake perimeter.
- **SSP1 to Distribution Box (Land Application Area):**
  - **Pipe:** 50mm uPVC pressure pipe.
  - **Issue:** Exposed at ground level in several sections along the access track (risk of damage, insufficient depth).

3.2.8 Effluent Disposal Area (Land Application Area)

This section details the specifications for the Effluent Disposal Area (Land Application Area).

- **Location:** Northern end of the ridge line running parallel to the lake, ~150m East of septic tanks.



Land Application Area

- **System:** Concrete distribution box feeding 4 disposal beds/trenches.
- **Trenches:** Approx. 35m long each (Total 140m). Appear to be Reln style plastic tunnel or similar. Max trench width ~1.5m.
    - **Issue:** Grossly undersized. Effluent visible flowing from ends of trenches (complete saturation).
- **Distribution Box:**
    - **Type:** Concrete.
    - **Condition:** Shows signs of sulphate attack, nearing end of design life. Exposed pipework leading in is prone to damage.

LAA Distribution Box

- **Inspection Openings:** 100mm PVC risers at start of trenches, protected by steel drums. Some risers damaged/not sealed to trenches.
- **Site Conditions:**
  - **LTAR:** 8-10 L/m²/day (below Code of Practice minimum of 10-25 for effective operation). Area considered unsuitable.
  - **Soil Horizon:** Inconsistent due to cut and fill (rock layer within 0.4m of surface in parts, Code requires >1.0m).
  - **Groundwater:** Not detected at time of investigation.
  - **Proximity:** Meets requirements for distance from bore (>150m) and watercourse separation (due to ridge).

3.2.9 Water Reservoir & Potential System Impact

This section details the Water Reservoir and its potential impact on the wastewater system.

- **Total Storage:** ~220,000 Litres (4 x 25,000L poly, 2 x 10,000L poly, 1 x 135,000L steel tank).
- **Risk:** During extended power outages, continued water use could fill the wastewater system. Upon power restoration, simultaneous pump operation could inundate the already failing disposal area.

3.3 Power Supply Overview

This document provides an overview of the estate power supply, including grid connection, distribution, protection, and backup power arrangements. Sub-pages provide detailed specifications for the grid connection and backup systems.

System Status

Current Assessment: The estate electrical supply is operational. Routine inspection, testing, and preventative maintenance are required to ensure ongoing reliability and safety.

Supply Architecture

- **Primary Supply:** Utility grid connection feeding the main switchboard (MSB)
- **Distribution:** Sub-mains supply to estate facilities and common infrastructure
- **Backup Supply:** Generator-based backup (with manual or automatic transfer, where installed)

Protection and Metering

- **Metering:** Utility revenue meters at point of supply; sub-metering where applicable
- **Protection:** Circuit breakers and RCDs per AS/NZS 3000; surge protection at MSB and sensitive loads
- **Earthing:** MEN system per AS/NZS 3000; equipotential bonding at metallic services

Load Management

- Prioritise critical services: water supply (bore pumps, treatment), wastewater pumping, critical lighting, comms
- Implement staged start and load shedding when on backup to avoid overloads

Operations and Maintenance

- **Routine Checks:** Visual inspection of MSB, enclosure integrity, labelling, indications, and ventilation
- **Testing:** RCD push-button monthly; trip-time testing annually; verify SPDs; thermographic scans annually
- **Documentation:** Keep single line diagrams, test records, and maintenance logs current and accessible

Safety and Compliance

- Comply with AS/NZS 3000 (Wiring Rules), AS/NZS 3010 (Generators), and relevant utility service rules
- Lock-out/Tag-out for all work; maintain clearances and ingress protection ratings
- Signage and labelling on all switchboards, transfer switches, and isolation points

Risks and Mitigations

- **Overload or Nuisance Trips:** Review protective coordination; stage large motor starts; verify cable sizing
- **Surge/Lightning:** Maintain SPDs; verify earthing and bonding; inspect after storm events
- **Backup Failure:** Monthly test runs under load; maintain fuel; service per OEM schedule

---

Sub-Pages

- 3.3.1 Grid Connection
- 3.3.2 Backup Power Systems

Version Control

Current Version: 1.0 Last Updated: 2025-10-06 Next Review Date: 2026-04-06

Related Documents

- 3.1 Water Supply System Overview
- 3.2 Sewerage and Wastewater System Overview

Lake Bennett Estate Grid Connection Manual

Main Switchboard (Units 37-38)

The primary grid connection to the estate comes from an overhead power line on the east side. This line feeds into the main switchboard located between units 37 and 38. Inside, you'll find meters for units 30 through 34, along with legacy meters controlling streetlights between units 43-44 and 29-30.

Main Switchboard Image Placeholder

Distribution Board DB1 (Near Unit 22)

DB1 is located near unit 22 on the east side. It contains meters for units 17-29 and three meters for the bores and sewerage pits (Pit 1 and Pit 2). It also controls a functioning streetlight between units 19 and 20.

DB1 Image Placeholder

Distribution Board DB2 (Near Unit 51)

DB2 is near unit 51 and serves units 45-58. It also controls streetlights between units 56-58 and 55-56, which are not functioning.

DB2 Image Placeholder

West Side Main Switchboard (DSB-DB1)

Located between units 66 and 75, this main switchboard connects the west side to the public network. It has meters for units 66-75 and controls a non-functioning streetlight in that area.

West Side Main Switchboard (DSB-DB1) Image Placeholder

Sewerage Pit 3 Distribution Box

Near Pit 3, this box contains meters for Pit 3 and 4 (on the same meter) and controls a non-functioning streetlight between units 65 and 66.

Sewerage Pit 3 Distribution Box Image Placeholder

Pit 5 Distribution Box

Near Pit 5, this distribution box has controls for Pit 5, meters for units 75, 76, 79, and 80, and controls for streetlights between units 75-80, which are not functioning.

Pit 5 Distribution Box Image Placeholder

North Shore Main Switchboard (Near Unit 7)

On the north shore near unit 7, this switchboard connects to the grid and contains meters for units 1-16. It also has controls for legacy streetlights that no longer function.

North Shore Main Switchboard Image Placeholder

3.3.2 Backup Power Systems

This page outlines backup power systems for the estate, focusing on generator solutions, transfer arrangements, critical load selection, testing, and maintenance.

System Types

- **Portable or Fixed Generators:** Diesel preferred for reliability and storage stability
- **Transfer Arrangements:** Manual Transfer Switch (MTS) or Automatic Transfer Switch (ATS)
- **Critical Loads:** Bore pumps, wastewater pumps, treatment controls, essential lighting, communications

Sizing and Design

- Size generator for starting currents of large motors (account for inrush)
- Apply diversity and consider staged starting to reduce peak load
- Provide adequate ventilation, exhaust management, and acoustic treatment

Fuel and Storage

- Sized for minimum 8–24 hours run time based on critical load
- Compliant storage tank with bunding and spill management
- Fuel quality management and rotation schedule

Controls and Integration

- ATS logic for safe transfer with appropriate time delays and interlocks
- Generator protection: over-current, under/over-voltage, under/over-frequency, emergency stop
- Remote monitoring where possible for runtime, alarms, and maintenance intervals

Testing and Maintenance

- Monthly test runs under load (at least 30 minutes) and record results
- Quarterly inspections; annual servicing per OEM
- Exercise MTS/ATS and verify indicators and interlocks during tests

Safety and Compliance

- Comply with AS/NZS 3010 for generator installations
- Earthing and neutral switching arrangements per design; clear labelling
- Keep clearances around generator; manage hot surfaces and exhaust

Version Control

Current Version: 1.0 Last Updated: 2025-10-06 Next Review Date: 2026-04-06

4.1 Internal Roads

Overview

Lake Bennett Estate's internal road network provides access to all residential lots and infrastructure facilities. The road system is designed to accommodate residential traffic, service vehicles, and emergency access while maintaining the estate's rural character.

Road Specifications

Road Classification

- **Primary Access Roads**: Main arterial roads connecting to the public road network
- **Service Roads**: Access routes to infrastructure facilities and maintenance areas

Construction Standards

- **Surface Material**: Sealed bitumen on primary roads, gravel on secondary and service roads
- **Road Width**: 6-7 meters for primary roads
- **Drainage**: Formed table drains and culverts for stormwater management
- **Load Rating**: Designed for standard residential and service vehicle loads

Road Layout

Primary Roads

As part of the Lake Bennett Estate, the access roads are essential infrastructure maintained to a high standard. The estate features two primary bitumen roads: - **Eastside Road:** This road spans approximately 400 meters in length. - **Northshore Road:** A shorter route, measuring about 250 meters.

Both roads are surfaced with bitumen and require periodic maintenance to address wear and minor surface issues. For patching, we utilize **EZ Street**, a high-performance asphalt product supplied by Fulton Hogan. This product is chosen for its reliability and ease of application.

For further technical details, you can refer to the EZ Street product sheet. For any support or inquiries, Fulton Hogan can be contacted directly through their official website.

Traffic Management

Speed Limits

- **Primary Roads**: 20 km/h maximum

Traffic Control Devices

- Speed limit signage at enterces
- Reflective delineation posts where required

Maintenance Requirements

Regular Maintenance

- **Sealed Roads**: Annual inspection and maintenance of surface integrity
- **Gravel Roads**: Regular grading and re-sheeting as required
- **Drainage**: Cleaning of table drains and culverts before each wet season

Responsibility Matrix

- **Estate Management**: Primary road maintenance
- **Property Owners**: Driveway connections and immediate frontage areas
- **Council/Government**: Public road interfaces and connections

Safety Considerations

Design Features

- Appropriate sight distances
- Adequate width for two-way traffic and emergency vehicles

Hazard Management

- Regular inspection for potholes, erosion, and surface deterioration
- Vegetation management to maintain sight lines
- Seasonal maintenance scheduling around wet weather periods

Future Development

Planned Improvements

- Progressive sealing of high-traffic gravel roads

For technical drawings and specifications, refer to Section 8.1 Civil Drawings

For maintenance schedules and responsibilities, see Section 7.2 Inspection and Maintenance Schedules

4.2 Driveways and Access Points

Overview

Property driveways and access points are critical components of the estate's transportation network. Proper design and construction ensure safe access while protecting the integrity of the internal road system and maintaining drainage effectiveness.

Driveway Standards

Construction Requirements

- **Connection Point**: Must connect to designated access points on estate roads
- **Surface Treatment**: Minimum 3-meter sealed or concrete apron at road connection
- **Width**: Minimum 3 meters, maximum 6 meters at road connection
- **Gradient**: Maximum 1:6 (17%) for first 6 meters from road

Design Specifications

- **Culvert Installation**: Required where driveway crosses table drain
- **Sight Distance**: Minimum 50-meter sight lines in each direction
- **Materials**: Approved materials compatible with estate road standards
- **Drainage**: Must not direct water onto estate roads or neighboring properties

Access Point Approval

Application Process

1. **Pre-Application Consultation**: Contact estate management for site assessment
2. **Formal Application**: Submit plans and specifications for approval
3. **Technical Review**: Engineering assessment of proposed connection
4. **Approval Conditions**: Specific requirements for construction and maintenance

Required Documentation

- Site survey showing proposed access location
- Driveway construction plans and cross-sections
- Drainage design and calculations
- Traffic impact assessment (if required)

Construction Standards

Culvert Installation

- **Size**: Minimum 375mm diameter, or as specified by estate engineer
- **Material**: Reinforced concrete pipe or approved equivalent
- **Installation**: Proper bedding and backfill to prevent settlement
- **Headwalls**: Concrete headwalls required at both ends

Surface Treatment

- **Sealed Apron**: Bitumen or concrete surface for minimum 6 meters from road edge
- **Transition Zone**: Gradual transition from sealed to unsealed surface
- **Compaction**: Proper compaction of base materials to prevent rutting
- **Edge Protection**: Appropriate edge treatment to prevent erosion

Maintenance Responsibilities

Property Owner Obligations

- **Driveway Surface**: Maintenance of entire driveway surface and structure
- **Culvert Maintenance**: Cleaning and repair of driveway culverts
- **Vegetation Control**: Trimming vegetation that affects sight lines
- **Damage Repair**: Immediate repair of any damage to estate road surface

Estate Management Responsibilities

- **Road Shoulder**: Maintenance of road shoulder adjacent to driveway
- **Table Drains**: Cleaning and maintenance of estate drainage system
- **Inspection**: Regular inspection of access points for compliance
- **Technical Advice**: Guidance on maintenance and upgrade requirements

Safety Requirements

Sight Line Management

- **Vegetation Clearance**: Maintain clear sight triangles at access points
- **Signage**: Appropriate warning signs if required for unusual conditions
- **Lighting**: Consider lighting for frequently used access points
- **Surface Conditions**: Maintain non-slip surfaces in all weather conditions

Traffic Safety

- **Turning Movements**: Design to accommodate safe entry and exit maneuvers
- **Queue Management**: Adequate space for vehicles waiting to enter property
- **Emergency Access**: Maintain access for emergency vehicles at all times
- **Pedestrian Safety**: Consider pedestrian movements and safety

Special Conditions

Service Vehicle Access

- **Waste Collection**: Ensure access for waste collection vehicles
- **Delivery Vehicles**: Accommodate standard delivery truck requirements
- **Emergency Vehicles**: Minimum 4-meter width for fire truck access
- **Utility Maintenance**: Access for power, water, and communication services

Environmental Considerations

- **Erosion Control**: Implement measures to prevent soil erosion
- **Water Quality**: Protect water courses from construction runoff
- **Native Vegetation**: Minimize impact on significant vegetation
- **Noise Control**: Consider noise impacts during construction

Non-Compliance Issues

Common Problems

- Inadequate drainage causing road damage
- Excessive width or inappropriate materials
- Poor sight lines creating safety hazards
- Lack of proper culvert installation

Enforcement Actions

- **Notice to Rectify**: Formal notice requiring compliance within specified timeframe
- **Access Restriction**: Temporary restriction of access until compliance achieved
- **Cost Recovery**: Recovery of costs for damage to estate infrastructure
- **Legal Action**: Court proceedings for persistent non-compliance

---

For building and development conditions, refer to Section 6.1 Building and Development Conditions

For technical specifications and drawings, see Section 8.1 Civil Drawings

4.3 Traffic and Safety Guidelines

Overview

Traffic safety within Lake Bennett Estate is maintained through a combination of appropriate road design, clear guidelines, and community cooperation. These guidelines ensure the safety of residents, visitors, and service personnel while preserving the estate's peaceful residential character.

Speed Limits and Traffic Rules

Speed Restrictions

- **Primary Estate Roads**: 40 km/h maximum speed limit
- **Secondary Residential Roads**: 20 km/h maximum speed limit
- **Near Community Facilities**: 10 km/h maximum speed limit
- **Construction and Service Areas**: 10 km/h maximum speed limit

Traffic Rules

- **Give Way Rules**: Standard Australian road rules apply
- **Overtaking**: Prohibited on narrow sections and blind corners
- **Parking**: No parking on roadways - use designated areas only
- **Heavy Vehicles**: Restricted to designated routes and times

Vehicle Types and Restrictions

Permitted Vehicles

- **Residential Vehicles**: Standard passenger cars, light trucks, motorcycles
- **Service Vehicles**: Delivery trucks, utility vehicles, waste collection
- **Emergency Vehicles**: Fire, ambulance, police - unrestricted access
- **Construction Vehicles**: Permitted with appropriate approvals and escorts

Vehicle Restrictions

- **Weight Limits**: Maximum 10-tonne gross vehicle weight on sealed roads
- **Oversized Vehicles**: Special permits required for wide or long vehicles
- **Commercial Traffic**: Limited to service and delivery purposes only
- **Recreational Vehicles**: ATVs and trail bikes prohibited on estate roads

Safety Infrastructure

Signage

- **Speed Limit Signs**: Posted at estate entry points and key locations
- **Warning Signs**: Installed at blind corners, steep grades, and hazards
- **Directional Signs**: Clear wayfinding for residents and visitors
- **Regulatory Signs**: No parking, weight limits, and other restrictions

Road Markings

- **Centre Lines**: Painted on primary roads where appropriate
- **Edge Lines**: Reflective markers on key routes and curves
- **Intersection Markings**: Give way lines and stop signs where required
- **Hazard Marking**: Reflective delineation at identified hazard points

Pedestrian and Cyclist Safety

Pedestrian Facilities

- **Walking Areas**: Designated safe walking areas along main routes
- **Visibility**: Maintain clear sight lines at pedestrian crossing points
- **Lighting**: Appropriate lighting at community facilities and gathering areas
- **Path Maintenance**: Regular maintenance of walking surfaces

Cyclist Considerations

- **Shared Roadways**: Cyclists share roadways with vehicles
- **Safety Equipment**: Helmets and reflective clothing recommended
- **Night Riding**: Appropriate lighting required for night cycling
- **Children**: Supervision required for children cycling on estate roads

Seasonal Safety Considerations

Wet Season Precautions

- **Road Conditions**: Increased caution on unsealed roads when wet
- **Drainage**: Avoid driving through flooded areas or blocked drains
- **Visibility**: Reduced speed in heavy rain or poor visibility
- **Maintenance**: Report road damage or hazards immediately

Dry Season Considerations

- **Dust Control**: Reduced speed on gravel roads to minimize dust
- **Fire Safety**: No parking in designated fire access routes
- **Water Trucks**: Give way to water trucks and maintenance vehicles
- **Wildlife**: Increased animal activity - drive with caution

Emergency Procedures

Accident Procedures

1. **Ensure Safety**: Move to safe location if possible
2. **Call Emergency Services**: Dial 000 for serious injuries
3. **Notify Estate Management**: Report all accidents on estate roads
4. **Document Incident**: Take photos and gather witness information

Emergency Vehicle Access

- **Clear Access**: Maintain clear access routes at all times
- **Fire Safety**: No parking in fire access zones
- **Medical Emergency**: Ensure ambulance access to all properties
- **Evacuation Routes**: Know and maintain designated evacuation routes

Enforcement and Compliance

Estate Management Role

- **Regular Patrols**: Periodic inspection of traffic compliance
- **Incident Response**: Investigation of traffic safety incidents
- **Education**: Information campaigns on traffic safety
- **Infrastructure Maintenance**: Ensuring safety infrastructure remains effective

Resident Responsibilities

- **Speed Compliance**: Adhere to posted speed limits at all times
- **Vehicle Maintenance**: Ensure vehicles are roadworthy
- **Visitor Education**: Inform visitors of estate traffic rules
- **Hazard Reporting**: Report safety hazards to estate management

Penalties and Sanctions

Traffic Violations

- **Speeding**: Warning letters, temporary access restrictions
- **Reckless Driving**: Formal warnings, potential legal action
- **Parking Violations**: Vehicle removal at owner's expense
- **Damage to Infrastructure**: Cost recovery for repairs

Repeat Offenders

- **Progressive Penalties**: Escalating consequences for repeat violations
- **Access Restrictions**: Temporary or permanent access limitations
- **Legal Action**: Referral to appropriate authorities for serious violations
- **Community Service**: Alternative penalties for minor infractions

Education and Awareness

New Resident Orientation

- **Traffic Rules Briefing**: Comprehensive overview of estate traffic requirements
- **Road Layout**: Familiarization with estate road network
- **Emergency Procedures**: Training on emergency response procedures
- **Contact Information**: Key contacts for traffic-related issues

Ongoing Education

- **Newsletter Updates**: Regular traffic safety reminders
- **Seasonal Campaigns**: Targeted safety messages for seasonal conditions
- **Incident Learning**: Sharing lessons learned from traffic incidents
- **Best Practice Sharing**: Promoting safe driving behaviors

---

For emergency contact information, refer to Appendix B. Emergency Contact Numbers

For reporting procedures, see Section 7.3 Reporting Faults and Issues

4.4 Emergency Access Routes

Overview

Emergency access routes within Lake Bennett Estate are designed to ensure rapid and reliable access for fire, medical, and other emergency services. These routes must be maintained to the highest standards and kept clear of obstructions at all times.

Primary Emergency Access Routes

Main Access Route

- **Lake Bennett Road Extension**: Primary emergency vehicle access from public road
- **Specifications**: 7-meter minimum width, sealed surface, all-weather access
- **Load Capacity**: Designed for fully loaded fire trucks and heavy rescue vehicles
- **Turning Circles**: Adequate turning facilities at key locations

Secondary Access Routes

- **Estate Drive**: Central spine providing access to all residential areas
- **Infrastructure Access Road**: Direct route to water and sewerage facilities
- **Perimeter Access Tracks**: Emergency access around estate boundaries
- **Service Roads**: Access to utility infrastructure and maintenance areas

Emergency Vehicle Requirements

Fire Service Access

- **Road Width**: Minimum 6 meters clear width for fire trucks

- **Overhead Clearance**: Minimum 4.5 meters clearance for aerial equipment
- **Load Bearing**: Surface capable of supporting 20-tonne vehicles
- **Turning Radius**: Minimum 12-meter turning radius for large fire trucks

Ambulance Access

- **Surface Quality**: Smooth surface suitable for patient transport
- **Gradient**: Maximum 1:6 gradient for safe ambulance operation
- **Width**: Minimum 4 meters for ambulance access to all properties
- **Lighting**: Adequate lighting or reflective markers for night access

Water Supply for Firefighting

Hydrant Network

- **Hydrant Locations**: Strategic placement throughout estate road network
- **Water Pressure**: Minimum 200 kPa at all hydrants
- **Access**: 3-meter clear zone around each hydrant
- **Identification**: Clear marking and signage for rapid location

Alternative Water Sources

- **Storage Tanks**: Access arrangements for emergency water supply
- **Natural Water Sources**: Identified access points to dams or water courses
- **Portable Supply**: Arrangements for water tanker access and positioning
- **Backup Systems**: Emergency water supply during system maintenance

Access Route Maintenance

Regular Maintenance Requirements

- **Surface Condition**: Monthly inspection of surface integrity
- **Vegetation Clearance**: Quarterly trimming to maintain clearances
- **Drainage**: Pre-wet season cleaning of all drainage infrastructure
- **Signage**: Annual inspection and replacement of damaged signs

Emergency Maintenance

- **Storm Damage**: Priority repair of emergency access routes
- **Equipment Failure**: Immediate response to infrastructure failures
- **Seasonal Issues**: Proactive maintenance before high-risk periods
- **24/7 Response**: Emergency maintenance capability available at all times

Obstruction Management

Prohibited Activities

- **Parking**: No parking in designated emergency access zones
- **Storage**: No storage of materials or equipment on access routes
- **Construction**: Temporary construction must not block emergency access
- **Vegetation**: No planting that may obstruct emergency vehicle access

Enforcement Measures

- **Regular Patrols**: Daily inspection of critical access routes
- **Immediate Removal**: Authority to remove obstructions without notice
- **Penalties**: Financial penalties for blocking emergency access
- **Legal Action**: Court proceedings for persistent offenders

Communication Systems

Emergency Service Liaison

- **Direct Contact**: 24/7 contact arrangements with emergency services
- **Access Information**: Current maps and access information provided to services
- **Key Contacts**: Updated contact list for estate management
- **Regular Meetings**: Quarterly liaison meetings with emergency services

Resident Communication

- **Emergency Procedures**: Clear instructions for emergency situations
- **Access Requirements**: Education on emergency access obligations
- **Contact Numbers**: Emergency contact information readily available
- **Alert Systems**: Communication systems for emergency notifications

Special Considerations

Bushfire Season

- **Asset Protection Zones**: Maintained clear zones around buildings
- **Fuel Load Management**: Regular reduction of combustible materials
- **Water Cart Access**: Designated routes for fire suppression water carts
- **Evacuation Routes**: Clearly marked and maintained evacuation routes

Wet Season Access

- **All-Weather Routes**: Priority maintenance of sealed emergency routes

- **Flood Planning**: Alternative routes during flood conditions
- **Communications**: Backup communication systems during power outages
- **Supply Access**: Maintained access for emergency supplies and equipment

Emergency Response Procedures

Incident Response

1. **Immediate Access**: Ensure emergency vehicles have clear access
2. **Traffic Control**: Manage traffic to facilitate emergency response
3. **Utilities**: Coordinate with utility services as required
4. **Communication**: Maintain communication with emergency services

Post-Incident Review

- **Access Performance**: Review effectiveness of emergency access
- **Infrastructure Damage**: Assess and repair any damage to access routes
- **Lessons Learned**: Document improvements for future incidents
- **System Updates**: Update procedures based on incident experience

Coordination with External Agencies

Fire Service Coordination

- **Pre-Planning**: Joint planning for fire response scenarios
- **Training Exercises**: Regular training on estate access routes
- **Equipment Compatibility**: Ensure hydrant and connection compatibility
- **Resource Planning**: Coordinate water supply and access requirements

Medical Service Coordination

- **Address System**: Clear address system for rapid location
- **Access Maps**: Detailed maps provided to ambulance services
- **Special Needs**: Identification of residents requiring special access
- **Communication**: Direct communication links during medical emergencies

Monitoring and Review

Performance Monitoring

- **Response Times**: Regular monitoring of emergency service response times
- **Access Issues**: Documentation of any access difficulties
- **Infrastructure Performance**: Assessment of access route condition
- **Stakeholder Feedback**: Regular feedback from emergency services

System Improvements

- **Technology Upgrades**: Implementation of new emergency access technologies
- **Route Optimization**: Continuous improvement of access route efficiency
- **Capacity Planning**: Planning for future emergency access needs
- **Best Practice**: Adoption of emergency access best practices

---

For fire management procedures, refer to Section 5.4 Fire Management and Bushfire Safety

For emergency contact numbers, see Appendix B. Emergency Contact Numbers

4.5 Street Lights

Overview

The Lake Bennett Estate features solar-powered LED street lighting designed to provide safe illumination for roads and walkways while maintaining energy efficiency and environmental sustainability. The lighting system operates independently of the electrical grid, utilizing advanced solar technology with intelligent controls.

Streetlight Specifications

Model Information

- **Model**: Luce Solar 15W LED
- **Power Rating**: 15 Watts
- **Light Output**: Up to 1,600 Lumens
- **Battery Capacity**: 10,800 mAh (lithium)
- **Color Temperature**: 5000-5500K (daylight white)
- **Weatherproof Rating**: IP65 (suitable for outdoor conditions)

Mounting System

- **Pole Material**: Aluminum construction
- **Installation**: No external wiring required
- **Mounting Height**: Standard street lighting configuration
- **Foundation**: Concrete base suitable for local soil conditions

Key Features

Intelligent Operation

- **Motion Detection**: Integrated motion sensor triggers full brightness upon detecting movement
- **Daylight Sensor**: Automatic dusk-to-dawn operation
- **Energy Management**: Smart power management optimizes battery life and performance

Environmental Benefits

- **Solar Powered**: Zero ongoing energy costs
- **No External Wiring**: Simplified installation with minimal site disturbance
- **Weather Resistant**: IP65 rating ensures reliable operation in all weather conditions
- **Long-term Durability**: Designed for extended outdoor service life

Security Enhancement

- **Motion Activation**: Provides enhanced security lighting when movement is detected
- **Consistent Coverage**: Strategic placement ensures adequate lighting coverage
- **Reliable Operation**: Independent solar operation eliminates power outage concerns

Installation Standards

Site Requirements

- **Solar Exposure**: Minimum 6 hours of direct sunlight daily for optimal performance
- **Clearance**: Adequate clearance from overhanging vegetation
- **Foundation**: Concrete foundation sized for local wind loads and soil conditions
- **Spacing**: Appropriate spacing to ensure adequate light coverage

Technical Installation

- **Pole Installation**: Professional installation to manufacturer specifications
- **Orientation**: Solar panel oriented for maximum sun exposure
- **Height**: Mounted at appropriate height for road lighting standards
- **Safety Clearance**: Minimum clearances maintained for vehicle and pedestrian safety

Maintenance Requirements

Regular Maintenance

- **Solar Panel Cleaning**: Periodic cleaning to maintain charging efficiency
- **Battery Inspection**: Annual battery performance assessment
- **LED Performance**: Monitor light output and replace units as required
- **Structural Inspection**: Regular inspection of pole integrity and mounting

Seasonal Maintenance

- **Pre-Wet Season**: Inspection and cleaning before heavy weather periods
- **Post-Storm**: Assessment of damage and functionality after severe weather
- **Vegetation Management**: Trimming vegetation that may shade solar panels
- **Performance Monitoring**: Regular assessment of charging and operation cycles

Performance Specifications

Lighting Performance

- **Operating Hours**: Typically 10-12 hours per night on full charge
- **Motion Detection Range**: Sensor coverage appropriate for pedestrian and vehicle detection
- **Brightness Levels**: Variable brightness with motion-activated full output
- **Battery Life**: Designed for 3-5 years typical battery service life

Environmental Performance

- **Operating Temperature**: Suitable for Northern Territory climate conditions
- **Weather Resistance**: Designed for tropical weather including heavy rain and high humidity
- **UV Resistance**: Materials selected for long-term UV exposure
- **Corrosion Resistance**: Marine-grade materials suitable for coastal environment

Safety Considerations

Electrical Safety

- **Low Voltage**: Safe low-voltage DC operation
- **No Grid Connection**: Eliminates electrical hazards from mains power
- **Enclosed Components**: All electrical components fully enclosed and weatherproof
- **Professional Installation**: Installation by qualified technicians

Public Safety

- **Vandal Resistance**: Robust construction to minimize vandalism risk
- **Emergency Operation**: Continues operation during power grid outages
- **Consistent Lighting**: Reliable operation maintains safe lighting levels
- **Motion Response**: Enhanced lighting for pedestrian and vehicle safety

Troubleshooting

Common Issues

- **Reduced Light Output**: Check solar panel for dirt, debris, or shading
- **Intermittent Operation**: Assess battery condition and charging performance

- **Motion Sensor Issues**: Verify sensor positioning and clean sensor lens
- **Physical Damage**: Inspect for storm damage or impact damage

Maintenance Actions

- **Panel Cleaning**: Use appropriate cleaning methods for solar panels
- **Battery Replacement**: Professional replacement when battery performance degrades
- **Component Inspection**: Regular inspection of all system components
- **Performance Testing**: Periodic testing of motion detection and light output

Documentation

Technical Resources

For comprehensive technical details and installation guidelines, please refer to the **Luce Solar 15W Manual** and product specifications available on the manufacturer's website: Luce Solar 15W Product Page.

Warranty Information

- **Product Warranty**: Manufacturer warranty covers defects in materials and workmanship
- **Battery Warranty**: Separate warranty terms for battery components
- **Installation Warranty**: Professional installation warranty for mounting and setup

---

For traffic safety guidelines, refer to Section 4.3 Traffic and Safety Guidelines

For emergency access considerations, see Section 4.4 Emergency Access Routes