PART 3: Framework Plan & Environmental Management Strategies

This part of the Precinct Plan describes the Framework Plan for the North & South Dunheved Precincts. It identifies the planning provisions contained within the management plans and strategies that have been prepared to provide the framework for the long-term management of the site's environmental issues.

The Framework Plan conceptually illustrates how the proposed development of the North & South Dunheved Precincts will respond to the key development principles identified in Part 2.

4.0 Framework plan

4.1 Urban structure & major land uses

The North & South Dunheved Precincts Framework Plan at **Figure 16** conceptually illustrates the urban structure and key principles for the planning and future development of the site.

The Framework Plan:

1. Confirms employment development as the principal land use.

2. Identifies the preferred nodal location for the provision of local convenience retail uses serving the worker population, i.e. near to the main entry to the site from Links Road, and as a focal point of the main road system.

3. Provides 2 public road vehicular access points at Links Road (south) and from the new internal east west road (north).

4. Connects the 2 public road vehicular access points via an internal collector road and loop road (local street).

5. Allows for future subdivision within the Precincts to create varying block sizes to accommodate a variety of employment generating land uses.

6. Creates an appropriate interface to the Regional Park via the establishment of asset protection zones, a heritage landscape setback to the Dunheved Homestead site and the location of the riparian and drainage corridors.

7. Allows for the establishment of fronting uses to streets, public open space and Regional Park areas.

8. Incorporates Water Sensitive Urban Design (WSUD).

9. Retains significant trees and vegetation within the riparian and drainage corridors to preserve biodiversity and maximise site amenity.

10. Integrates with the adjoining Dunheved industrial estate via vehicular, pedestrian, cycle and public transport linkages.

The principal land use within the Dunheved Precincts will be employment. A small proportion of convenience retail and recreation uses will be disbursed throughout the precinct. The maximum quantum of convenience retail floor space within the Dunheved Precinct is to be up to a maximum of 200m^2.

The main elements of the Framework Plan are described further in the following sections.

Character areas

The detailed built form controls contained within the Precinct Plan aim to generate buildings that address and activate streets within the precincts, and that create an environment which encourages walking, the use of public transport and passive surveillance of streets and open spaces.

The site has been divided into three character areas to promote the development of building forms that reflect their immediate context. A Landscape Strategy will be designed and implemented to enhance the unique character of the defined character areas.

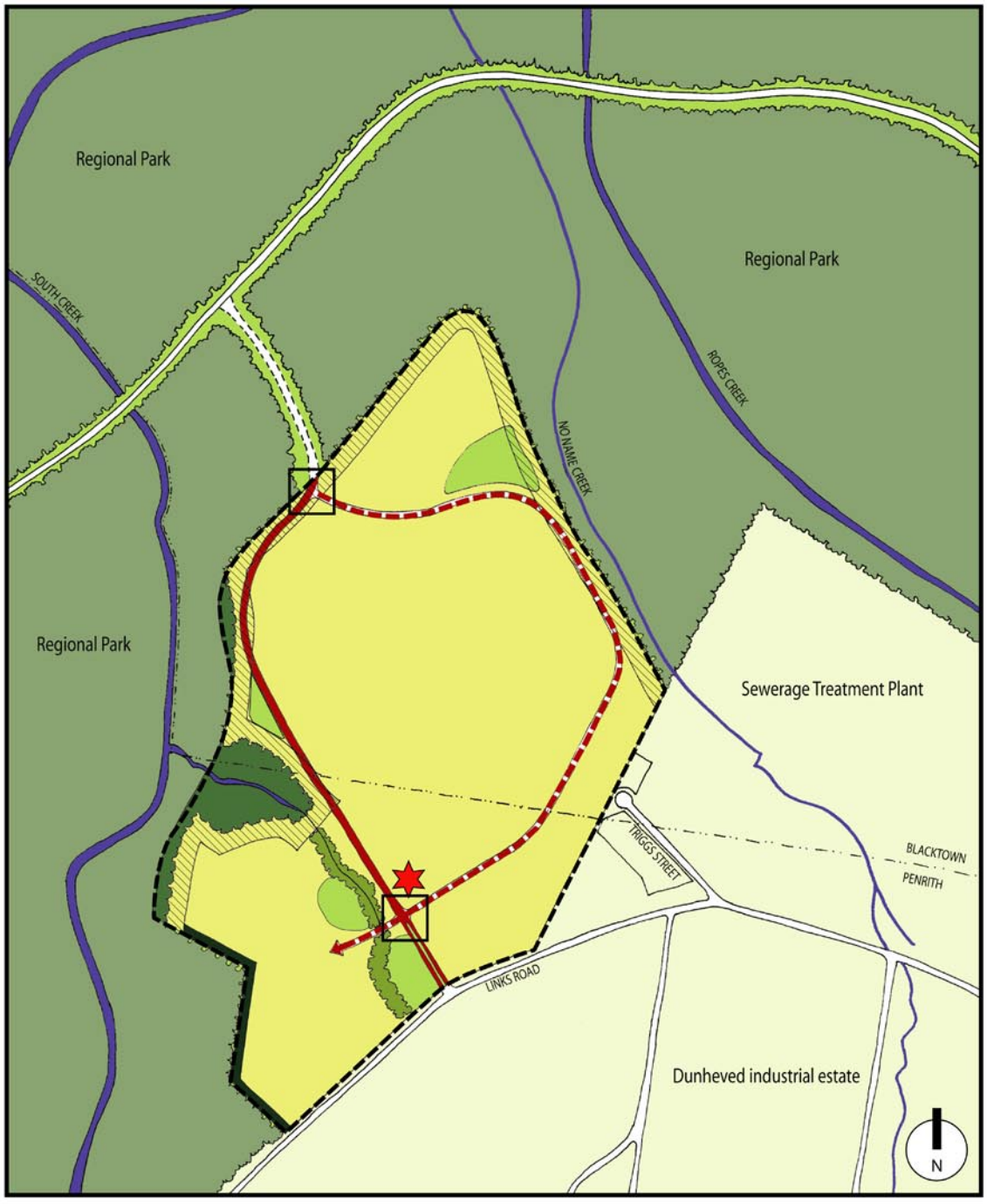
The character areas proposed for the site are:

- Parkland south employment;
- Parkland north employment; and
- Urban employment.

The locations of the character areas are illustrated at **Figure 17**.

Landmark Sites

Within the site a number of locations have been identified as landmark sites. Landmark sites are those sites that terminate a street corridor view and have a higher visibility, establishing the character and built quality of the area. Accordingly, it is important that the building design as viewed from public places is well considered. The locations of the landmark sites are illustrated at **Figure 18**.



Framework Plan
(indicative layout)

m0 100 200 300

- Collector Street
- Local Street
- Drainage Basins
- Employment Land
- Indicative Road Design (subject to separate future approval process)
- Heritage Landscape Setback
- Riparian Corridor (40m)
- Riparian Corridor (20m)
- Precinct Boundary
- LGA Boundary
- APZ (can include Car Parking and Roads)
- Node (preferred location for Local Retail Services)
- Intersection control

Figure 16 - Dunheved Precincts Framework Plan

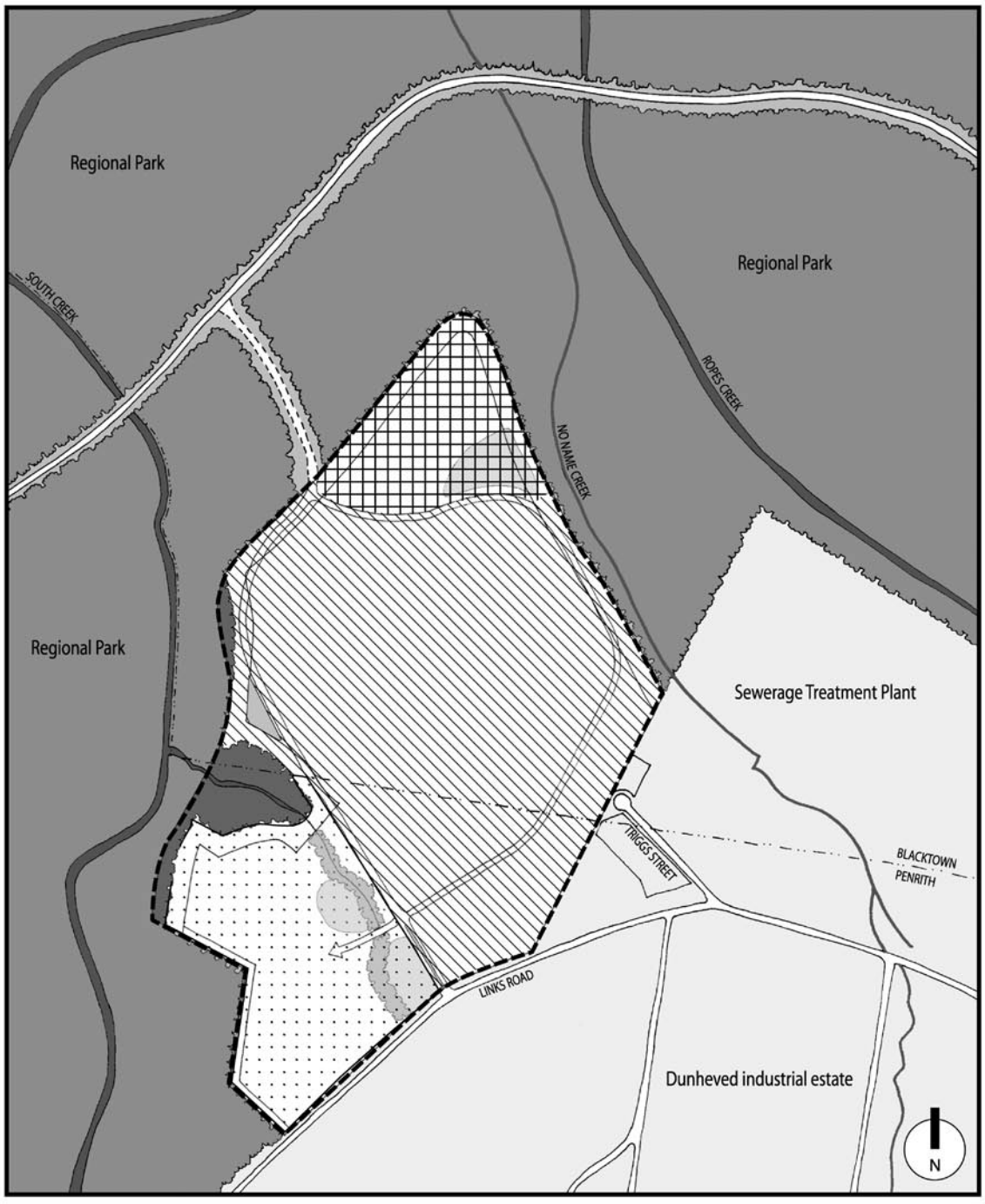
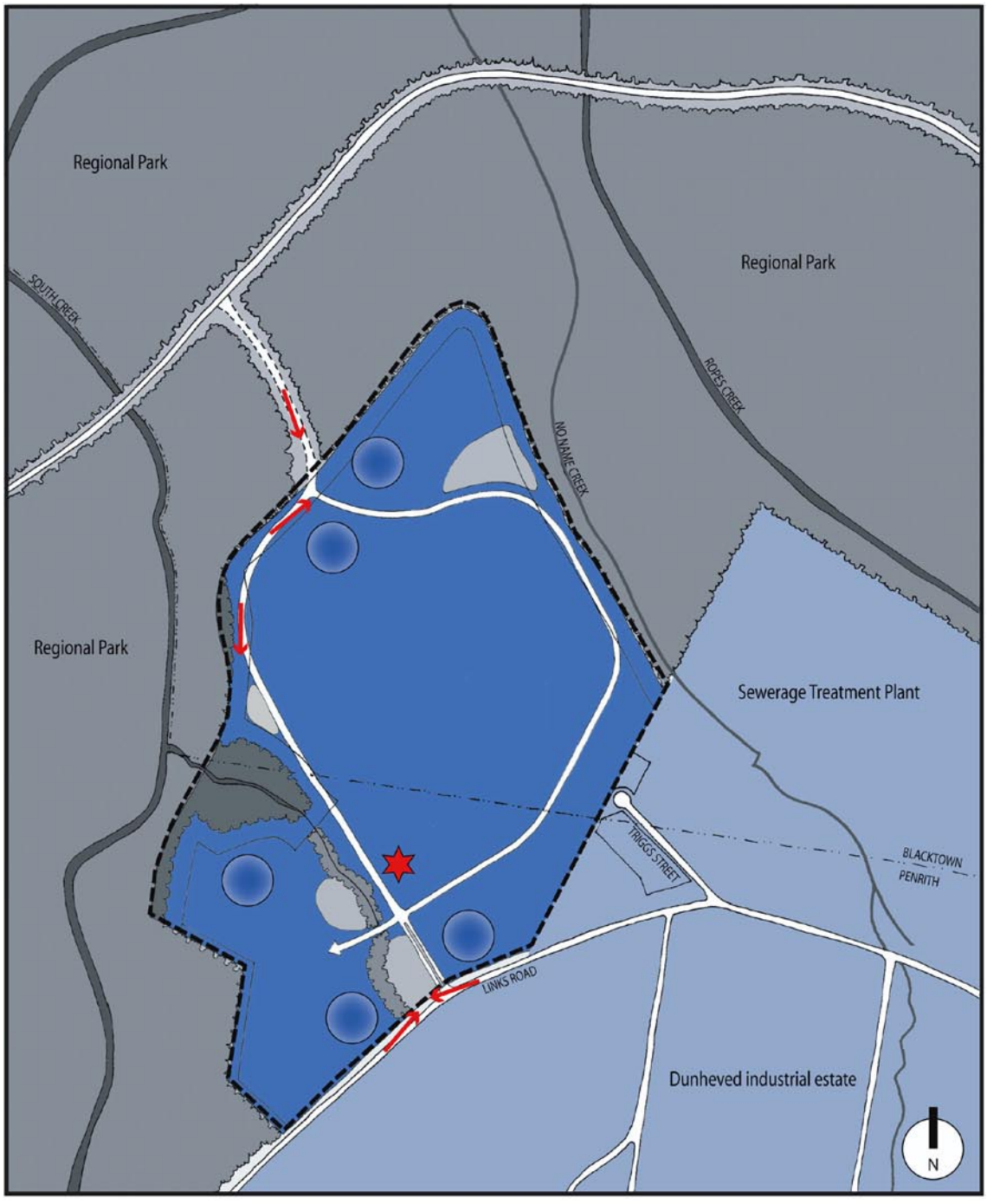


Figure 17 - Dunheved Character Areas



Landmark / Node Sites
(indicative layout)

m0 100 200 300

- Employment (new)
- Employment (existing)
- Node
- Key Landmark Sites
- LGA boundary
- Precinct Boundary
- Indicative Road Design (subject to separate future approval process)
- View to Key Landmark Site

Figure 18 - Landmark Sites

5.0 Conservation of natural values

The impacts of vegetation clearance within the Dunheved Precincts will be balanced by the major conservation outcomes resulting from the establishment and maintenance of the Regional Park, which provides habitats for the threatened flora and fauna known the occur within the Dunheved Precincts.

Therefore, although the development of the Dunheved Precincts will result in direct impacts to native flora and fauna arising from the removal of some of the scattered and disturbed patches of woodland that remain, the development will not have a significant affect upon any threatened flora or fauna species.

The framework plan for the Dunheved Precincts recognises the importance and habitat retention values of the Regional Park, and has had regard to the conservation value of the land and its relationship to the vegetation and fauna habitats within the Regional Park.

A range of mitigation measures and strategies to avoid or minimise potential indirect impacts of development have been incorporated into the planning framework for the Dunheved Precincts.

The mitigation measures and strategies include:

- Retention of significant trees within the riparian corridors wherever possible;
- Establishment of a creek riparian habitat;
- WSUD;
- Domestic and feral management strategies;
- Fire management plan; and
- Weed management plan.

The mitigation measures and strategies will ensure that the conservation objectives of SREP 30 and the St Marys EPS are met and that there will be no significant affect on threatened species or endangered ecological communities.

Retention of significant trees

The following strategies are to be used wherever possible (subject to development constraints including filling) in the subsequent planning phases:

- Maximise the conservation of existing drainage lines for drainage and vegetation retention purposes.
- Take into account significant trees in the design of the road alignments.
- Take into account appropriate quality trees in the setback areas of individual allotments and within the asset protection zones.
- Retain appropriate and healthy trees where possible in the Collector Street road reserve.

Areas within which there is potential to retain existing trees are shown on **Figure 19**.

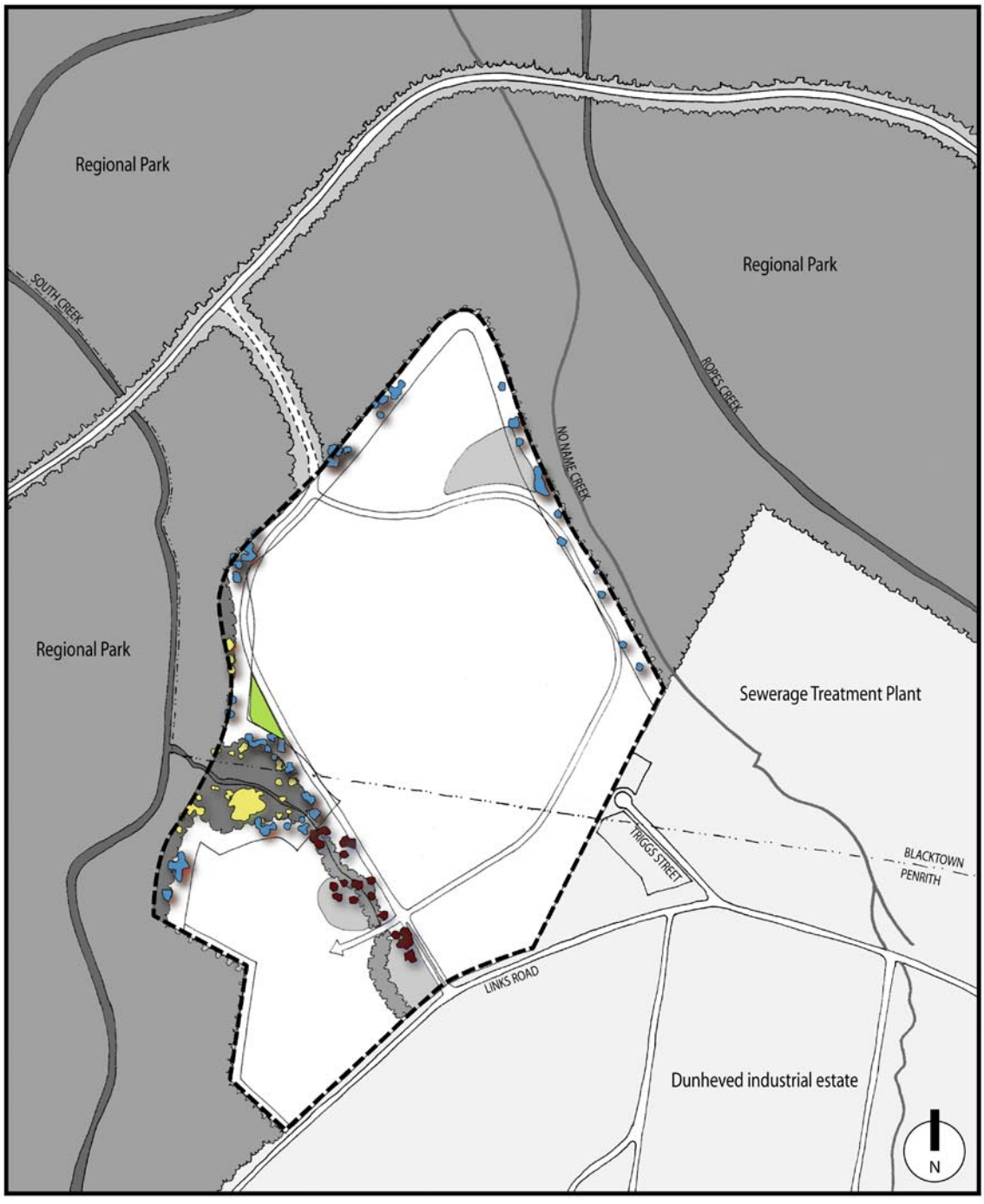


Figure 19 - Dunheved Precincts Potential Tree Preservation Areas

Corridor habitat

The Framework Plan for the Dunheved Precincts retains habitat along the South Creek drainage line.

This area currently provides continuous, although sparse, vegetation between the riparian areas of South Creek and the outflow of the Sewer Treatment Plant.

Within this area the following measures are to be implemented to protect creek habitat and retain its value as a fauna movement corridor:

1. A continuous native tree canopy is to be retained and enhanced.

2. Understorey shrubs are to be retained.

3. Exotic species are to be removed.

4. Native shrubs and ground cover are to be used in regeneration works to assist in enhancing corridor values.

Specific management strategies

As part of the precinct planning process a number of specific management strategies have been developed by Cumberland Ecology and Bushfire and Environmental Services to mitigate and prevent impacts from the proposed development of the Dunheved Precincts on the conservation values of the precinct and on those of the adjoining Regional Park.

These management strategies, included at **Appendices D**, **E** and **F** of Volume 2 of the Precinct Plan, include:

- Weed Management Strategy;

- Fire Management Strategy; and

- Feral and Domestic Animal Strategy.

General and species-specific environmental control measures for the Dunheved Precincts derived from each of these management strategies are set out as part of the development controls at Part 4.

The long term management of macro fauna that will be excluded from the Dunheved Precincts will occur in accordance with the Macrofauna Management Plan.

The Macrofauna Management Plan details the management and movement of kangaroos within the Dunheved Precincts.

6.0 Access and Movement

6.1 Road hierarchy

The proposed street hierarchy for the Dunheved Precincts accords with SREP30 and the St Marys EPS and is shown on **Figure 20**.

Figure 20 shows:

1. Provision of 2 principal public road vehicular accesses to the site at 1) Links Road (south); and 2) the existing internal east-west road (north).

2. Connection of the northern and southern public road vehicular access points by an internal north-south collector street that will form the main transport corridor through the site.

3. A street hierarchy comprising:

   - An internal collector road connecting the northern and southern public road vehicular access points to form the main transport corridor through the site; and

   - Other roads.

4. Additional local circulation may be provided running off the main connecting roads as appropriate within the developable areas, depending upon the subdivision configuration. The design standards for the collector street and local street road typologies are provided in Part 4.

5. Direct vehicular access to Links Road for lots fronting Links Road.

6.2 Pedestrian & cycle network

The indicative pedestrian and cycle network for the North & South Dunheved Precincts is shown in **Figure 21**.

Pedestrian and cycle paths form a key component of the connectivity of the Dunheved Precincts.

Figure 21 shows:

1. Provision of a shared pedestrian cycle path on the (or close to the) western side of the main Collector Street to encourage cycling and walking.

2. Accommodation of on road cycle routes on the Local Streets.

3. Integration of pedestrian and cycle routes with public open space and the Regional Park (subject to the DEC Regional Park Plan of Management).

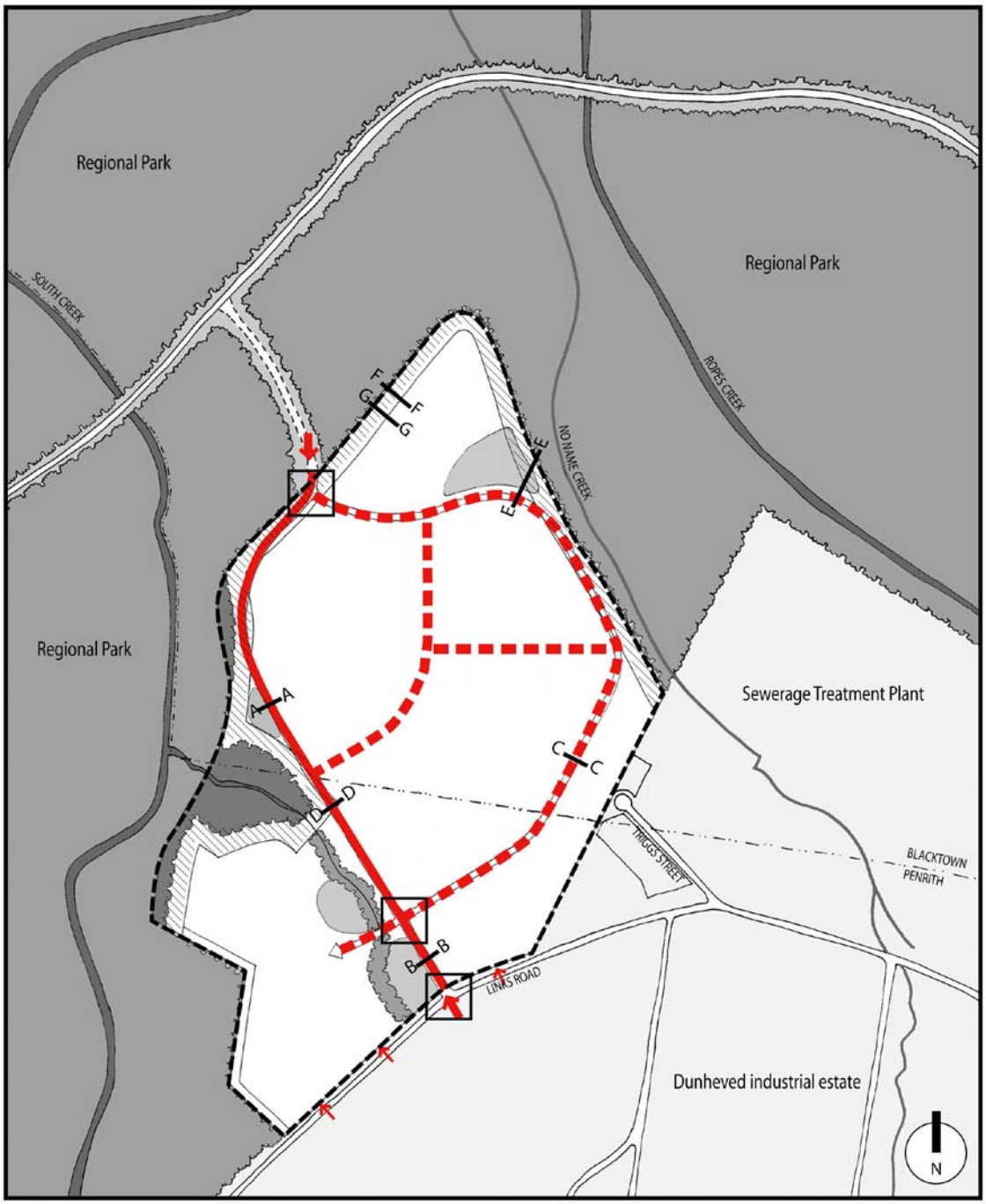


Figure 20 - Dunheved Precincts Street Hierarchy

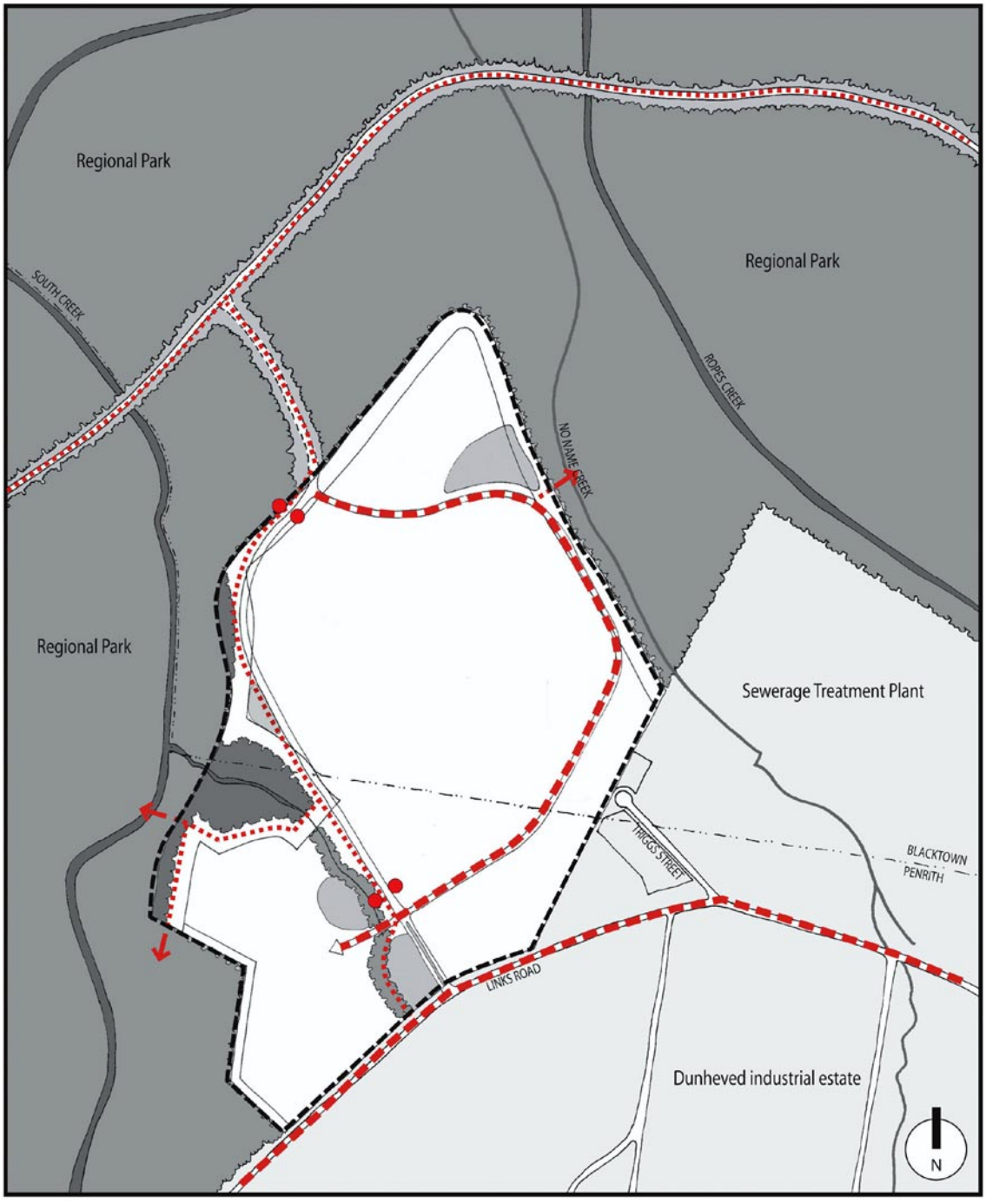


Figure 21 - Dunheved Precincts Pedestrian and Bicycle Access

6.3 Public transport

Bus services are the most effective form of public transport for the St Marys site.

To encourage the use of public transport the proposed road hierarchy is designed to accommodate the extension of bus services planned for the Eastern Precinct within the Dunheved Precincts, linking the precincts with both the St Marys and Mt Druitt railway stations.

Bus stops and shelters are likely to be provided on the collector road in the vicinity of the junctions with the local roads at the northern and southern edges of the site (subject to detailed discussions with bus service providers).

The provision of public transport services will ensure the connectivity of the precincts with surrounding neighbourhoods and to the established transport systems serving the greater metropolitan area.

The planning principles for public transport within the Dunheved Precincts are shown on **Figure 22**.

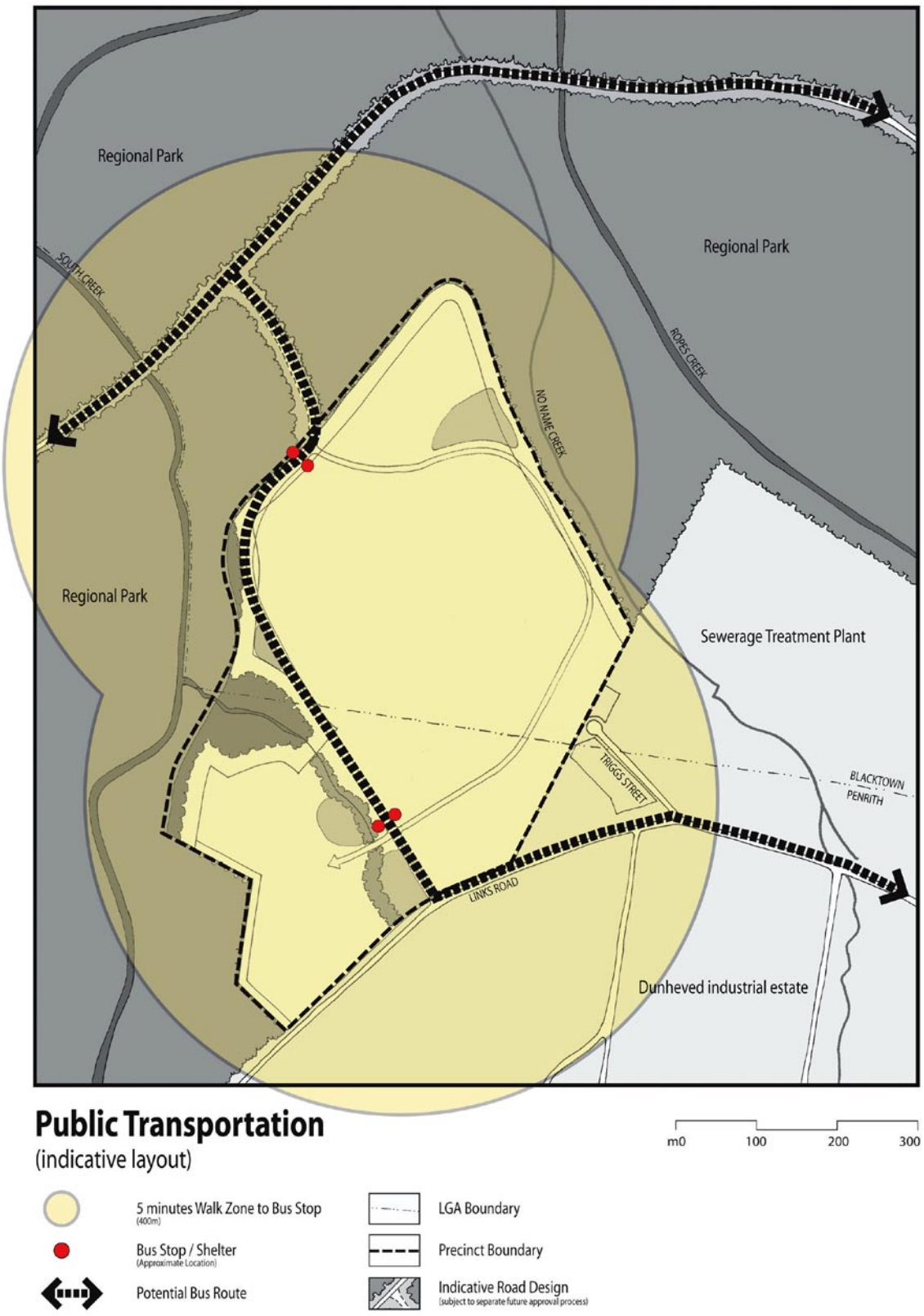


Figure 22 - Dunheved Precincts Public Transportation

7.0 Landscape and Drainage Network

The landscape vision for the Dunheved Precincts is:

> *"To develop a sustainable landscape setting that reflects and nurtures its Regional Park context and provides an accessible, integrated, diverse, safe and adaptable network of open space, streets and private allotments with an identifiable character and "sense of place"".*

The principal consideration is the integration and relationship of the landscape and drainage network with the Regional Park which surrounds a significant portion of the Dunheved Precincts. The Regional Park conserves the highest quality biodiversity values and potential habitat zones on the overall St Marys site.

The proposed indicative locations and categories of landscaped and drainage areas to be located within the Dunheved Precincts is shown on **Figure 23**.

The landscape and drainage network developed for the Dunheved Precincts identifies seven broad categories:

1. A 20 metre riparian corridor including path linkages (provides for drainage and vegetation/habitat linkages).

2. A 40 metre riparian corridor to the South Creek tributary (protects habitat and natural resources of Regional Park).

3. A 20 metre Asset Protection Zone (APZ) along the majority of the north, east and western precinct boundaries supplementing the landscape character (where not required for roads and/or parking) of the Precincts and providing for additional access links (will adjoin development on some boundaries to the Regional Park).

4. A 10 metre setback to the boundary of the Dunheved Homestead site that may incorporate screen planting, subject to meeting any requirement of Planning for Bushfire Protection 2001.

5. A landscaped outdoor eating area associated with the retail node.

6. Green streetscapes providing strong visual identity and designed to support an integrated network of access links catering for pedestrian and cycle access through the employment zone and link to adjoining open space.

7. Private open space for staff amenities.

The network of landscaped and drainage elements within the Framework Plan has responded to the conservation values of the land by:

1. Locating vegetation linkages and open spaces around high quality stands of trees and vegetation.

2. Retaining existing drainage lines for drainage and conservation purposes where appropriate.

3. Defining an edge to the Regional Park. This may include the provision of boundary fencing to create a visual buffer and to assist in the minimization of impacts on biodiversity and heritage values. Boundary fencing will be subject to the requirements of the DEC (NPWS) Regional Park Plan of Management.

4. Conserving and enhancing natural edges and riparian corridors.

Landscape and drainage network schedule

The landscape and drainage network schedule for the Dunheved Precincts is summarised in **Table 4**.

Table 4 - Landscape and drainage network schedule

Category	Landscape Characteristics	Benchmark
Riparian corridor- South Creek tributary	– full strata vegetation community – traversed by pedestrian / cycle path access only to localised situations and defined access routes – provide biodiversity / habitat linkages – buffered / defined from development by road incorporating drainage and access controls to manage potential impacts along South Creek boundary	20m wide corridor
Riparian corridor- South Creek	– defines alignment for edge of "Buffer" loop road to development where road adjoins riparian zone – defines edge of "full strata" vegetation conservation	40m wide corridor
APZ	– incorporates loop road where possible – tree canopy managed to maintain non-linked tree canopies – maintenance of native grass understorey	20m wide APZ
Setback to Dunheved Homestead	– tree canopy managed to maintain non-linked tree canopies – maintenance of native grass understorey	10m setback
Outdoor eating area	– tree planting – outdoor furntiure (seating and tables) – shade structures	Approximate area of 100-150m^2. Details to be finalised in Landscape and Urban Design Strategy.
Green streetscape	– avenue tree planting to street corridors – soft drainage techniques (including swales) to control and manage stormwater entering natural river / creek system – pedestrian / cycle path links shaded and "lined" by native tree planting	Street tree planting in accordance with requirements of Section 11.9.
Private open spaces	– native canopy tree planting – managed / maintained landscape – appropriately placed staff amenity areas including park furniture / shelter	Landscaped setbacks in accordance with requirements of Section 12.

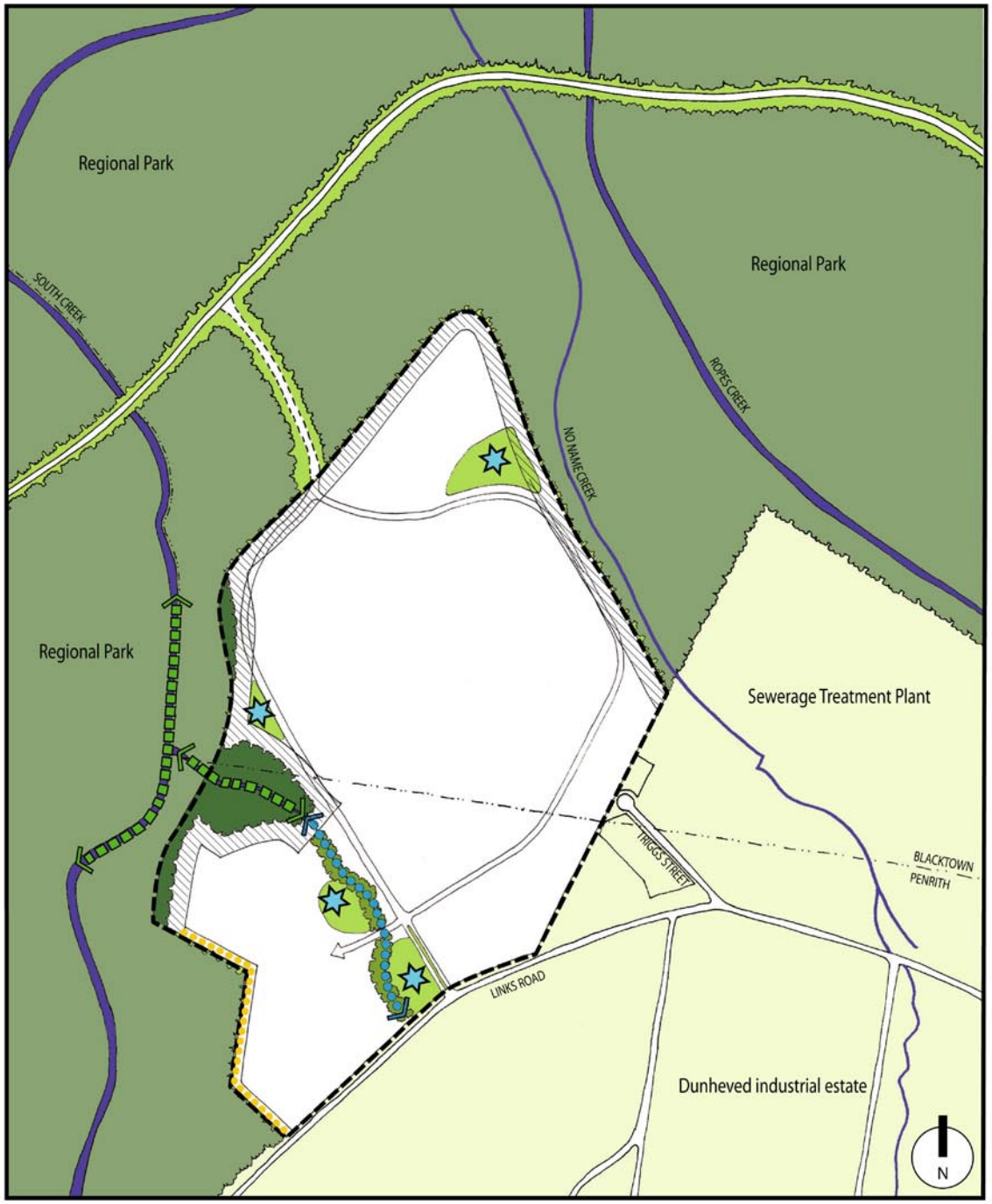


Figure 23 - Dunheved Precincts Landscape and Drainage Network

8.0 Water cycle and soils

8.1 Water cycle management

A Water, Soils and Infrastructure Report for the Dunheved Precincts has been prepared by Sinclair Knight Merz.

The Water, Soils and Infrastructure Report incorporates:

- A Stormwater quality management and reuse strategy;
- A Stormwater quantity management strategy;
- A Groundwater management strategy;
- A Soil and water management strategy; and
- A Flood Evacuation strategy.

Each of these strategies conform to the requirements of SREP 30 and the St Marys EPS and have been accommodated within the Precinct Framework Plan.

The water management strategies are based on the principles of WSUD and rely on linking urban design, landscape architecture and stormwater management infrastructure. The strategies generally focus on source controls.

In addition, a groundwater monitoring program has been formulated to allow verification that the ultimate development of the Dunheved Precincts conforms to the requirements of SREP 30 and the EPS.

An overview of the various adopted management strategies to be implemented as part of the management framework for the North & South Dunheved Precincts follows in Table 5. Detailed provisions relating to the water cycle management strategies are provided in the Water, Soils and Infrastructure Report and have been incorporated in the development controls at Part 4. All future development will be undertaken in accordance with these provisions.

The water cycle management measures for the Dunheved Precincts have been incorporated into the framework plan as illustrated on **Figure 24** below and on the Open Space planning principles at **Figure 23**.

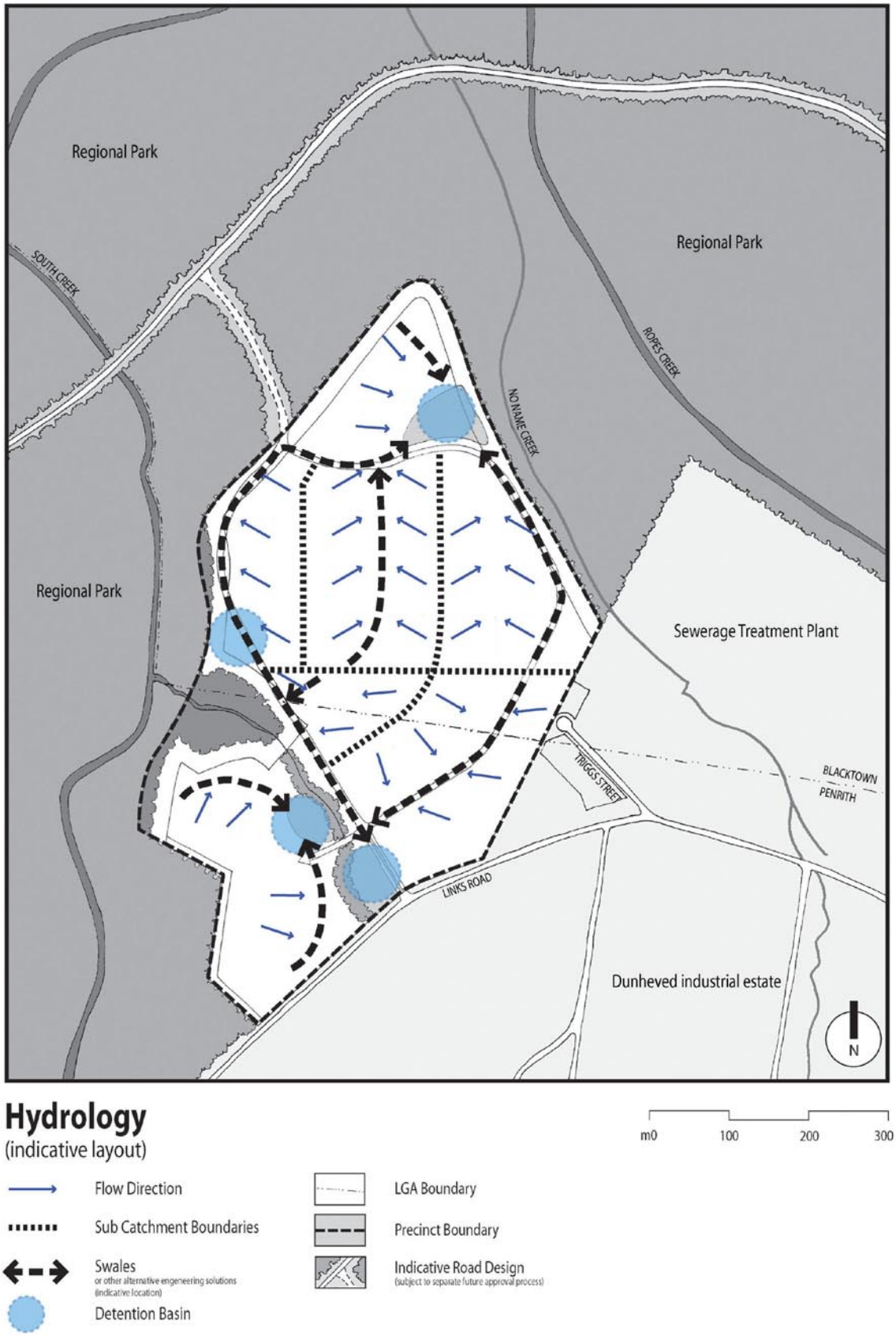


Figure 24 - Dunheved Precincts Indicative Water Cycle Management Plan

Table 5 - Water cycle management measures

Stormwater quality management and reuse	Runoff Control	Groundwater management	Trunk drainage system	Stormwater run-off and erosion

– Rehabilitate natural drainage lines.
– Use recycled effluent from the St Marys Sewage Treatment Plant for toilet flushing, industrial processes and irrigation where appropriate.
– Provide rainwater tanks (or recycling) on each lot with external reuse (irrigation) to minimise potable water demand.
– Provide spill containment devices on each lot to prevent possible contaminants from spillages from entering the main drainage system.
– Establish bioretention swales or alternative engineering solutions alongside the roads where appropriate in order to remove sediments, nutrients and particle bound pollutants for road runoff.
– Provide stormwater treatment devices upstream of dry basins to remove coarse sediment, litter and debris.
– Establish dry infiltration basins to remove nutrients, fine sediment and heavy metals.
– Provide extended detention storage for water quality purposes.
– Use water efficient fixtures to restrict use of potable water.
	– Use vegetation in the drainage system to assist in reducing stormwater pollutant loads.
	– Utilise rainwater tanks to reduce runoff and capture water for reuse.
	– Use spill containment devices to capture contaminants from accidental spills.
	– Use bioretention swales or alternative engineering solutions where appropriate to remove nutrients, fine sediment and heavy metals.
	– Utilise stormwater treatment devices to pre treat stormwater before it enters the dry basins.
	– Utilise dry infiltration basins as an end of line stormwater control measure.
		– Shape the landform to shed water efficiently and effectively.
		– Shape the landform to direct water into graded natural watercourses.
		– Construct the base of the embankment of free draining rock fill and provide subsoil drains to prevent the accumulation of water.
		– Control and collect stormwater run off to reduce amount available for infiltration.
		– Utilise impermeable liners for drainage features such as bioretention swales and basins.
		– Use low water demand drought resistant vegetation in common landscaping areas.
		– Incorporate significant tree planting in the development, and maintain existing trees where possible within the riparian and drainage corridors and open space elements.
		– Incorporate mulching in public landscaped areas.
		– Fluctuations in ground water levels and changes in water quality will be monitored to ensure that the proposed development achieves the objectives of the groundwater management strategy.
			– The trunk drainage system components will include:
			  – Pit and pipe system able to convey flows up to the 20 year ARI storm;
			  – Bioretention swales or alternative engineering solutions able to carry flows in excess of the 20 year ARI storm and up to the 100 year ARI storm; and
			  – Combined water quality basins are able to provide the necessary quality and quantity controls while also coping safely with the 100 year ARI flow.
			– The trunk drainage system will be designed in accordance with Council standards. The pipe system will not be affected by backwater flooding at the downstream end.
			– The water cycle and trunk drainage system needs to be fully implemented downstream of any development. To avoid filing then excavating the system should be implement progressively as the site is filled. Implementation from the downstream to the upstream end of each subcatchment will allow for the logical progression of the system as the site is filled.
				– Above-ground drainage lines are to be constructed and vegetated so they approximate as natural a state as possible, and are to conserve indigenous flora wherever possible;
				– Where multiple-use drainage corridors are to be established to convey run-off through the precinct, they are to be formed as riparian corridors with use of pool and ripple sequences to enhance the aquatic habitat value;
				– Water detention areas are to be provided within the development area;
				– An erosion and sediment control plan is to be prepared for the subdivision development and construction phase. This plan is to be formulated in accordance with acceptable standards and is to ensure that the development does not pollute the environment
				– Fill contamination has the potential to degrade the water quality of South Creek and in turn the vegetation and fauna of those habitats. All fill must be assessed and cleaned before use in the Dunheved Precinct.

8.2 Flood management

The Water, Soils and Infrastructure Report for the Dunheved Precincts prepared by Sinclair Knight Merz details the flood mitigation measures incorporated into the development of the site.

The proposed development involves land fill on the site within the 1:100 flood level. The Water, Soils and Infrastructure Report states that filling of the South Creek floodplain within the Dunheved Precincts is likely to impact on flooding in South Creek. Given that South Creek passes directly through the St Marys site with an entire reach of the floodplain contained within the site it is acceptable to allow flood levels to change within the site itself. Changes in flood levels within the site can be designed for as part of the proposed development.

The flood mitigation option to be incorporated in the development of the Dunheved Precincts includes:

- Raising the ground surface of majority of the site by 1 to 1.5m to ensure that development occurs above the 100 year flood level;
- Removal of the approach embankment for the Old Munitions Bridge; and
- Augmentation of the existing Ropes Creek and South Creek crossings.

Based on the flood mitigation measures outlined above, the flood modelling results indicate that the impacts of the proposed development will be:

- Substantial reduction in flood levels at most points within the site in the 1 in 100 year Annual Rainfall Index (ARI event); and
- No significant change to flood levels in the South Creek PMF event.

It is important to note that while the PMF event in the Hawkesbury-Nepean River has not been modelled it is expected that any change in flood levels on the site would be negligible.

A Flood Evacuation Strategy for the Dunheved Precincts is incorporated in the Water, Soils and Infrastructure Report.

The overall objectives regarding flood management which have guided the precinct planning process for the Dunheved Precincts are:

- To provide safe conveyance of local runoff;
- To bring all design ground levels on site at least 500mm above the 100 year ARI flood level;
- To ensure floor levels are as high or higher than ground levels;
- To provide for continuously graded evacuation routes above the PMF;
- To identify evacuation centres on high ground;
- To be consistent with the existing regional flood plan and local flood plans in terms of the flooding and evacuation information presented; and
- To conform with the requirements of the NSW Government Floodplain Management Manual.

The key elements of the flood evacuation strategy are:

- In the unlikely event that evacuation is necessary the most accessible continually rising evacuation route is via the existing Dunheved industrial area towards St Marys i.e. via Links Road, Forrester Road and Maple Street towards Poplar Park (the St Marys North Primary School is on high ground in this vicinity); and
- An alternative evacuation route is from the northern end of the site over either Ropes Creek or South Creek towards the higher ground of the Eastern Precinct or Central Precinct.

8.3 Soil management

The Water, Soils and Infrastructure Report for the Dunheved Precincts prepared by Sinclair Knight Merz incorporates a Soil Management Strategy.

Soil management measures

The soil management measures to be used during construction phases of development include:

1. Limit clearing of vegetation until required.
2. Utilise barrier fencing to limit site disturbance and control construction traffic.
3. Replace soils in same order as removed.
4. Minimise duration of works.
5. Limit vehicular and pedestrian traffic on recently stabilised areas. Seed/cover stockpiles.

In addition to the controls identified within the Soil and Water Management Strategy, local Erosion and Sediment Control Plans will need to be provided for the development of each individual lot.

The local Erosion and Sediment Control Plans will need to be prepared in accordance with the requirements of Penrith City Council's Erosion and Sediment Control Development Control Plan and Code of Practice 1996 and Blacktown City Council's Soil Erosion and Sediment Policy 1998 and the Landcom Soils and Construction Manual 2004 (the Blue Book).

8.4 Contamination

A Contamination Management Plan has been developed in accordance with the requirements of the conditions of the Site Audit Statement (reference CHK001/1 dated 7 June 1999).

The successful implementation of the Contamination Management Plan is dependant on the appropriate briefing of site operatives who may uncover potential chemical and/or explosive ordnance. This briefing is to include the review of the URS Contamination Management Plan document and flow chart.

The Contamination Management Plan describes the reporting procedures and lines of responsibility. These are to be documented along with the contact numbers for the relevant experts at the commencement of works and attached to the Contamination Management Plan. The experts will include those with detailed knowledge of the remediation which has been undertaken at the site and details of the location of, and access to, the substantial supporting documents related to the extensive assessment and remediation of the St Marys site.

9.0 Phasing of development

The indicative phasing for the development of the Dunheved Precincts is shown on **Figure 25**.

It is envisaged that phasing will commence near the entrance to the South Dunheved Precinct and proceed northwards into the North Dunheved Precinct. The water cycle and trunk drainage system will be implemented and roads constructed progressively as the site is filled. It will be established from the downstream to the upstream end of each subcatchment. All other infrastructure and services including public transportation will be provided at the relevant stages of development where and as necessary. As the site is progressively developed more than one phase may be under construction at any particular time.

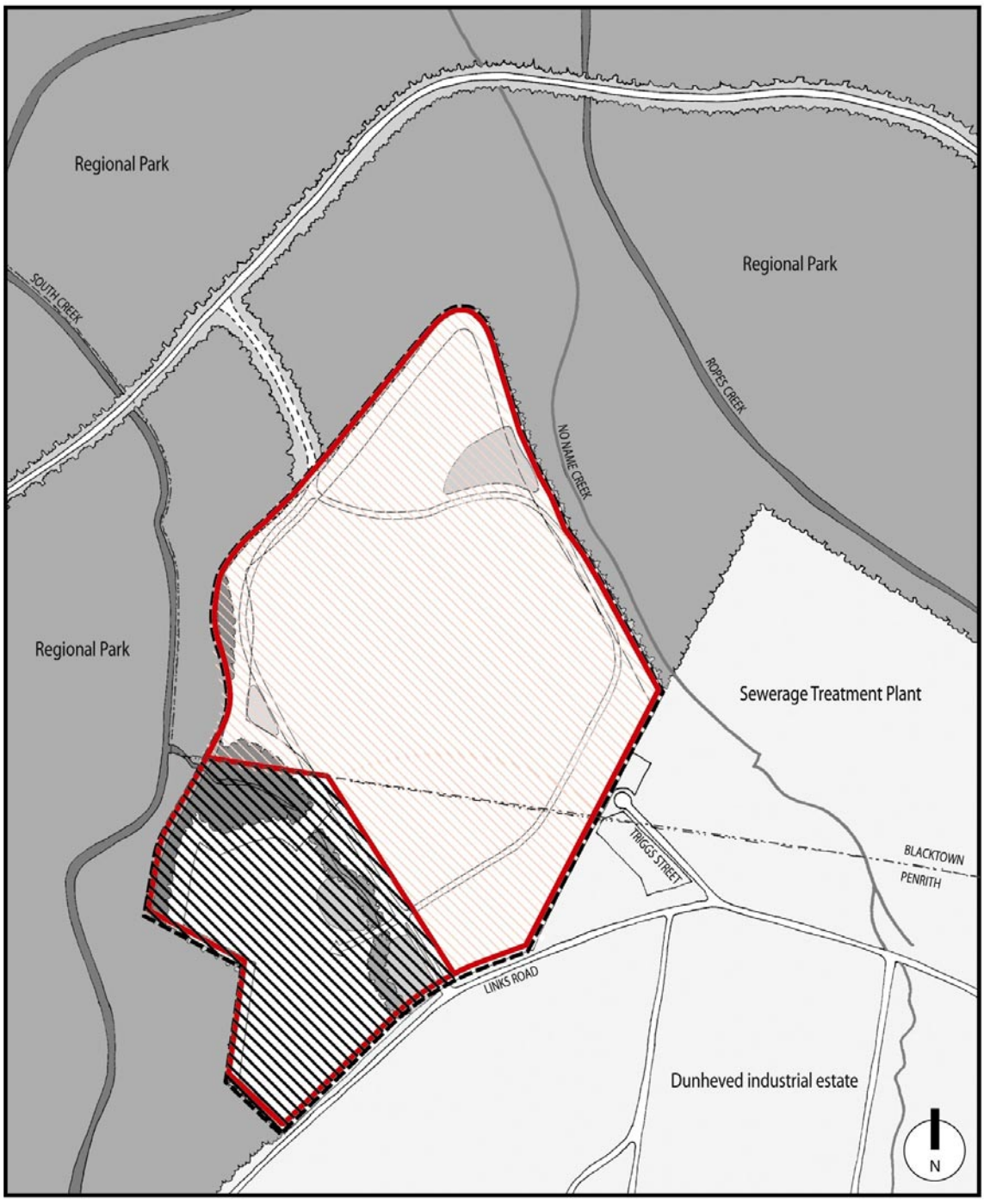


Figure 25 - Dunheved Precincts Indicative Phasing Plan

10.0 Efficient Resource Use Strategy

As outlined at Section 3.10 the development of the Dunheved Precincts is to be undertaken in a manner to ensure that the principles of ecologically sustainable development (ESD) will be achieved. The indicative framework plan and development control strategy is designed to ensure that development of the precincts is focussed on energy efficiency, waste management and air quality in the following manner:

- The Framework Plan is designed with regard to the shape, topography and slope of the site to allow for a lot layout that optimises energy efficiency;
- The Plan minimises distances travelled by private vehicles by establishing a central spine that enhances the accessibility of all parts of the Precinct;
- The Plan incorporates a street network that will allow for a high level of connectivity, ensuring that the employment lots can be accessed in an efficient manner by employment related traffic entering the precincts;
- The Plan provides a permeable street network to encourage walking;
- The Plan is designed to achieve a journey to work transport modal split of 50 - 60 percent private car and 40 - 50 percent other modes through the provision of an efficient public transport system that connects to key local destinations and the provision of on street and off street cycle ways.
- The Development Controls at Part 4 include controls to ensure that development (wherever possible):
  - utilises measures for minimising heat loss and the absorption of heat from outside;
  - allows for cross ventilation;
  - uses shading devices on windows facing east or west;
  - uses materials and construction methods which have low energy inputs;
  - selects energy and water efficient building services, equipment and appliances;
  - reuses and recycles materials during demolition and construction;
  - uses material with the highest practical recycled content;
  - uses materials derived from sustainable or renewable sources;
  - uses materials and products ensuring long life / durability / recyclability;
  - uses materials requiring the minimum of energy and rare resources to produce and use;
  - uses materials requiring the least amount of energy to transport to the job site;
  - promotes development that minimises potable water usage on the site;
- It is envisaged that an education program will ensure that the future land owners and tenants are aware of the need for, and benefits of, energy efficiency and how to practically apply these concepts.

This efficient resource use strategy and the development principles and controls contained within this Precinct Plan are designed to assist in the achievement of ecologically sustainable development within the Dunheved Precincts.