Tillegra Dam

Planning and Environmental Assessment

Draft

Draft Integrated Land Use Plan

WORKING PAPER n

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Hunter Water

Document Control

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Contents

1. Introduction

1.1 This document

This draft Integrated Land Use Plan (ILUP) has been prepared by Hunter Water Corporation (HWC) to develop a plan of action and management for the proposed Tillegra Dam, storage and surrounding area. The ILUP is intended as a management tool for HWC and the community and outlines the future operational and recreational activities that could occur on and around the storage as well as identifying implementation processes.

The information presented is based upon best practice and case studies from other operational storage areas and dams. A risk assessment and management focus has been adopted in order to minimise potential impacts on the storage and achieve the objectives outlined in the ILUP. As more information becomes available throughout the life of the Project, the ILUP would be reviewed and updated, as discussed in more detail in Section 1.8.

While the ILUP focuses on opportunities within the immediate surrounds of the storage, it also identifies activities and strategies for the wider catchment.

During preparation of the ILUP (and the EA Report), it was noted there was some variability among local residents with regard to the names used for various localities. As such, some names used in the ILUP may not necessarily reflect individual usage for some residents. For example, 'Tillegra' is both a rural place name and a Council parish. For the purposes of the ILUP, the following usages have been adopted:

- 'Tillegra' refers to the locality around the site of the dam wall, spillway and southeastern part of the storage
- 'Munni' refers to the locality broadly in the vicinity of the middle part of the storage
- 'Underbank' refers to the general locality to the north of the storage

These have been used to define precincts for the grouping of various potential activities (refer Chapter 8).

The use of a name for a place, road, etc in the ILUP should not be taken to mean this is necessarily 'official' usage; rather it should be treated as a convenience for the purpose of preparing the ILUP. The final naming of all roads and places (such as the storage) would occur through the Geographical Names Board of New South Wales which is the official body responsible for assigning place names under the Geographical Names Act 1966. The process also provides for the general public to put forward a view.

1.2 Tillegra Dam

HWC is proposing to construct a 450 gigalitre dam at Tillegra near the town of Dungog in the Hunter Valley (Figure 1.1). It would approximately double the total existing water storage capacity of the lower Hunter region. The storage is deemed an essential component of the NSW Government's State Plan (*A new direction for NSW, November 2006*) to secure the water future of the region for at least the next 60 years.

A dam was first proposed at the site during the 1950s due to the large catchment area, good rainfall and low environmental impacts. HWC began purchasing land in the Tillegra area in the early 1980s. In the mid to late 1980s, HWC deferred plans for the construction of a dam as a result of the community's response to pay-for-use water pricing and an overall reduction in water demand.

The current proposal to build Tillegra Dam has come about as a result of:

- long term climate change implications and the current drought being experienced across the country
- the need to improve drought security for existing customers in the lower Hunter region
- significant growth in the Hunter and Central Coast regions predicted by the most recent regional strategies
- potential to improve the Hunter's capacity to assist the Central Coast by improving the existing links between the two systems.

The dam would be used as a water source during drought conditions, with the storage kept at 90 to 100 per cent full under non-drought conditions. During times of drought, water would be released into the Williams River, extracted at Seaham Weir and transported to Grahamstown. Water could also be sourced from the storage when Chichester Dam is offline. The dam operations are discussed in more detail in Chapter 3 of this document.

1.3 Study and inundation areas

The study area covers the localities of Tillegra and Munni along the Williams River, north of Dungog. The Williams River rises in the Barrington Tops National Park and flows to meet the Hunter River estuary at Raymond Terrace. Downstream of the dam wall is the confluence of the Williams and Chichester Rivers near Bandon Grove. The Project is located within the Williams River sub catchment which is part of the Hunter River catchment. The study area is indicated on Figure 1.1 and incorporates the inundation area, the foreshore and surrounding area.

1.3.1 Features of surrounding area

Vegetation

There are a number of parcels of land that are vegetated, either in part or in whole in the area. Existing vegetation has been mapped so that where practical, any removal of vegetation associated with the construction and inundation of the dam can be avoided, as well as identifying any potential revegetation/habitat corridors. The terrestrial ecology report (Ecotone 2008, Working Paper E of EA Report) can be referred to for more detail on ecology along with Chapter 4 of the ILUP.

Topography

The study area is rolling country side with hill ranges forming local valleys. The slope of the land may inhibit activities if it is too steep. Figure 1.1 illustrates approximate depths when the storage is at 100 per cent capacity or full supply level.

Heritage Items

A number of heritage items have been identified within the inundation area. These items include Munni House and Quart Pot/Munni Cemetery. Both sites are shown on Figure 1.1.

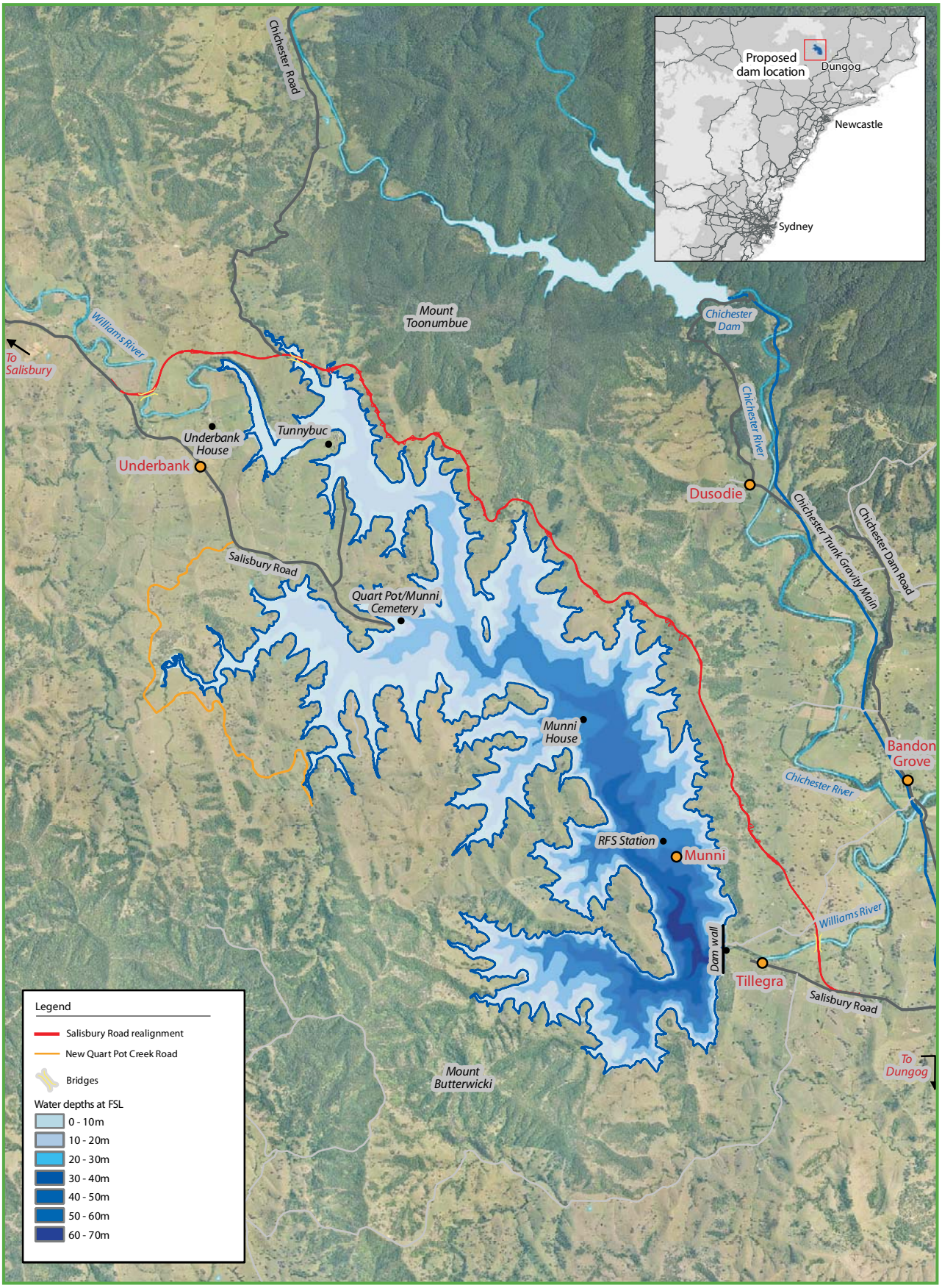

FIGURE 1.1 TILLEGRA DAM STUDY AREA

Aerial view of the proposed inundation area

Road and Access

Construction of the proposed dam would result in the inundation of approximately 2,100• hectares of land. Approximately 17 kilometres of the existing Salisbury Road would be inundated and require relocation. The new section of Salisbury Road would run along the eastern side of the storage. Several link roads are also required to provide access to properties currently serviced by Quart Pot Creek Road. The relocated roads are depicted in Figure 1.1.

1.4 Vision and objectives

HWC has developed the following vision for the ILUP:

The storage will be a high quality drinking water reservoir to drought proof the Hunter and wider communities that also provides recreational and social benefits for the community.

The main objectives of the ILUP are to:

- provide long-term protection for water quality as a resource for local and downstream users
- identify the storage's potential environmental, social and economic opportunities and outline key actions to be undertaken
- identify recreational activities that would be compatible with the water management and operation of the reservoir
- identify opportunities that recognise the natural and cultural values of the area.

The ILUP has been prepared as a 'living' document which would evolve as the dam is constructed, the storage fills and the dam becomes operational. Opportunities identified in the ILUP for the study area may not all be present when the dam becomes operational, however the ILUP conveys a long-term vision for the future uses of the dam and storage area.

1.5 Comparable recreational areas in the local area

There are a number of dams, State forests and National Parks in the upper Hunter. Chichester Dam, Lostock Dam and Glennies Creek Dam (also known as Lake St Clair) are used for a variety of recreational purposes in addition to being used as water storages. North of Tillegra is the World Heritage listed Barrington Tops National Park, and State Forests in the Upper and Lower Barrington. Moving east towards the coast is Myall Lakes National Park and further south near Clarence Town are the Wallaroo and Karuah Nature Reserves. These recreational areas are depicted on Figure 1.2.

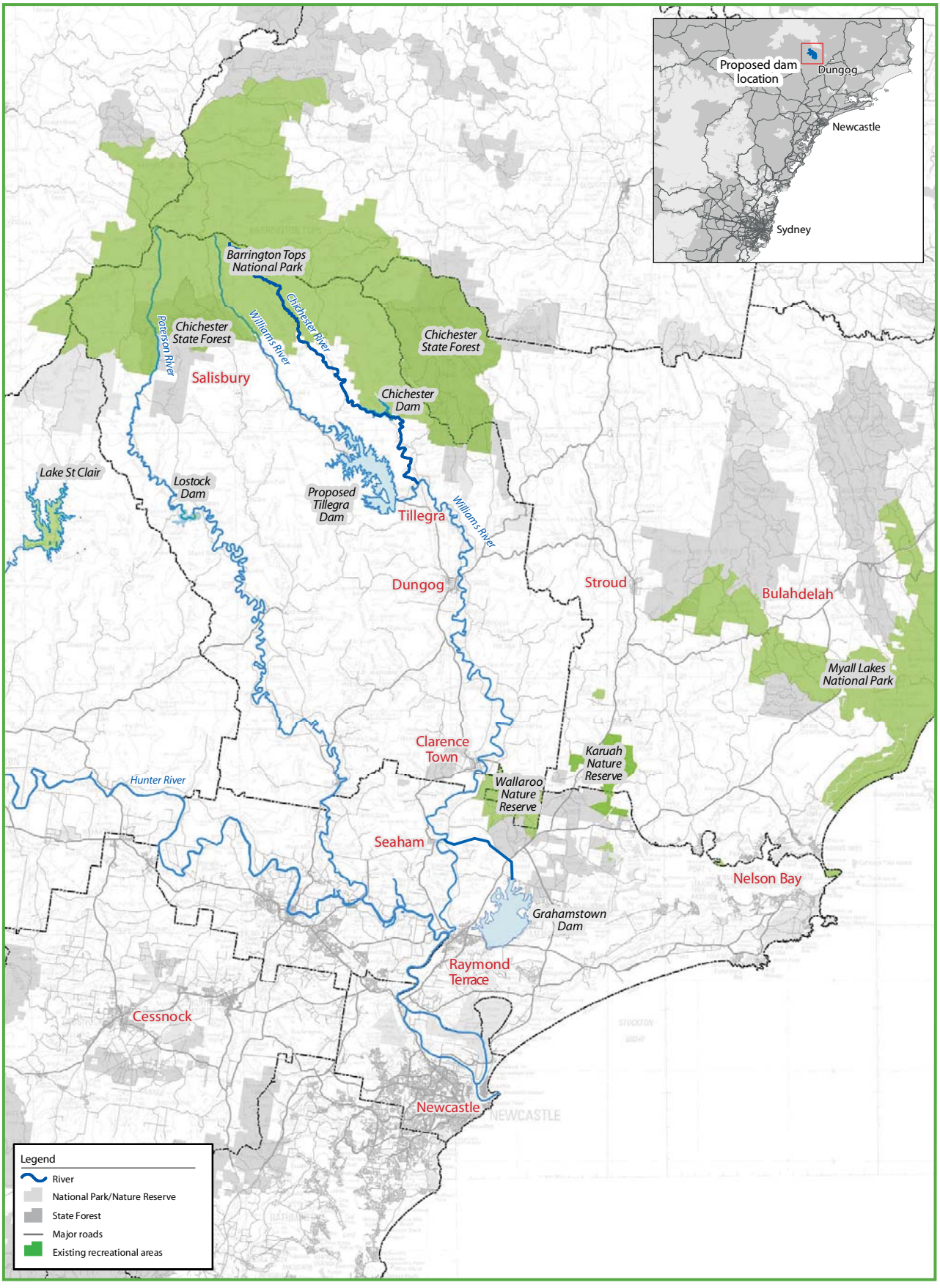

FIGURE 1.2 COMPARABLE RECREATIONAL AREAS AROUND TILLEGRA

TABLE 1.1 SNAPSHOT OF COMPARABLE RECREATIONAL FACILITIES AND ACTIVITIES IN THE UPPER HUNTER

	CHICHESTER DAM	BARRINGTON TOPS*	LOSTOCK DAM	LAKE ST CLAIR	KARUAH AND WALLAROO**	MYALL LAKES ***
Vehicle entry fees				●		●
Camping grounds	●	●	●	●	●	●
Caravan sites		●	●			●
Cabins/cottages	●	●			●	●
Toilets	●	●	●	●	●	●
Picnic facilities	●	●	●	●	●	●
Barbecues	●	●	●	●	●	●
Kiosk				●		●
Swimming		●	●	●		●
Showers			●	●		
Walking tracks	●	●	●	●	●	●
Cycling		●		●		●
Boating			●	●	●	●
Canoeing/kayaking		●	●	●	●	●
Boat ramps			●	●	●	●
Fishing		●	●	●	●	●

*Barrington Tops includes Barrington Tops National Park, and State Forests in the Upper and Lower Barrington.
** Karuah and Wallaroo includes Karuah and Wallaroo Nature Reserves and Wallaroo State Forest.
*** Myall Lakes includes Myall Lakes National Park, Myall Lakes and Bulahdelah State Forests

1.5.1 Chichester Dam

Chichester Dam is one of the principal water storages for the Hunter region and is located at the base of Barrington Tops National Park. Activities and land use within the catchment are limited and water for domestic purposes is drawn directly from the storage which has a capacity of 21.5 gigalitres. To maintain the high quality water supply, recreational uses around the storage are limited. On-water activities are not permitted including any form of boating and swimming. Adjacent to the spillway (that visitors can walk halfway across) are picnic facilities and toilets. There are also campsites and cottages nearby.

The spillway in operation at Chichester Dam

1.5.2 Barrington Tops

The Barrington Tops area consists of National Park and State forests and is highly popular with locals and tourists. It has extensive native vegetation and rivers and some parts have been listed as World Heritage. Camping sites are provided at a number of locations in both the State forests and National Park. While camping is free within State forests, there is a camping fee for sites within the National Park. Power boating is not possible at Barrington Tops. There are picnic areas, barbecues, toilets, walking and cycling tracks as well as a number of spots for fishing. There are concerns that increasing visitor numbers may be unsustainable in the future.

1.5.3 Lostock Dam

West of Tillegra is Lostock Dam which has a capacity of 20 gigalitres. The storage is used primarily for irrigation. However, it also offers a variety of recreational activities. Water skiing and jet skiing are not allowed, however boating activities are permitted under a speed limit of 8 knots. Picnic areas, toilets and showers are provided and close by is the Lostock Dam Caravan Park. Fishing is a popular activity at the dam which is stocked on a regular basis with Australian bass.

Boating

1.5.4 Lake St Clair

Lake St Clair was created through the damming of Glennies Creek. It has a capacity of 283 gigalitres and is located west of Lostock Dam. The lake is a water source for nearby Singleton and is also used for irrigation and coal mining in areas of the Lower Hunter. Visitors pay an entry fee to the recreation reserve where there are picnic facilities, barbecues, toilets and a kiosk open on weekends. All forms of boating are permissible including water skiing although there are some areas where a speed limit of 8 knots applies. A total exclusion zone exists near the dam wall to preserve the quality of the water supply. Swimming and fishing are encouraged and the lake is stocked with Australian bass, silver perch and goldern perch. Visitors can pay to camp overnight in one of eight powered camping sites or anywhere on the 38 hectares reserved for camping.

1.5.5 Karuah and Wallaroo

The Karuah and Wallaroo Nature Reserves and Wallaroo State Forest are located south of Tillegra near Clarence Town. Within these reserves are a number of picnic sites, toilets, walking tracks and lookouts. Camping is permissible at the Karuah Nature Reserve which borders the Karuah River. Fishing, canoeing and boating are permissible activities along the river and a boat ramp is located at Allworth.

1.5.6 Myall Lakes

Myall Lakes encompasses a number of State forest and National Park areas located closer to the coast. A large number of recreational activities are offered in the Myall River, Bulahdelah and Nerong State Forests, and in the Ghin Doo-Ee and Myall Lakes National Parks. Camping in designated State forest areas is free, however camping sites in National Park areas incur a camping fee. Vehicle entry fees are also required for entry into the Myall River National Park. Within these areas visitors can take advantage of picnic facilities, walk along a number of tracks and lookouts, fish, swim, canoe along rivers or go sailing upon Myall Lakes.

1.5.7 Dungog

Dungog is the closest town to Tillegra and is often referred to as the southern gateway to the Barringtons. The town offers recreational activities such as horse riding, golf, a museum, historic cinema, information centre and local swimming pool. There is the annual Pedalfest, (a celebration of cycling), a rodeo, fishing competitions, agricultural shows and community jubilee markets that are held once a month.

Dungog

1.6 Opportunities for future recreation

Tillegra Dam would be located close to Barrington Tops and there is an opportunity to connect the 'mountains to the storage', and to complement the walking and camping activities offered in Barrington Tops with boating, swimming, fishing experiences around the storage.

A large expanse of water inland is a valuable commodity for recreation as it allows for boating and fishing, activities that are not widely available at Barrington Tops or Chichester Dam. It is anticipated that the water would only be drawn from the storage in times of drought, so storage levels are likely to remain between 90-100 per cent the majority of the time. This relatively stable storage level would enable a variety of recreational activities and experiences.

Walking tracks and lookouts are found throughout the region and there is the opportunity to build on these by creating walking tracks around the storage. There is also potential to extend walking tracks to Chichester, further linking the mountains to the storage. Driving tracks to Barrington Tops could pass through Dungog and around the storage contrasting the views visitors would experience at Barrington Tops.

Overnight visitors from further afield, such as Newcastle and Sydney, could camp by the storage, and there could be opportunities for commercial operators to establish accommodation for tourists. There is likely

"The storage will be a high quality drinking water reservoir to drought proof the Hunter and wider communities that also provides recreational and social benefits for the community."

to be potential for local businesses to provide additional services such as other accommodation, supplies, fishing licenses and other equipment. The storage could also serve as a location for a number of water based competitions, such as rowing, that have not previously existed in the area.

The existing recreation areas around Tillegra all offer a unique experience. Myall Lakes is a more coastal experience while out west Lake St Clair and Lostock Dam are the main hubs of recreational activity. Tillegra Dam would be situated in close proximity to a protected and popular wilderness area and there are likely to be many opportunities to enhance visitors' experience to the region by offering a larger range of recreational activities. The potential activities mentioned here are discussed in more detail in Chapter 7.

1.7 About the ILUP

The ILUP is a preliminary planning document that has been prepared to elicit community and stakeholder comment on HWC's proposed management of the catchment area surrounding the storage as well as to help clarify community interests and concerns.

Issues and opportunities addressed in the ILUP have been identified through a review of past planning documents as well as community and stakeholder consultation conducted since the proposed dam was announced in November 2006. The ILUP will be placed on exhibition, along with the environmental assessment, and will be further refined following feedback received during the exhibition period.

The ILUP will go through a number of phases in development (refer Figure 1.3) and would evolve and change to reflect the community's and HWC's objectives for the area.

The ILUP aims to ensure the long-term sustainable use of the storage and its surrounds. To achieve this aim, the ILUP focuses on a number of key outcomes including:

- provision of a supplementary water supply
- communication, consistency and a coordinated approach to planning and future development around the storage
- high quality water
- high quality ecological habitat
- safe use of the storage
- community ownership of and commitment to the sustainable use of the storage.

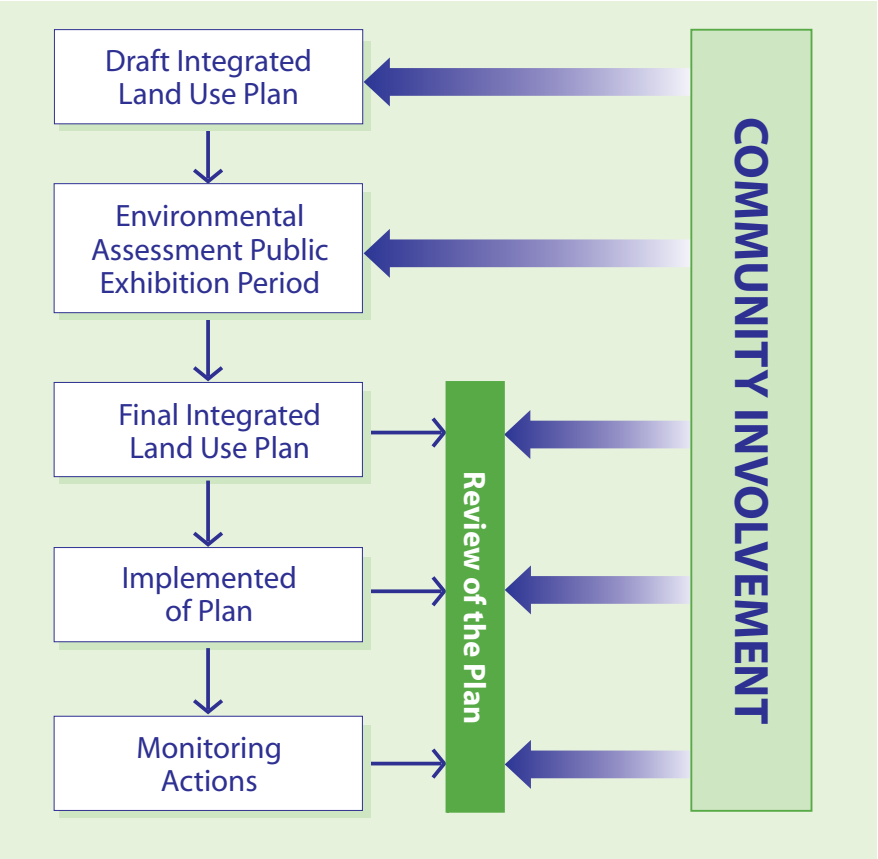

FIGURE 1.3 ILUP DEVELOPMENT PROCESS

1.8 Relationship of the ILUP to the Part 3A approvals process for the Project

The ILUP identifies a range of potential recreational and associated activities and/or facilities. A number of these are not proposed as part of the Project for which HWC is seeking approval.

For clarification, the following are included in the Project and have been considered as part of the assessment:

- realignment of Salisbury Road and provision of alternate access to the Quart Pot Creek locality (replacing Quart Pot Creek Road)
- habitat replacement/restoration allowing natural regrowth and supplementary planting as required, particularly around the eastern margins of the storage
- weed management
- walking tracks, lookouts and associated access on HWC-owned land
- fish stocking
- fencing
- bushfire risk management
- weather station(s) and telemetry
- essential services
- dam security components (eg CCTV, fencing, etc)
- office building(s) and storage sheds
- interpretative centre/education facilities and associated parking, access and amenities

- interpretive signage
- designated swimming areas including appropriate boundary marking
- picnic/barbecue areas/facilities and associated amenities/water tanks and childrens playground(s)
- boat ramp and associated access
- relocation of RFS station, Quart Pot/Munni Cemetery and associated memorials
- conservation of Munni House
- caretakers cottage(s).

The following are not included in the Project and consequently have not been considered as part of the assessment:

- kiosks/shops
- walking tracks/access outside of HWC-owned land
- camping ground(s) and associated facilities including access road(s)
- caravan park(s) and associated access roads and facilities
- commercial accommodation (eg eco-lodges)
- other commercial activities (refer Section 7.12).

Assessment of impacts associated with these types of developments would be addressed separately as part of any subsequent planning consent applications.

1.9 Review

The ILUP has a 5-10 year focus for the implementation of specified actions, underpinned by HWC's 50 year vision for the future of the storage.

As the timeframe for completion of filling of the storage is dependent on the frequency and intensity of rainfall, it is recommended that review of the ILUP occurs within one year of the storage reaching 90 per cent capacity, rather than a specific date. After this point, the recommended review period is every five years. The review process would provide an opportunity to incorporate changes arising from the dynamic nature of planning processes and changes in stakeholder roles, responsibilities and strategic directions, coupled with community expectations and demand management.

1.10 Sustainability

A sustainability model has been developed for the Project and is outlined in detail in the environmental assessment report developed for the Project. The model comprises four key components:

- sustainability goals
- sustainable development themes
- criteria/categories
- key performance indicators.

The sustainability goals outlined below are directly relevant to the ILUP and have been considered through the development of the ILUP:

- to provide an equitable, reliable and efficient water body for present and future generations while also providing environmental protection and neutralising contributions to climate change
- to leave a positive economic, social and environmental legacy to the community

- to provide opportunities for sustainable local business enterprises.

Sustainability categories allow for the grouping or aggregation of the sustainability indicators and those of relevance to the ILUP are listed in Table 1.2.

TABLE 1.2 SUSTAINABILITY INDICATORS OF RELEVANCE TO THE ILUP

CATEGORY	INDICATOR
Economic	
Economic performance	Tourism economy
Land use	Increased development potential
Social	
Community and stakeholders	Improved recreational facilities

Performance is ranked as low, medium or high for each indicator during the design, construction and operational phases of the Project. The following discussion describes the ranking for the indicators listed in Table 1.2.

Economic performance – tourism economy

Tourism economy has been ranked as low for design and construction. There is potential for this rating to increase significantly during operation of the dam, however this increase would largely be due to third party investors over a length of time. Consequently, the tourism economy indicator would need to be revisited during the life of the Project.

Land use – increased development potential

Development potential of the land surrounding the site is currently rated as low due to the existing Rural 1A zoning. Should Dungog Shire Council change the zoning in its Local Environmental Plan (LEP), there could be increased development potential and the rating may need to be reassessed at this stage. Refer to Chapter 4 for more information regarding zoning.

Community and stakeholders – improved recreational facilities

For design and construction of the dam, this indicator is ranked as low. During operation improved recreation activities would be ranked as high. Refer to Chapters 7 and 8 for more details regarding proposed recreation activities within the area.

1.11 Quick find index

2. Consultation

2.1 Tillegra Dam Community Reference Group

The Tillegra Dam Community Reference Group (TDCRG) was established by HWC in February 2007 as part of the consultation process for the Tillegra Dam project. The purpose of the TDCRG is to support the community engagement process and, where necessary, provide advice to achieve better Project and community outcomes.

The TDCRG operates under defined Terms of Reference and will run for the duration of the environmental and engineering assessment phases of the Project. The TDCRG includes representatives of key stakeholder groups from the local area and HWC. It is chaired by Brett Peterkin, an independent facilitator engaged by HWC to co-ordinate the TDCRG's activities.

Two meetings were held with the TDCRG during development of the ILUP. The first meeting took place on 5 March 2008 at Munni House. The purpose of the meeting was to introduce this component of the Project and to seek preliminary feedback from the group. During the course of the meeting, it became apparent that the group wanted time to collate their feedback, including gaining input from their constituents. Further feedback was provided by seven members of the TDCRG and incorporated into the ILUP where appropriate.

The second meeting with the TDCRG was held on 7 May 2008, again at Munni House. At the meeting, concepts for the ILUP were shown and discussed. The group was generally supportive of the proposed concepts. Feedback from the previous meeting was also presented.

Members of the Tillegra Dam Community Reference Group

2.1.1 Summary of issues raised by the TDCRG

Members of the TDCRG were asked to complete a feedback form on the ideas presented for the ILUP following the first meeting. Members commented on the vision for the storage, the objectives and development of the ILUP, issues related to the LEP, as well as other constraints and ideas for the ILUP. The main issues identified in the feedback forms are as follows:

Objectives and Vision

- consideration of the term 'high quality drinking water'. Some respondents felt this was not relevant as they believed water quality is more of a downstream issue
- the term 'drought proofing' is not accurate

- the 'storage' should be referred to as a dam and not a lake
- the storage has the capacity to be the foremost in freshwater lifestyle
- despite the need to maintain high water quality, it should still be possible to have a full range of recreational activities.

Zoning and planning issues

- support for new zoning around the dam to allow for accommodation and recreation activities
- larger parcels of land around the dam should remain zoned as Rural 1(a)
- the '60 hectare' rule should still apply except for properties in the inundation area where residual land is less than 60 hectares. This rule may also need to be changed to allow for tourism activities
- make clear that permissible activities are such under the present Dungog LEP
- interested to know whether other State-wide plans (such as the Williams River Regional Environmental Plan) need to be taken into consideration or amended
- would like to know what the zoning considerations are for the residual HWC land that would be resold
- land not used by HWC could be sold to developers
- restrict access points suitable for exclusive resorts with water and air access restricted
- any development needs to be in keeping with the character of Dungog and not adversely impact upon local residents.

Around the storage

- suggestions of a number of accommodation types such as eco-accommodation, small cabins, house boats, caravan parks, camping grounds, sport and recreation centre and environmental studies camp complex
- suggestions of a number of recreational activities such as lookouts, picnic areas with barbecues, walking tracks, cycling, boating, fishing, swimming, golf course, kiosk, adventure activities (flying fox, climbing ropes), skywalk, nature/swamp experience, heritage centre, helicopter trips and other eco-tourism activities
- designate different areas on the storage such as a 'No-go' zone near the dam wall and segregate different activities such as power boating and sailing/canoeing

- installation of boat ramps
- visitor/education centre to be located near dam wall. Munni House to be used as visitor centre
- install phone tower or emergency phone given the lack of phone reception
- suggestions for walking tracks to Barrington Tops with overnight shelters
- cycle track that extends from Dungog to the storage.

Other issues

- suggestion that the Rural Fire Service station be located around Bandon Grove
- would like to see the cricket ground and as much of the existing roads retained
- properties around Quart Pot and Tunnybuc to retain access to electricity and telecommunication
- the original location of Quart Pot/Munni Cemetery should be marked in some way
- wider consultation has not yet been undertaken. Would like to see community consultation group established in the future as well as consultation with Council, Government and other stakeholders
- would like the long term effects of recreation on residents of Dungog investigated
- local businesses could be granted contracts to harvest timber and remove fences/fencing wire from within the inundation area
- floating booms could be installed to mitigate erosion of foreshore.

2.1.2 Economic opportunities subcommittee

As part of the TDCRG, an economic opportunities subcommittee was formed in March 2007. The subcommittee's activities have included discussions about a range of economic and tourism issues, including future recreation opportunities. Members of the subcommittee also attended a field trip to Keepit Dam located near Gunnedah to gain a better understanding of the types of recreational activities possible.

A number of ideas for future recreation were discussed by the subcommittee including:

- excursions to the dam site during and after construction
- possibility of a part-time education officer to facilitate learning modules for local schools
- privately operated caravan park
- camping areas
- self contained cabins
- skywalk
- sport and recreation camp
- conference facilities
- bicycle and walking tracks
- fish stocking
- other eco-tourism opportunities.

2.2 Government agencies

Development of the ILUP has progressed in consultation with a number of government agencies. In January 2008 the NSW Minister for Water Utilities, Nathan Rees announced the establishment of a Whole of Government Taskforce. The Taskforce meets on a monthly basis to discuss issues that are interrelated to the proposed Tillegra Dam and the associated impacts on the community. Agencies represented on the Taskforce include Council, the Department of Premier and Cabinet (DPC), the Roads and Traffic Authority, the Department of State and Regional Development, the Department of Water and Energy, Department of Planning (DoP), HWC and the TDCRG.

The Dungog Land Use Planning Review project is being run concurrently to the development of the ILUP. The Planning Review project has been established to examine the Council's planning provisions and to identify modifications that maybe necessary to provide for the Tillegra Dam Project. Members of the Planning Review project include DoP, HWC, Council, and Planning Workshop Australia (PWA).

Regular updates have been provided throughout the course of development of the ILUP to the Whole of Government Taskforce and the Planning Review project team.

Discussions have also been held with the NSW Department of Health (DoH). The DoH has indicated that the *Guidelines for the Recreational Use of Water Storage Areas (DoH, 2005)* should be considered when determining storage uses. The guidelines outline activities which are permissible at water storage (dam) sites. The DoH has advised that the storage would be a Class 4 Regulation Storage. Class 4 storages release water for abstraction by towns downstream from the dam. The guidelines explain that full recreational use of the storage should be related to the stream water quality and extent of treatment provided.

Under Class 4, a range of activities may be permitted on and around the storage and include:

- sailing
- fishing (issue of permits)
- naturalist and other like activities (issue of permits)
- picnicking

- hiking and bush walking (issue of permits)
- water-skiing (subject to water quality)
- rowing
- swimming
- camping
- horse riding.

The DoH has indicated that primary contact through recreational activities may be considered for the storage area. Instead of prohibiting recreational activities, the DoH considers that suitable management of activities would suffice. A multi-barrier approach would be incorporated into the storage management, such as No-go zones, interpretive signage, buffer zones and the like. These are discussed in more detail in Chapters 3 and 7.

There have been ongoing discussions with the NSW Rural Fire Service (RFS), particularly with regards to the relocation of the RFS Station that is currently located within the inundation area on Salisbury Road. Requirements for the new station and its location have been discussed with the RFS and are further outlined in Chapter 5.

The Department of Primary Industries, Fisheries (DPI (Fisheries)) has been consulted with regard to potential fish stocking of the storage area. DPI (Fisheries) has indicated that it would be appropriate to stock the storage area with Australian bass, as discussed in Chapter 7.

HWC has also consulted with NSW Maritime regarding the potential for recreational boating on the storage. NSW Maritime has advised that it supports boating and has indicated that in principle, that funding may be made available under the Maritime Infrastructure Program for up to 50 per cent of the cost of the boat ramp facilities.

NSW Maritime has also advised that it would manage safe boating practices on the storage as it does for all NSW Waterways. Ongoing consultation would be required for appropriate safety awareness and signage at the boat ramp. See Chapter 7 for further detail.

2.3 Community comment

The ILUP is to be placed on exhibition along with the EA Report for the Tillegra Dam project. Key consultation activities during this period include:

- staffed display locations for EA exhibition
- community information sessions to provide stakeholders with a clear understanding of the Project and summary of the assessment findings. These sessions would provide a forum for the community to interact with the Project Team and provide direct feedback concerning aspects of the Project.

Submissions received relevant to the ILUP would be assessed and incorporated where appropriate.

2.4 Ongoing consultation

As outlined in Section 1.9, the ILUP would be reviewed on a regular basis. During the review process there would be further opportunity for community and stakeholder participation and input into the ILUP. The form of input would be determined at a later date. The TDCRG, if still operating, would likely be involved along with key stakeholders outlined above. There may also be an opportunity for commercial developers to become involved.

3. Operations and management of the dam and storage

3.1 Water quality

A primary focus of the Tillegra Dam project is to provide a source of high quality drinking water for the Hunter and surrounding areas. This water can also be drawn upon during drought situations or at times when other sources of water are affected by a water quality issue. For example, should Chichester Dam suffer an algal bloom, it would be possible to switch to Tillegra Dam as a backup supply in such an emergency. Water quality can be measured through chemistry and biology for its suitability for specific uses. The most common indicators used are salinity, turbidity, sediment and nutrient concentrations, temperature, bacteria and pathogens. Good water quality is not only critical for water supply, it is also important to maintain a healthy ecosystem. Hence it would be necessary to adopt measures to protect water quality as previously noted. The storage at Tillegra would be classified as a Class 4 Regulation Storage, under the NSW DoH *Guidelines for the Recreational Use of Water Storage Areas*. As such the level of protection required for the storage is not as robust as for Class 1-3 storage lakes.

The volume of water stored in Tillegra Dam would be comparable to Lake St Clair at Glennies Creek Dam. It is likely that the water quality issues experienced at Lake St Clair would be similar for Tillegra Dam. Based on data collected at Lake St Clair, key water quality issues include summer temperature stratification, dissolved oxygen stratification and the presence of blue-green algae. The latter may also be an issue during the filling stages of the storage as the volume of water would be smaller and nutrient levels are likely to be higher in the surface layers during the filling period.

Experience from other storages such as Lake St Clair, show that land use within the surrounding catchment may have a significant influence on water quality. For example, rural runoff has the potential to carry high nutrient loads that can impact on the water quality.

Rather than restricting activities on surrounding land, HWC's preference is to adopt a multi-barrier approach to secure the water quality within the storage. One method is to exclude on-water activities within the vicinity of the multi-level off take tower. It is envisaged that public on-water activities would not be allowed within at least 500 metres of the dam wall. Consequently a 'No-go' zone for on-water activities has been developed and is depicted in Figure 3.1.

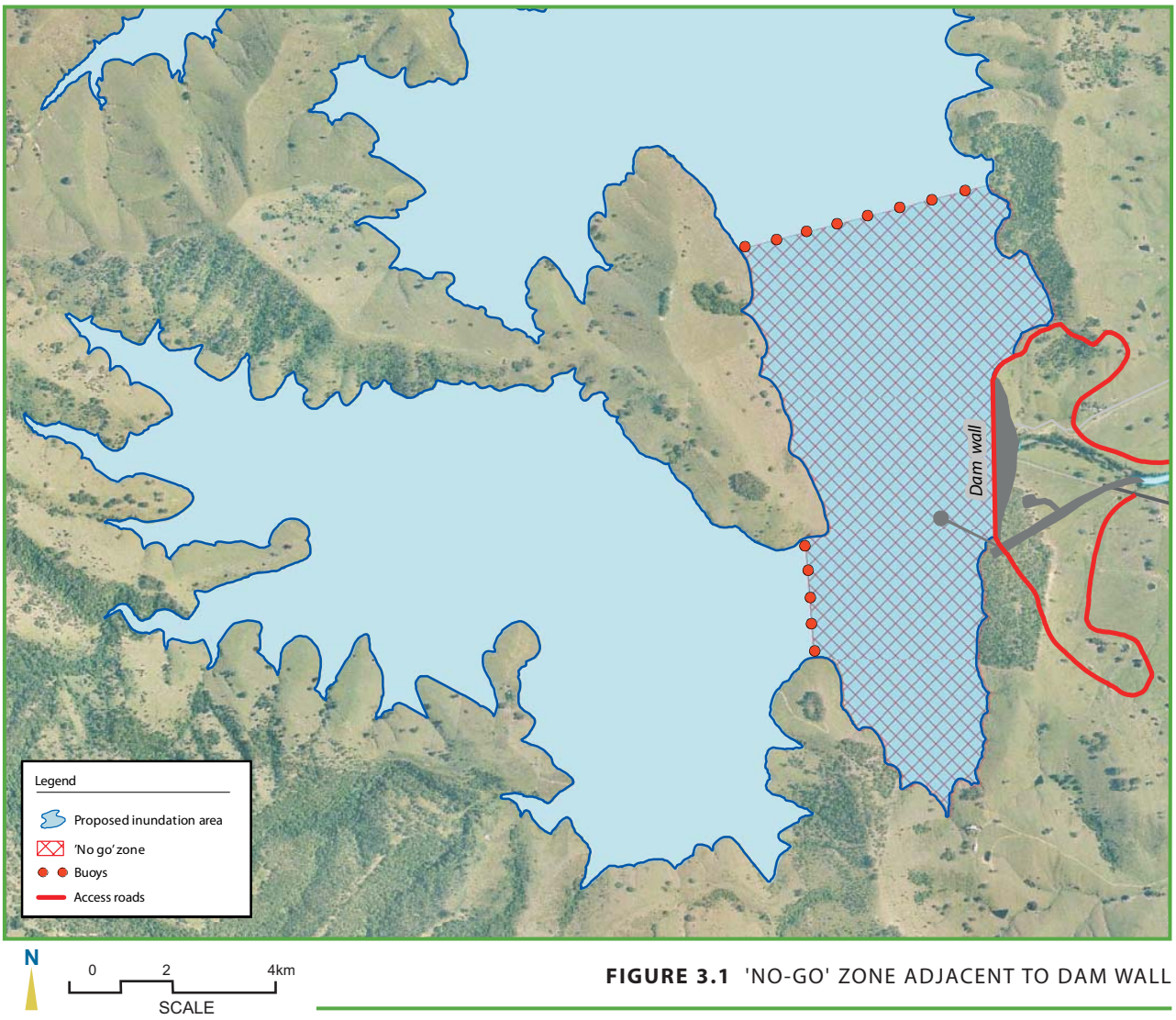

FIGURE 3.1 'NO-GO' ZONE ADJACENT TO DAM WALL

Additional methods to maintain water quality may include:

- establishing a buffer zone and riparian margin
- fencing around the storage
- managing erosion risk
- making sure recreational activities are consistent with maintaining water quality
- providing recreational facilities such as toilets and picnic grounds that are appropriately set back from the water
- clearing of vegetation prior to filling to reduce nutrient loading.

ACTION:

- **Ongoing water quality testing and monitoring once the dam is operational**

3.1.1 Buffer zone/Riparian margin

The role of a buffer zone is to assist in maintaining water quality and to restrict access to the storage in unsafe and unsuitable areas. The benefits of a buffer include bank stabilisation and reduced erosion, decreased impact of floods, reduced levels of nutrients entering the storage and the provision of habitat for

native fauna. Typically, a buffer zone consists of riparian vegetation extending back at least 20 to 30 metres from the water's edge (Tasmanian Dept of Environment 2003). The remainder of a buffer zone is usually established with varied vegetation and may extend back anywhere from 20 metres to three kilometres.

The Western Australian Department of Environment has issued guidelines as to how large a buffer zone should be for a water supply source. This zone ranges from 20 metres to 200 metres. A buffer zone of 200 metres is recommended when a water body is used primarily as a drinking water source and there is no other form of barrier. Middle ranking buffers of 50 metres are used to protect water quality and deter land development.

A buffer zone would be established around the perimeter of the storage (refer Figure 3.2). Regeneration within the zone could be augmented where necessary by planting with native vegetation. Fencing may be required to exclude livestock from the buffer zone. Fencing may also be required to prevent livestock from negatively impacting on buffer vegetation.

ACTION:
- **Encourage natural regeneration within the buffer zone**
- **Augment regeneration with planting if determined necessary after review**

3.1.2 Foreshore erosion

Foreshore erosion occurs when wave action erodes the banks, undercutting the toe of the slope causing bank failure. The waves at the root of this process may be generated naturally by the wind or through human activity such as wakes from the use of powerboats close to shore. Recent studies suggest that boating areas do not necessarily coincide with areas of shoreline erosion (Davis 1996). This assertion does not suggest that power boats do not cause erosion, but rather that there are a number of factors influencing erosion such as vegetation cover, fluctuating water levels and wind generated waves. A one kilometre fetch (the distance over which wind blows generating waves) would create natural waves of a magnitude equivalent to powerboats. In many locations on the storage, fetches of greater than one kilometre are present.

Erosion can also occur when livestock access the foreshore, trample vegetation and unsettle the soil, or when walking tracks are overused and the foreshore is not maintained.

Foreshore erosion potential around the storage should be monitored. The extent of any such erosion should be assessed in conjunction with consideration of other contributing factors outlined above, followed by the implementation of appropriate practices to stabilise the foreshore area. This could include planting of riparian vegetation, fencing off areas to prevent human and livestock access, or restricting boat access to certain areas within the storage.

ACTION:
- **Monitor the foreshore for erosion**
- **Restrict vehicles to formed routes**
- **Where necessary, prevent stock access by installation of fencing**
- **Where appropriate undertake remedial action, such as planting at-risk areas**

3.1.3 Fencing

To assist in maintaining water quality, fencing of some areas around the buffer zone may be required. The extent of fencing required would depend on the adjoining land use and accessibility to that area. Fencing may be used to prevent cattle approaching the storage and damaging buffer vegetation, and potentially compromising water quality. Fencing would also be erected to prevent public access to

operational areas that may be unsafe.

The exact layout of fencing would be determined over time. The location and orientation of the fencing would be dependent on the disposal of residual land and the timing of sales. However the boundary of the buffer zone provides a general indication of the areas that could be fenced. Responsibility for the installation and upkeep of the fences is likely to be determined at the time of the disposal of land in question.

ACTION:
- **Undertake fencing as required**

3.1.4 Grey/black water disposal

Disposal of human effluent via reticulated and non-reticulated systems has the potential to cause contamination of the storage if inappropriately designed, sited or managed. Consequently, it is imperative that any new systems are located at an appropriate distance from the water's edge and that these and any existing systems are regularly inspected and maintained. In determining an appropriate distance for the setback it would be necessary to make an assessment of the rate (amount) of discharge, along with the soil types and topography of the site. *The Environment & Health Protection Guidelines – On-site Sewage Management for Single Households* (Department of Local Government *et al* 1998) recommends a setback of 250 metres from a land application site to a domestic groundwater well and so provides some guidance as to an appropriate setback distance from the water's edge.

Fencing is one method to help maintain water quality and minimise erosion

Grey water is generated from showers or hosing down of equipment/boats for example, and would need to be managed to reduce the possibility of contamination through discharge to the storage. Where on-site systems are proposed, particular attention must be given to the water consuming appliances installed. The use of low flow devices (including dual six or three litre flush toilets) is recommended. Food waste disposal units and spa baths should not be connected unless on-site systems are designed for the additional load. Any such activities would need to appropriately located to minimise the likelihood of any impacts on storage water quality.

ACTION:
- **Establish appropriate guidelines for wastewater disposal systems and setbacks**

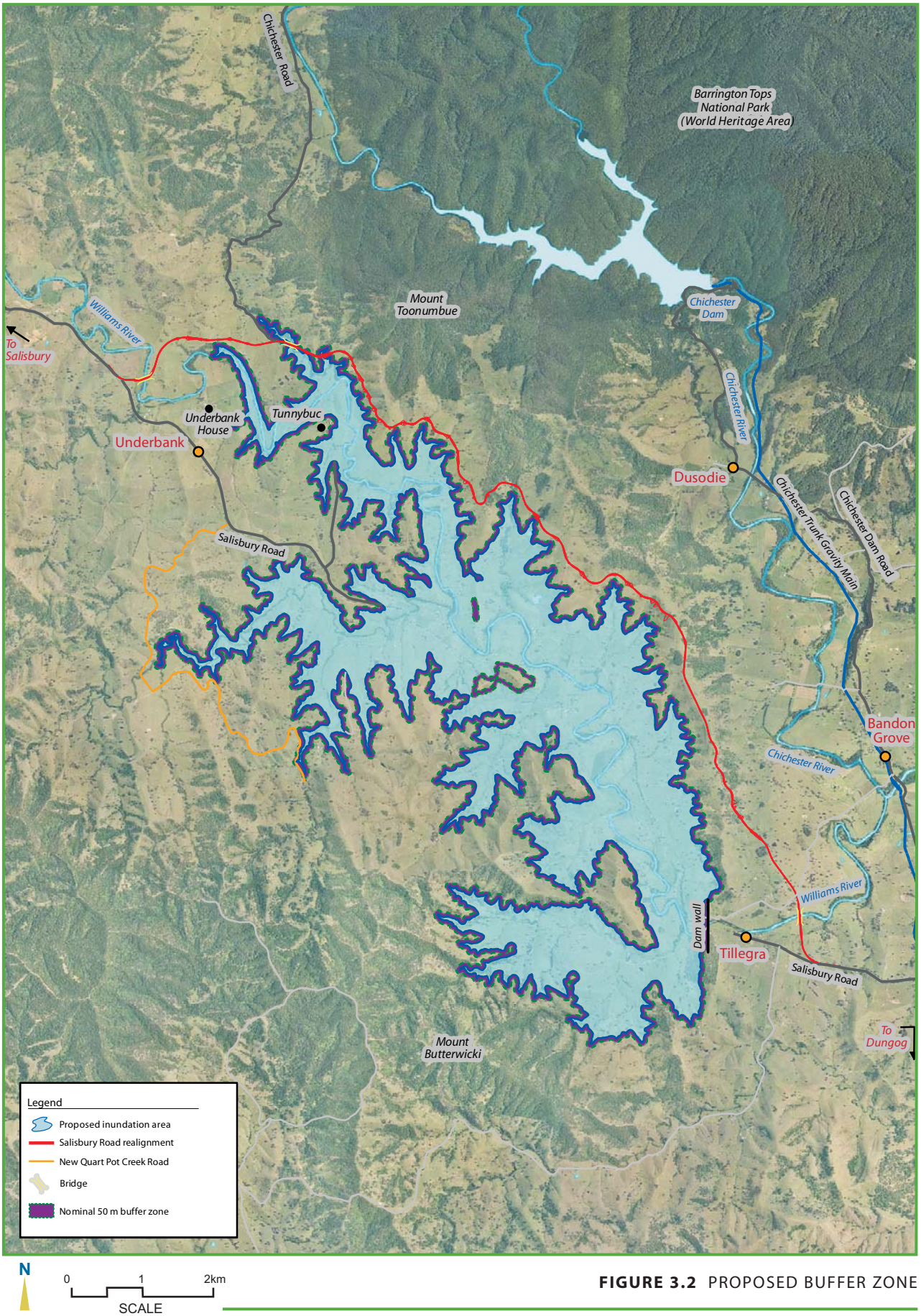

FIGURE 3.2 PROPOSED BUFFER ZONE

3.2 Dam wall access road

Access roads to the dam wall would be constructed allowing HWC staff access for maintenance and monitoring. The roads are intended to be used only by HWC or other contracted staff and are likely to have security gate access. The dam access roads are shown in Figure 3.3. However there is the potential for these access roads to be used for pedestrian access. Existing tracks and roads would be utilised where possible to avoid the need for further infrastructure development which would lessen the environmental impact of the Project.

3.3 Mini hydroelectric power plant

The design of the dam would provide for installation of a mini hydroelectric power (HEP) plant at Tillegra Dam which would be privately operated. The mini HEP plant could generate up to 3,000 megawatt hours of electricity which is roughly equivalent to the energy demands of 550 households. The plant would be located at the base of the dam wall and would operate during environmental flow releases and bulk water transfers using the multi-level off take tower.

3.4 Chlorination plant

A chlorination plant would be part of the infrastructure at the dam. This would be used to dose water transferred to Dungog water treatment plant via the Chichester Trunk Gravity Main. Dosing would be undertaken to limit bacterial growth during transfer.

Chichester Trunk Gravity Main

3.5 Caretaker cottages

HWC intends to employ two full-time caretakers whose responsibilities are likely to include maintenance and inspection, water quality testing, monitoring of erosion and maintenance of HWC land. The caretakers and their families would be accommodated in two cottages which would be located to the south of the spillway. A third dwelling would be provided as an alternate accommodation for a temporary caretaker if required. At the end of construction, the construction site office (east of the spillway) would be converted to provide temporary accommodation for another temporary caretaker or HWC staff as required. The locations of these buildings are shown in Figure 3.3.

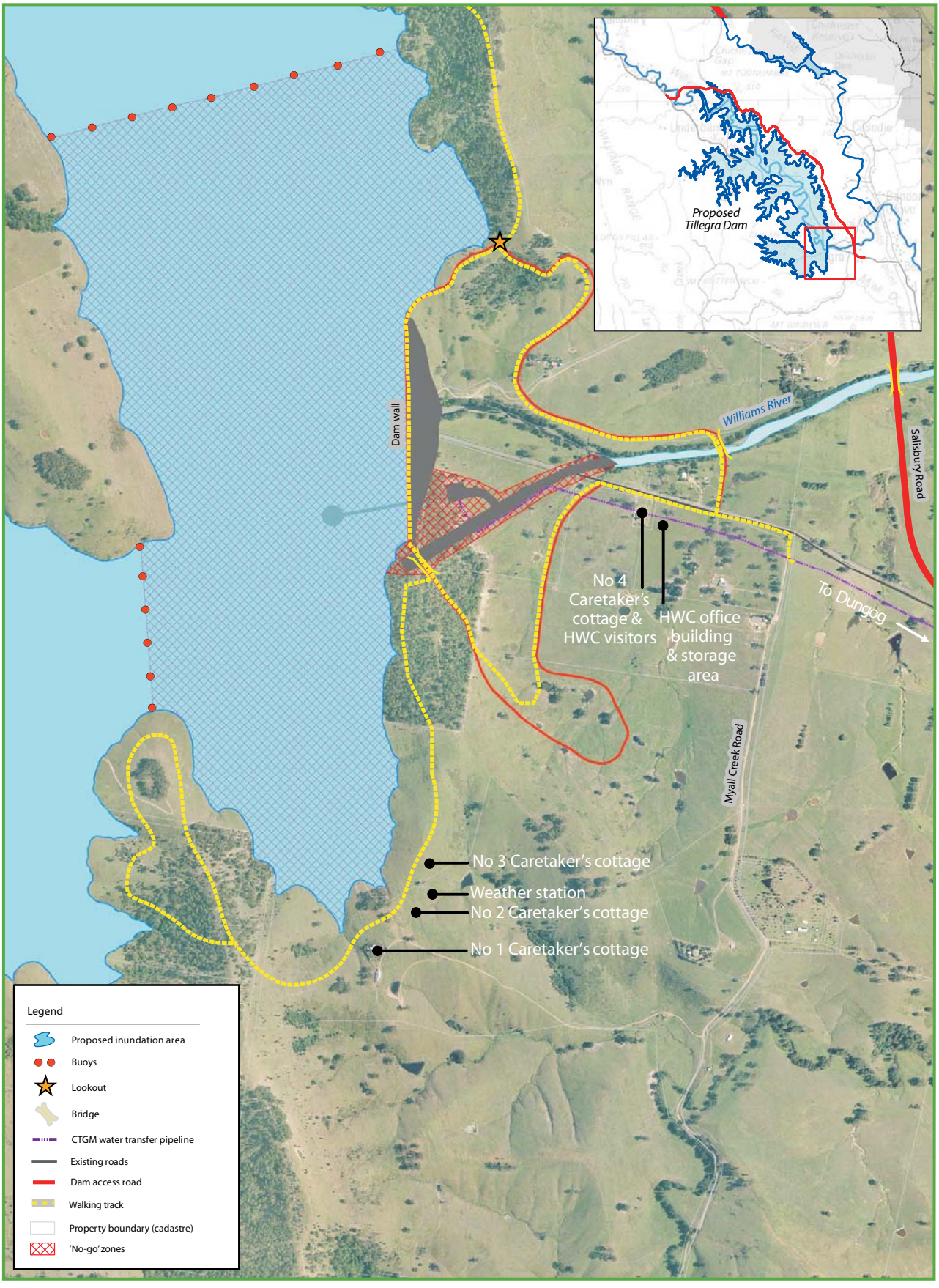

FIGURE 3.3 DAM OPERATIONS

3.6 Office building and storage shed(s)

HWC requires a small office building for administration activities. The building would be large enough to accommodate office space for four people, kitchen, toilet facilities and parking. The building would also have access to power, telemetry and telephone lines. A maintenance shed and double garage for storing equipment such as mowers would also be required. Both the office building and the storage shed(s) would be erected close to the number four caretaker cottage as shown in Figure 3.3.

3.7 Weather station and telemetry

A weather station would be situated in a cleared area that does not have significant local topographic features that would impact on the weather measurements. Figure 3.3 shows a likely location of the weather station. It is considered that this location is sufficiently separated from the buildings so as not to impact on the quality of weather readings but close enough to reduce the risk of vandalism or interference with the equipment.

3.8 Services

An electrical supply would be required for various operational activities at the dam such as lighting, etc. Electricity would also need to be provided to the caretakers' cottages and to the HWC office building. The supply would be taken from the existing line which runs along Salisbury Road. The feasibility of putting lines underground to minimise visual impact would be considered during detail design and in consultation with Country Energy. Detail design would also consider inclusion of renewable energy sources such as solar power to offset demands on electricity derived from burning of fossil fuels. The need for backup generators would also be considered during detail design.

Potable water would be required for the office building and caretakers cottages. This would be provided by rainwater tanks and alternate supply sources. Water supply will be undertaken in accordance with the NSW Department of Health's Private Water Supply Guidelines of August 2008.

3.9 Dam operation security/public safety

Certain areas would be off limits to the public for security and safety reasons (refer Figure 3.3). These areas would be fenced and appropriate warning signage provided. Access to the top of the dam wall would be permitted and would be via walking tracks located beside the two access roads. The southern access would include a footbridge over the spillway. Public vehicles would not be permitted to use these access roads.

ACTIONS:

- **Determine the areas that would be closed off to the public and ensure these areas are appropriately sign posted and fenced off**

3.10 Land preparation prior to filling phase

Prior to the initial filling of the dam, land within the inundation area would need to be cleared to the maximum extent practicable and cost effective of items such as:

- trees and other vegetation
- buildings
- farm infrastructure (such as grain storage, cattle transport yards, fencing, gates and sheds)
- power poles
- tanks (on-site fuel, septic systems and water).

This is required for several reasons:

- to reduce potential impacts on water quality
- to recover materials which could reused or recycled (thereby reducing demand on sources of new materials)
- safety (for example clearing of trees along areas which would become foreshore zones and where power boating may be permitted).

The removal of vegetation would seek to strike a balance between achieving water quality objectives, recovery of a resource, managing public safety, and reducing emissions of greenhouse gases (from decomposition of rotting vegetation). The removal of infrastructure would similarly seek to achieve a balance between competing goals, in this case water quality objectives, resource recovery and managing public safety.

ACTIONS:

- **Determine the areas of trees/vegetation to be removed from the inundation area**
- **Removal of infrastructure, materials and vegetation**

3.11 Land management during filling phase

During the life of the dam there would be periods when the storage would be filling after being drawn down during droughts. There would also be the initial filling period following the end of construction. The analysis undertaken for the design of the dam suggests this initial filling phase could be from three to six years, this being dependent on frequency of rainfall events and the amount of rain that falls. It could also fill more quickly. By way of an example, between January and June 2008, the amount of rain that fell would have filled the dam, if it had been built, to 40 per cent of the full supply level.

Land within the inundation area would need to be appropriately managed during filling periods to achieve objectives related to water quality, minimising greenhouse gas emissions, etc. It is anticipated that there would be a difference between the initial filling period and subsequent filling periods due largely to the extent of vegetation (pasture and bushland) that would still be present following completion of construction. In subsequent filling periods, this would have died off and exposed land would likely be devoid of significant vegetation (this being influenced by the length of time land below the full supply level is exposed).

For both the initial filling period and subsequent filling periods, it will necessary to have appropriate management strategies in place to address:

- vegetation growth/revegetation
- access/public safety
- foreshore stability
- suitability of recreation activities

ACTIONS:

- **Determine timing for the clearing of land relative to filling**
- **Develop management strategies for implementation during filling periods**

Munni House outbuilding and other infrastructure in the inundation area may need to be removed

3.12 Bushfire management

HWC is responsible for the management of around 3,500 hectares of land around the Tillegra Dam site. The obligations of public authorities such as HWC with respect to managing bushfire risk are identified in Section 63 of the *Rural Fires Act 1997*. This requires all practicable steps be undertaken to prevent the occurrence of bushfires on, and to minimise the spread of bushfire from, land under their control.

Bushfire risk management planning identifies risks and level of risk. Following this, specific strategies can be put in place to deal with those risks (NSW RFS 2006). Effective planning includes:

- identification of the location of bushfire hazards (eg high fuel loads)
- identification of the location of community assets (eg built and natural)
- assessment of whether the hazard would be a threat to identified community and environmental assets.

The management of a large area as would be the case for Tillegra Dam has multiple objectives associated with operational, environmental and community issues. The effective management of bushfire risk is one of these objectives.

There are a number of phases of the Project that need to be considered in the development of bushfire management planning for the area. They can be broadly described as:

- project planning and development
- interim management before the Project commences
- management of bushfire risk during construction
- long term bushfire risk management planning when the dam becomes operational.

The Lower Hunter Zone Bushfire Management Committee (BFMC) provides a forum for cooperative and coordinated bushfire management in the local area. It also provides for community involvement in the bushfire risk management process and assists the Bush Fire Coordinating Committee to consider issues relevant to the protection of life, property and the environment from bushfires.

For projects such as Tillegra Dam which involves a large area with multiple land uses and significant public access, it is important that HWC is represented and actively participates on the BFMC so that the management requirements of the dam are appropriately considered in the planning of bushfire management activities.

The RFS through its services and the BFMC ultimately manage:

- the preparation of Plans of Operations and Bush Fire Risk Management Plans (BFRMPs)
- the collation of the annual risk management reporting program
- providing advice to Council and other agencies on bushfire management issues

- assisting agencies and councils to identify and respond to equipment and training needs
- addressing specific bushfire management issues in the local community including coordination and implementation of programs such as Community FireWise.

The current Dungog Bushfire Risk Management Plan will be replaced by the Lower Hunter Zone Bushfire Risk Management Plan. This is due for completion in late 2008.

Areas currently classed as bushfire prone based on bushfire risk mapping are shown in Figure 3.4. This does not include grasslands which can present significant risks when not properly managed and high fuel loads accumulate.

Current assessments of bushfire risk are based on the existing land use within the area which is largely rural and predominantly grazing. As development of the Project proceeds the distribution of hazards will change and hence the bushfire risks. The main factors would be changing land use, development of facilities, revegetation of the surrounding areas and provision of access to the public.

Effective planning needs to address:

- implementation of appropriate planning and building controls
- developing priorities and strategies for hazard reduction work, treating both the assets and the hazards
- provision of sufficient information to fire fighters and support agencies to allow effective response to emergencies.

As part of the draft ILUP, a baseline bushfire risk management plan has been developed (see below) which aims to:

- address relevant matters in the *Rural Fires Act 1997*
- accommodate HWC operational requirements
- be consistent with the management aims for the dam and storage.

Baseline bushfire risk management plan

Objectives	The objective of this baseline plan is to protect human life, facilitate evacuation of the public from the area in times of bushfire, facilitate access for firefighting activities and prevent the impact fire to infrastructure and assets within the Tillegra Dam project area.
Foreword	This plan has been prepared through a desktop analysis of the Tillegra / Munni / Underbank area. The plan will require additional development as the Project evolves. It is recommended that future iterations of the plan be developed in close consultation with the local Bendolba RFS brigade and landholders in the immediate vicinity of the project area. The purpose of the baseline plan is to provide the foundations of a more comprehensive plan that would be subject to ongoing development and continual improvement as the project progresses through construction and operational stages. Any bushfire management plan currently in existence or prepared by Dungog Shire Council or the RFS takes precedence over this baseline plan. Future more comprehensive versions of this plan will be developed under guidance of the RFS, the bush fire management committee and with due regard for any requirements of Council.
Legislative requirements	Under Section 63 of the *Rural Fires Act 1997* all landholders have a duty to prevent the occurrence of and minimize the spread of bushfires within their properties.
Risk management	Risk assessments for both key infrastructure and general areas would be undertaken regularly and would include assessing the probability of a fire occurring and the extent and consequences of likely impacts. Risk would be considered for both assets and

	people. At all times the safety of the public and employees of HWC would be paramount. Where high risk is identified, HWC would undertake all practical measures to improve safety and reduce the risk of fire damage.
Construction of buildings by HWC	All residential or office buildings constructed by HWC would comply with AS3959:1999 *Construction of buildings in bushfire-prone areas* (including amendments) as appropriate. Each building would have an evacuation plan and be provisioned with appropriate fire fighting equipment. This may include but not be limited to fire extinguishers, fire blankets, and first aid kits. All buildings would have established inner and outer protection areas which would be managed to remove or reduce fuel loads. Storage of fuel, combustible materials or chemicals would only be allowed at designated sites and would be appropriately secured.
Perimeter and fire access trails	HWC would maintain existing fire access trails on land purchased for the Project. In future revisions of this plan, HWC would identify all fire trails on HWC land and work co-operatively with the local Bendolba brigade to maintain or improve fire trail access where it is deemed necessary for public safety and asset protection. Fire access trails would be established and maintained around the proposed habitat corridor. Fire breaks would be established at strategic points along (but not within) the perimeter of the corridor. Fire breaks would be established after considering the slope of the land, accessibility and other environmental issues. Fire breaks would be established where it is considered likely to protect the public or HWC assets and where they are likely to be most effective. Perimeter roads, trails and breaks would be established pursuant to RFS policy guidelines which include set minimum standards for widths, clearances, slope, construction standards and service.
Hazard reduction	HWC would participate in hazard reduction programs implemented by the RFS and the local community. Hazard reduction can be given effect by controlled burn off or by mechanical slashing. Mechanical slashing is preferred should fuel reduction be required in close proximity to the storage as runoff contaminated with ash could have a deleterious effect on water quality. Hazard reduction burning may be undertaken in controlled circumstances on land set back from the storage on the request of and under the supervision of the RFS.
Access to water	During construction, safe access points for fire tankers would be established where water could be drawn for fire fighting where the RFS is responding to an emergency in the general area. The primary access points will be: • priority use of the boat ramp to be installed on the eastern edge of the storage at either the end of Upper Chichester Road or the end of Salisbury Road near the existing cemetery • at the dam wall near the spillway (an access point to be constructed). Other access points may be developed in consultation with the RFS.
Specific site management	A number of picnic and barbecue areas are proposed to be established by HWC as detailed in the ILUP. Facilities would be designed to minimise the risk of fires occurring or escaping these areas. For example, designated barbecue areas would be established. The facilities installed by HWC would be coin-operated gas models to reduce the risk of accidental fires.
Emergency response and muster point(s)	The Tillegra cricket ground would be used as an emergency muster point for HWC employees and may also be used by members of the public during times of necessity. It is envisaged that water and supporting basic facilities would be available from the proposed interpretation/visitor centre.

	Specific evacuation and emergency response plans would be prepared for each HWC building and for the greater area. HWC would periodically undertake fire drills with employees as part of emergency response planning.
Relocation of Bendolba RFS station	The existing RFS fire station would be relocated by HWC. A new category 2C station would be built to replace the existing shed. Additional details of the proposed relocation are provided in Section 6.3 of the ILUP.
Priority actions	• Relocation of the RFS fire station • Risk assessments for all ancillary components of the Project including administration buildings, the operational depot, caretaker cottages, and offsets (such as the visitor/recreational area), as well as consequential risk to neighbouring properties • Maintenance of existing fire trails on HWC-owned land.

Should the Tillegra Dam project be approved, HWC would contact the RFS to discuss the expansion and refinement of this baseline plan including priority actions. Review of the plan would form part of the greater review process undertaken for the overall ILUP.

ACTIONS:

- **Establish representation on the Lower Hunter Zone BFRMC to facilitate consideration of HWC needs in the current bushfire risk management plan review and upgrade process**
- **Provide suitable access for fire control and establishment of adequate measures to protect life and property as the ILUP is refined**
- **With the RFS, review the ILUP for its suitability with regard to bushfire response access and protection of visitors to the site**
- **Work with the Lower Hunter Zone BFRMC to develop and refine the Bushfire Risk Management Plan to:**
  - **reduce the occurrence of human caused unplanned fires at the site**
  - **suppress unplanned fires occurring at the site**
  - **minimise the potential for the spread of bushfires within, from or into the site**
  - **protect persons and property in, or immediately adjacent to, the site from bushfires occurring at the site**
  - **manage fire regimes to avoid unacceptable impacts on biodiversity**
  - **protect all known Aboriginal sites, historic places and culturally significant features within the site from bushfire damage**
  - **protect revegetation areas from fire impacts while they are establishing.**

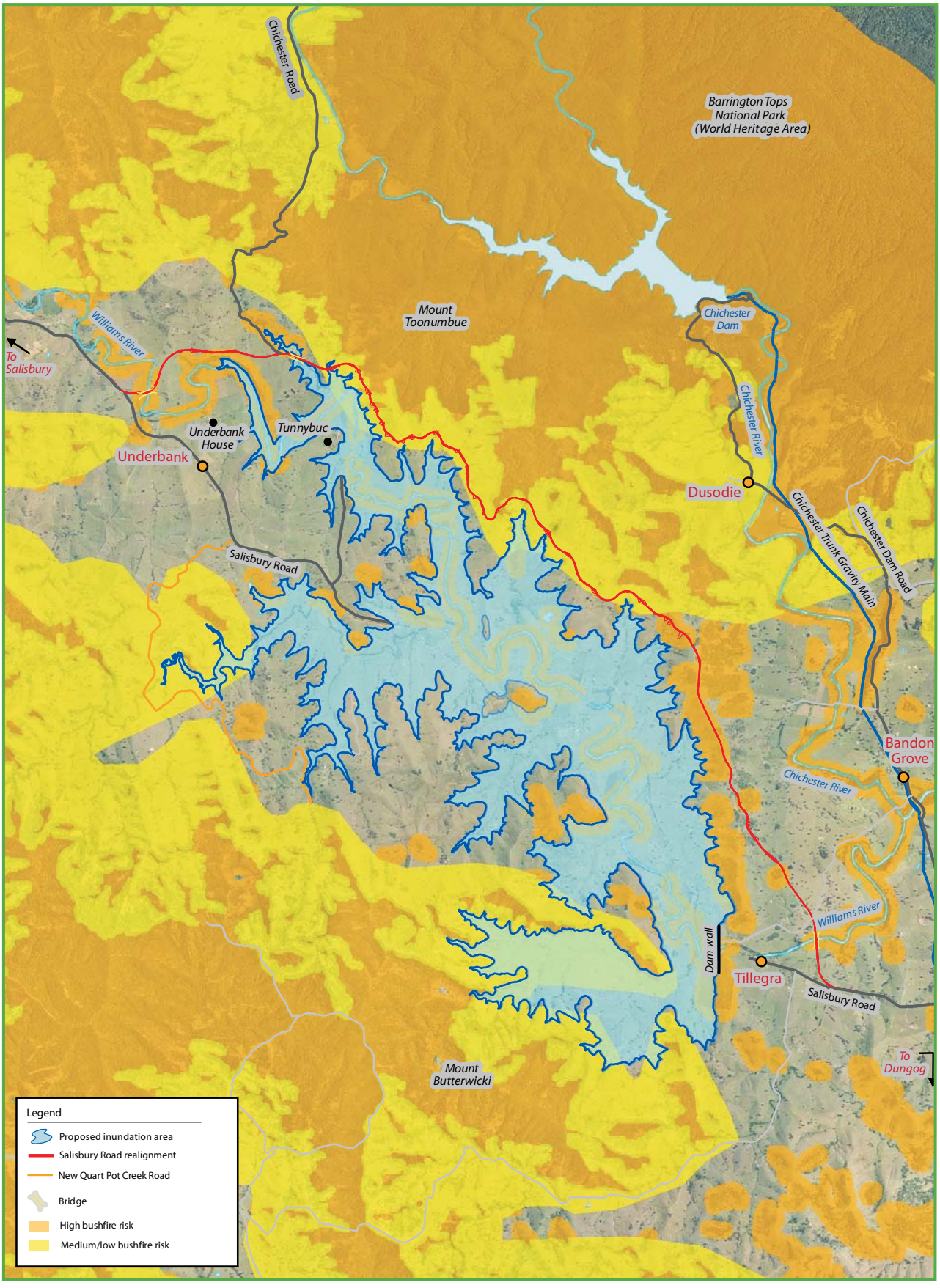

FIGURE 3.4 EXISTING BUSHFIRE RISK

4. Zoning and land use

4.1 Existing zoning

The land surrounding the inundation area is currently zoned 1(a) *Rural* under the Dungog LEP with one parcel of land to the south of the dam wall being zoned as 7(a) *Environmental* zone.

Land use surrounding the storage includes agricultural uses as well as rural residential. The closest settlements to the storage are Dungog and Salisbury.

4.2 Zoning aims

The storage would introduce a new land use within an area currently dominated by agricultural uses. The Project offers an opportunity for Council to develop a zoning plan that could enable different opportunities and land uses within the area. However, as one of the key objectives of the dam is to provide high quality potable water, the surrounding land should be zoned appropriately to assist in achieving this objective. Consequently, it is HWC's aim that permissible land use surrounding the storage be compatible with dam operations (and water quality requirements) and allow for recreational facilities and opportunities.

4.3 Current zoning issues

Areas zoned as rural allow intensive/extensive agriculture as a land use. Intensive agriculture may not be a compatible use within close proximity to the dam, particularly if the site drains to the storage. This incompatibility could be further pronounced for land in close proximity to the offtake tower.

The rural zoning also has a restricted subdivision policy to reduce the fragmentation of agricultural land. Subdivision of rural zoned land is permissible if:

"The lot is for use for intensive agriculture, a utility installation or a community facility, without the need for an additional dwelling."

The dam, storage and associated infrastructure are classified as a utility installation. Subdivision of properties required for this type of infrastructure within the rural zone is permissible provided that additional dwellings are not required. Further, a minimum allotment size of 60 hectares for the purposes of a dwelling house in a rural zone is required under the Dungog LEP and as such, the adjacent land could only be used for purposes other than residential dwellings. Where a property is less than 60 hectares and has no existing dwelling that property could be listed on Council's Vacant Holding listing, provided that:

- it is demonstrated that the lot is suitable and capable of sustaining a dwelling house
- land was under one ownership as of 1 July 2003
- compliance with sub-clause of 26.1 (Environmental Protection) of the Dungog LEP 2006
- if the land comprises more than one lot, then the land is first consolidated into one lot.

While HWC is unlikely to know what a buyer of any land would utilise it for, going through this process (if approved by Council) may increase the development opportunities available on the property. However, there would not be any guarantee that Council would approve multiple vacant holding listings around the storage.

4.4 Potential zoning

The NSW Government has developed a standard template LEP that all councils need to conform with for that local government area and have operational by 2011. Council is currently preparing its standard LEP, under the Model Provisions, with the aim for it to be operational prior to 2011.

As the ILUP is being developed at the same time as the standard LEP preparation, it is important that, as far as possible, the two documents are consistent and provide clear objectives for the future development of the area. To that end, the ILUP would only identify potential zonings that could be utilised by Council on land surrounding the storage. It would be up to Council to determine the exact zonings to be allocated and the specific locations for those zonings.

The Standard LEP produced by the NSW Government is merely a template and provides flexibility to each individual council. As such, the zonings indicated below assume that Council would make certain activities within the zoning permissible. The following zonings have been identified based only on the uses/activities that could surround the storage, and has not taken into account the whole of Dungog Shire. In developing its standard LEP, Council would take into account the entire shire. Activities identified here as required to be permissible may not be consistent with Council's direction for the wider shire.

Potential zonings for the storage and surrounding area include:

- SP1 *Special Activities*
- SP2 *Infrastructure*
- SP3 *Tourist*
- E3 *Environmental Management*
- RU1 *Rural Production*
- RU4 *Rural Small Holdings*.

4.4.1 SP1 Special Activities

Objectives of the zone

The *Special Activities* zoning provides for:

- special land uses not provided for in other zones
- sites with special natural characteristics that are not provided for in other zones
- development that is in keeping with the special characteristics of the site or its existing or intended special use, and that minimises any adverse impacts on the surrounding land.

Reason for potential implementation

SP1 *Special Activities* could be used to zone the storage, buffer area, HWC operational areas, and HWC recreational areas. The zoning would allow for the environmental management and protection of the storage and the surrounds.

Assumptions

In order to enable the proposed recreational, environmental and education activities in the area, the following uses would need to be permissible:

- camping ground
- boat launching ramp
- jetty
- environmental facilities
- information and educational facility
- kiosks
- recreational areas.

Implementation

The land use (ie water storage facility) would be indicated on the accompanying zoning maps to the LEP.

4.4.2 SP2 Infrastructure

Objectives of the zone

This zoning provides for:

- infrastructure and related uses
- prevention of development that is not compatible with or that may detract from the provision of infrastructure.

Reason for potential implementation

SP2 *Infrastructure* could be used to zone the storage, buffer area, HWC operational areas, and HWC recreational areas. The zoning would allow for the environmental management and protection of the storage and the surrounds.

Assumptions

In order to enable the proposed recreational, environmental and education activities in the area, the following uses would need to be permissible:

- camping ground
- boat launching ramp
- jetty
- environmental facilities
- information and educational facility
- kiosks
- recreational areas.

Implementation

The land use (ie water storage facility) would be indicated on the accompanying zoning maps to the LEP.

Protection, management and restorationof vegetation is provided under the E3 Environmental Management Zone

Under the NSW Government's Infrastructure SEPP, activities relating to water supply systems become permissible without consent in certain zones. This permissibility would provide for maintenance of the dam and associated facilities to be undertaken without consent from Council.

4.4.3 E3 Environmental Management

Objectives of the zone

This zone provides for:

- the protection, management and restoration of areas of high ecological, scientific, cultural or aesthetic values
- the prevention of development that could destroy, damage or otherwise have an adverse effect on those values.

Reason for potential implementation

This zoning should be considered for land identified as potential habitat corridor (refer Chapter 5) which would extend from the dam wall to connect with vegetation at Chichester Dam and the Barrington Tops. This land is intended to meet the objective of establishing and enhancing biodiversity within the area.

Assumptions

Permissible use required within the zone:

- environmental facilities.

4.4.4 RU1 Rural Production

Objectives of the zone

This zoning provides for:

- the encouragement of sustainable primary industry production by maintaining and enhancing the natural resource base
- the encouragement of diversity in primary industry enterprises and systems appropriate for the area
- the minimisation of fragmentation and alienation of resource lands
- the minimisation of conflict between land uses within the zone and land uses within adjoining zones.

Reason for potential implementation

Land not required for HWC operational or recreational areas around the storage could be zoned RU1 *Rural Production* so that there is effectively no change to the existing zoning.

Assumptions

Permissible uses that would be required within the zoning in order to facilitate further commercial operations close to the dam include:

- recreational facilities
- environmental facilities
- caravan parks/camping grounds
- tourist and visitor accommodation.

Implementation

The assumed permissible land uses mentioned above may not be consistent with a wider rural zoning. In order to allow these activities, an alternative zoning may be more appropriate.

4.4.5 SP3 Tourist zone

Objectives of the zone

This zoning provides for a variety of tourist- oriented development and related uses.

Reason for potential implementation

To allow for commercial operators to develop tourism/visitor related developments and activities.

Assumptions

Permissible uses that would be required within the zoning in order to facilitate further commercial operations close to the dam include:

- recreational facilities
- environmental facilities
- caravan parks/camping grounds
- tourist and visitor accommodation.

Implementation

This zoning may restrict any rural leasing arrangements that HWC may want to initiate prior to divestment of surplus land.

4.4.6 RU4 Rural Small Holdings

Objectives of the zone

This zoning provides for:

- sustainable primary industry and other compatible land uses
- the maintenance of the rural and scenic character of the land
- development does not unreasonably increase the demand for public services or public facilities
- minimisation of conflict between land uses within the zone and land uses within adjoining zones.

Reason for potential implementation

There are a number of small lot parcels that would be created around the storage. A zoning of *Rural Small Holdings* would enable the areas to maintain the rural environment of the area, while enabling smaller lots.

Assumptions

Permissible uses that would be required within the zoning in order to facilitate further commercial operations close to the dam include:

- recreational facilities
- environmental facilities
- caravan parks/camping grounds
- tourist and visitor accommodation.

Implementation

A specific lot size for these properties would be included on a Lot Size Map that would be included in a standard LEP.

Areas identified as suitable for small lots would need to have appropriate existing access.

4.5 Residual land

HWC has acquired land to facilitate the construction and operation of the dam. There are parcels of land which are not required and would be available for sale (Figure 4.1). It is unlikely that all of this land would be sold off immediately. Rather, this would be spread out over a period of time.

Larger blocks of land which do not share a boundary with the storage may be suitable for addition to existing/ neighbouring holdings or sold as separate parcels. As the storage begins to fill, confirmation of land boundaries (for properties that would need to be subdivided due to inundation of part of that property), would enable land to be progressively released for sale.

For properties that border the storage/buffer area, HWC has the option of placing covenants on the land (eg regarding set backs from the buffer area and sewage disposal arrangements). These covenants would be put in place to protect the water quality of the storage in line with the objective of ensuring a high quality water supply.

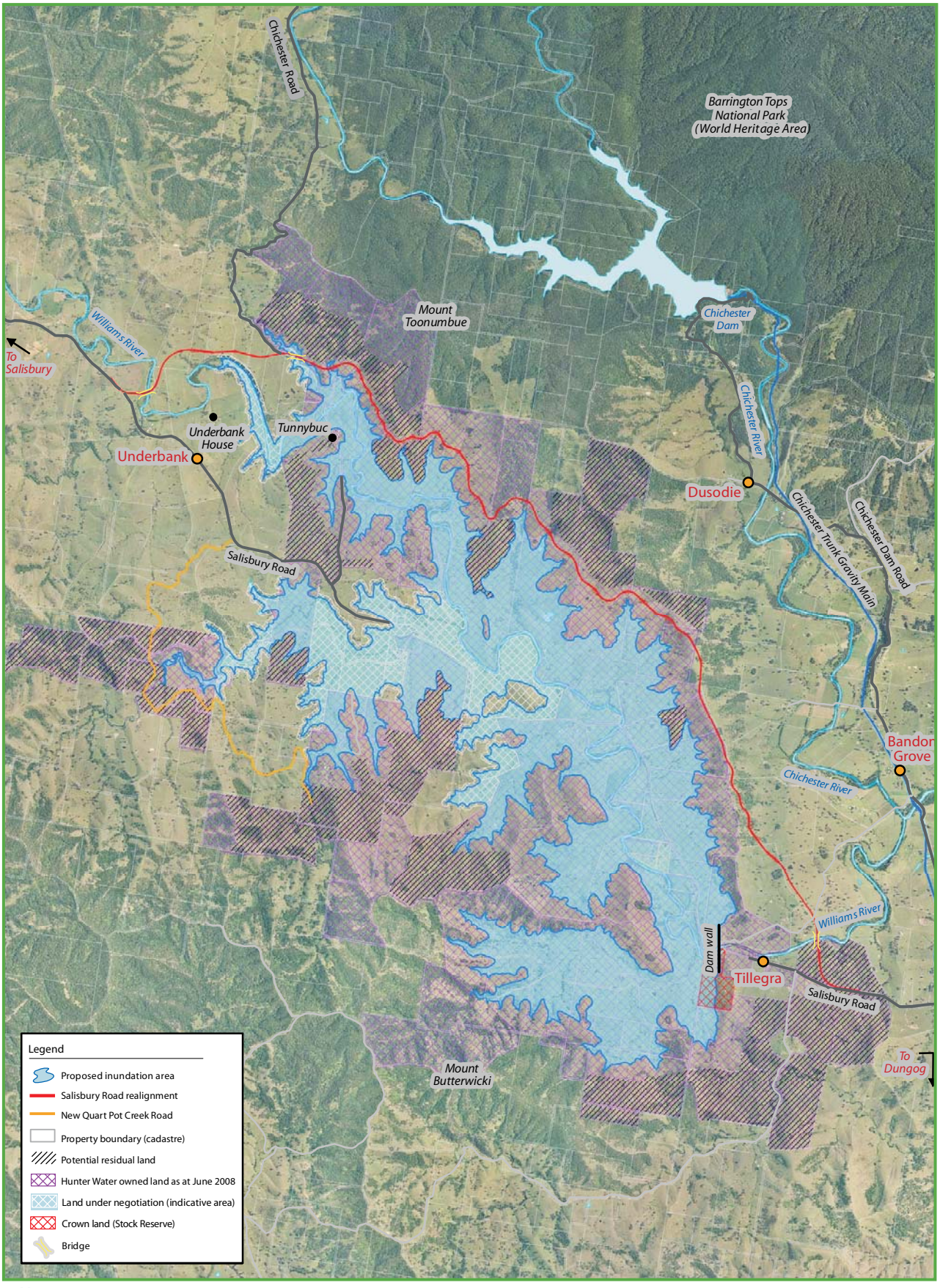

FIGURE 4.1 POTENTIAL RESIDUAL LAND AS AT JUNE 2008

5. Biodiversity protection and management

Field work to understand the biodiversity of the area included both terrestrial and aquatic surveys. Terrestrial ecology investigations identified a total of 315 flora species and 157 fauna species occurring in the study area. Aquatic ecology sampling caught six species of fish although species diversity downstream in the river is expected to be higher.

Key findings were as follows:

- plant species diversity was high, however 25 per cent of species were exotic
- five different forest types exist in the area including subtropical rainforest, moist gully blue gum wet schlerophyll forest, spotted gum-ironbark forest, forest red gum forest and riparian forest (the riparian forest is considered to be an intergrade form of an endangered ecological community)
- fish species included Cox's gudgeon, striped gudgeon, flathead gudgeon, Australian smelt, long finned eel and the introduced mosquito fish
- eight species of threatened fauna occur in the locality including the squirrel glider, brush tailed phascogale, the koala and several species of bats
- the iconic species, platypus and water rat were present in the river.

The ecology investigations concluded that no threatened species were expected to be affected significantly by the Project. A key ecological impact mitigation measure is the establishment of a habitat corridor along the eastern and southern margins of the storage (refer Section 5.2.3). This is expected to be of benefit not only to threatened species but other flora and fauna in the general area.

The following subsections discuss the management strategies for key fauna species that may be impacted by the Project.

5.1 Fauna

5.1.1 Koala

Protection of koala habitat from development impacts is addressed through State Environmental Planning Policy No. 44 – *Koala Habitat Protection*. While the SEPP does not apply to the Project (as it is being assessed under Part 3A of the EP&A Act), achievement of the objectives of the SEPP would still form part of the overall impact mitigation.

Koalas were sighted during ecological survey

Koalas were sighted during the ecological survey and a portion of the vegetation within the study area represents 'core' or 'potential' koala habitat as defined under SEPP 44. The greatest threat to koalas in Australia is destruction and fragmentation of habitat and, if not mitigated, the Project could contribute to this process. The storage could also impede koala movement.

A key impact mitigation strategy for the Project is the creation of a habitat corridor which would extend from the Williams River near the dam wall and spillway north around the eastern side of the storage, eventually connecting with Barrington Tops National Park. The corridor would also extend part way around the southern margin of the storage, connecting with the Mount Butterwicki area.

The general strategy for the creation of the corridor will be to allow natural regeneration of vegetation to occur for two to three seasons after which time the need for supplementary planting would be assessed. Such plantings may include eucalypt species which could be utilised by koalas, including for food. Signage warning of koalas crossing the road would be provided at various locations along the new section of Salisbury Road. Other management strategies such as those relating to bushfire risk and feral animals would also assist in mitigating impacts on koalas.

ACTION:

- **As part of any supplementary planting, include suitable eucalypt species to provide habitat and food for koalas**
- **Provide warning signage to reduce the risk of koala road injury/fatality**

5.1.2 Platypus

The terrestrial ecology investigations identified the potential for impacts on platypus and, to a lesser extent, the water rat through inundation of habitat as the storage fills. While neither species is listed as threatened under NSW or Commonwealth legislation, they are still considered locally significant.

Platypus and the water rat live in burrows and forage for food along the Williams River. Approximately 19 kilometres of riverine habitat would be flooded as the storage fills. Impacts on these two species would include loss of burrows, alteration of foraging habitats and potential increase in predation.

The terrestrial ecology report recommended a number of measures to mitigate these impacts. These included planting of riparian vegetation and placement of semi submerged logs at suitable locations

around new storage shoreline at the full supply level, particularly for along tributaries entering the storage where it is expected platypus would eventually move to as water levels rose. The timing of these activities would, to a large extent, be determined by the rate at which the storage fills.

ACTION:
- **Implement appropriate habitat replacement/restoration measures consistent with the terrestrial ecology report recommendations**

5.1.3 Bats

The southern myotis was found at several locations in the study area. This species is more likely to roost under bridges and culverts than other bat species. However, the eastern bat and little bentwing bat could also potentially roost in these areas.

The terrestrial ecology investigation identified Tillegra Bridge as a potential seasonal roosting site. The bridge would be removed as part of construction of the dam. The terrestrial ecology report includes a bat management plan which would be implemented to mitigate impacts.

It should be noted that other management strategies such as those relating to bushfire risk and feral animals would also assist in mitigating impacts on bats.

ACTION:
- **Provide alternative roosting sites allowing sufficient time for bats to begin to use the roosts**
- **Post-construction, monitor use of alternative roosts for level of usage**

5.2 Flora

There are eight flora species known to occur in the upper Hunter region that have been listed as either vulnerable or endangered under NSW or Commonwealth legislation. The terrestrial ecology investigation identified a total of 315 flora species, of which 78 were exotic. No species listed as threatened under NSW or Commonwealth legislation were identified during the survey.

There is potential to develop interpretive boards regarding the native flora (and fauna) in picnic areas and along walking tracks.

ACTION:
- **Investigate provision of flora and fauna interpretive boards and identify potential locations**

5.2.1 Riparian vegetation

Riparian vegetation serves as important habitat for land-based plants and animals. It assists in stabilising river banks and lake foreshores thereby protecting against erosion. It can assist in filtering runoff helping to improve water quality. It also provides shade and shelter, and acts as a source of woody debris for fish habitat and spawning.

A significant amount of the remnant bushland in the Project area exists as riparian vegetation along the Williams River. The ecological investigation identified this as comprising the endangered ecological community *River-flat Eucalypt Forest on Coastal Floodplains*. As noted, approximately 19 kilometres of the Williams River within the inundation area would be affected. While clearly an impact, this is not considered to be significant at the regional level.

A key component to effectively managing water quality will be the establishment of a buffer zone around the entire perimeter of the storage. This would have a nominal width of 50 metres but could be wider or narrower in some locations to accommodate local conditions such as step slopes.

Riparian vegetation along Williams River
Source: Ecology Lab, 2008

Establishment of a significant vegetation cover (trees and shrubs), either through allowing natural regrowth or undertaking supplementary planting, will form an important part of developing the buffer zone.

This would provide an opportunity to offset the loss of vegetation which currently occurs along the Williams River. Given the total length of the buffer zone (some 120 kilometres), the general strategy would be to allow natural regrowth to occur with progress reviewed after two to three years. Supplementary planting of appropriate local species would be undertaken where regrowth was identified as being less than expected. This is consistent with the revegetation strategy for the previously mentioned habitat corridor.

The strategy would need to allow for multiple land uses in some locations such as where recreational facilities may be provided. Effective management of weeds (see Section 5.2.4) would also need to be addressed during this establishment phase.

ACTION:
- **Implementation of revegetation strategy for the storage buffer zone**

5.2.2 Hollow bearing logs/trees

Hollow-bearing logs and trees provide important habitat for a variety of fauna species such as the brush-tailed phascogale. While there are a large number of hollow-bearing trees within the inundation area, these are sparsely distributed. These occur predominantly along road verges and as single trees in paddocks. The loss of hollow-bearing logs and trees could be offset to some extent by the relocation of some felled trees and logs to above the full supply level. It should be noted that the practicality of this will be influenced by the distances involved. In some cases, it may be more practical to provide nesting boxes.

Logs and fallen timber left within the inundation area would eventually provide habitat for aquatic fauna.

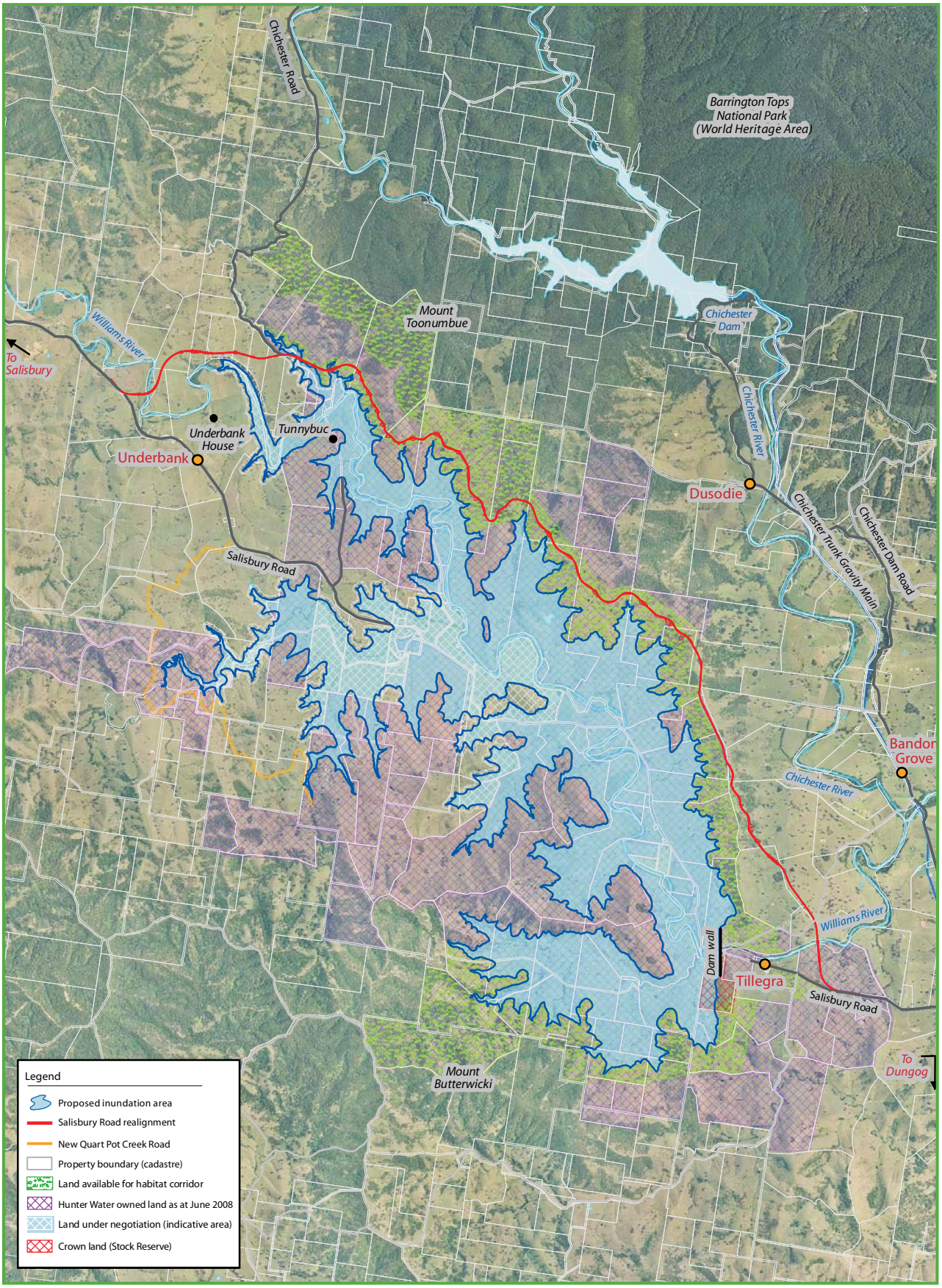

FIGURE 5.1 LAND AVAILABLE FOR POTENTIAL HABITAT CORRIDOR

Regeneration will be encouraged and supplemented with plantings

5.2.3 Voluntary conservation areas

Some 264 hectares of native vegetation is expected to be removed as a result of the Project. A potential conservation area has been identified to offset the associated impacts (refer Figure 5.1). This would be located on land owned by HWC which would provide certainty for its ongoing existence and could be designated a voluntary conservation area. A key function of this area would be to act as corridor to facilitate fauna movement between Barrington Tops and the middle and lower reaches of the Williams River, as well as provide a carbon offset for emissions generated by the Project.

The corridor would extend approximately 15-20 kilometres along the eastern boundary of the inundation area. Along much of the corridor, vegetation could extend from the inundation water level to the boundary of new Salisbury Road, a width of about 300-500 metres. A second area which could also serve as a voluntary conservation area extends from the dam wall and spillway locality around the southern part of the storage to Mount Butterwicki.

The regrowth of vegetation in these corridors would provide valuable habitat and allow for the movement of many fauna species such as the squirrel glider, koala and brush-tailed phascogale. The establishment of these voluntary conservation areas would help to make the area around the storage more aesthetically pleasing and bushwalking through these areas would be an enjoyable activity.

The terrestrial ecology investigation identified a large of number of native plant species within the study area which would be suitable for the habitat corridor. It will be important that these are appropriately represented in any supplementary planting activities. This would also contribute to making the area aesthetically pleasing for locals and visitors to the dam.

ACTION:

- **Monitor regeneration to determine need for supplementary planting**
- **Undertake supplementary planting as required and monitor establishment**

5.2.4 Weed management

There is a need to effectively manage weeds around the storage. Weeds often thrive in disturbed areas and can outcompete native flora. The terrestrial ecology investigation identified five noxious weeds, as defined under the *Noxious Weeds Act 1993*, in the Project area as well as many other introduced flora species. The noxious weeds present in the study area consisted of blackberry, black willow, lantana, Noogoora burr and shamrock oxalis.

Weeds occurring within the inundation area would eventually be destroyed by submergence and consequently not pose a management issue. However, until the storage reaches the full supply level, some form of management action would be required to minimise the risk weeds spreading outside the inundation area. As part of operational activities, weed control would also need to form part of management of the riparian zone around the storage foreshore. Monitoring of noxious weeds would form part of HWC's operational monitoring activities.

Typical appearance of subtropical rainforest within the study area

A variety of methods can be used to control weeds. Mechanical removal of weeds can sometimes be effective although is not a permanent solution. The use of chemical sprays would require appropriate assessment to determine whether there could be a negative impact on water quality, or on flora and fauna. Co-ordination with local landowners to adopt an integrated approach to weed management would also be an avenue to explore.

As the storage fills, there will be potential for aquatic weeds to become established. The negative effects of these include the blocking of waterways and outlet structures, reduction in water quality, competition with native aquatic flora, decline in aesthetic values, and restriction of water-based recreational activities. Two species of particular concern are water hyacinth and alligator weed. Both are listed as noxious weeds and were observed within the study area during the field surveys. Early detection and removal of water hyacinth and alligator weed is recommended. Management techniques for controlling aquatic weeds include mechanical harvesting, reduced nutrient loading into the dam, provide shading over sections of the storage, and lowering of storage levels.

There would also be potential for aquatic weeds to be brought into the storage via boats, trailers and fishing equipment. It will be important that regular inspections are undertaken to ensure early detection of weeds. Information boards would be placed at a number of locations advising the boat owners of their responsibilities to assist in preventing the spread of aquatic weeds. The boards would have clear photographs of the types of weeds to look out for as well as reminders to clean boats and associated equipment.

ACTION:

- **Incorporate weed monitoring and control measures into land management activities**
- **Installation of interpretive boards for effective management of aquatic weeds**

6. Relocation of existing facilities

6.1 Munni House

6.1.1 Background

Munni House is a single storey red brick homestead located at 800 Salisbury Road, approximately 20 kilometres north-west of Dungog and within the planned inundation area of the dam.

John Mann, a free settler who arrived in the New South Wales colony in September 1828 was authorised to take possession of the 1,920 acre homestead on 13 October 1829. Mann farmed his property with cattle and sheep and by 1840 a slaughter house, stables and corn barn had been constructed on the land. The property transferred to a William Alexander Smith in 1873.

The original structure of Munni House was built in the late 1860s or early 1870s, possibly constructed by the owner at that time. The house has undergone a number of renovations over the years, the main ones being:

- the rear dining wing was added in 1875 and a bull nosed verandah was added about this time
- the verandah was removed around 1910, when it was widened to its current dimensions and a brick balustrade with rendered curved capping and timber posts was constructed
- the original kitchen wing was removed along with some of the surrounding orchard in 1962 to accommodate a tennis court
- the western and eastern verandahs were closed in around 1965.

The house has period features including high ceilings, cedar woodwork and marble fireplaces. There are also several historic slab sheds located adjacent to the house. There is cracking in the brickwork of the main section of Munni House as a result of the earthquake in Newcastle in 1989.

Munni House has been listed as a local heritage item by Council, it being considered a comparatively rare example of an early homestead in the district.

Munni House and shed

6.1.2 Relocation

HWC is investigating the feasibility of relocating Munni House, either in its entirety or partially. Should this be possible, the most likely use for the building would be as an interpretive centre. The final decision would be made pending a heritage assessment and feasibility study. The proposed interpretive centre is discussed in more detail in Chapter 7. Figure 6.1 shows the current location of Munni House and its proposed new location.

ACTION:

- **Investigate feasibility of relocating all/part of Munni House**

6.2 Quart Pot/Munni Cemetery

Quart Pot/Munni Cemetery would be affected by the Project as it also lies within the inundation area. At full supply level, the majority of cemetery would be submerged by more than 10 metres of water. Issues relating to the potential relocation of the cemetery have been considered in detail and are documented in Working Paper H *Quart Pot/Munni Cemetery Relocation Management Plan*.

Quart Pot/Munni Cemetery

6.2.1 Background

The cemetery known as the 'General Cemetery of Munni' was reserved from sale or lease and notified in the Government Gazette on 18 August 1915 pursuant to Sections 28 and 29 of the *Crown Lands Consolidation Act 1913*. However, the first burial did not occur until 1923.

The cemetery is located immediately off Salisbury Road, between Munni and Underbank, occupying an area of approximately 0.85 hectares of sloping land. The cemetery is bounded by a post and wire fence.

There are approximately 80 known burials in 55 graves in the cemetery. The oldest burial dates from 1923 while the most recent was in January 2008. There are about 10 reservations for future burials.

6.2.2 Relocation of the cemetery and memorial

A number of sites were investigated for the relocation of the cemetery. These are shown in Figure 6.1 which also highlights the preferred site.

The preferred site was selected through consideration of the following criteria:

- family feedback
- distance from the existing cemetery
- accessibility, including access by elderly and/or disabled persons
- slope, mainly in relation to erosion risk and foot access

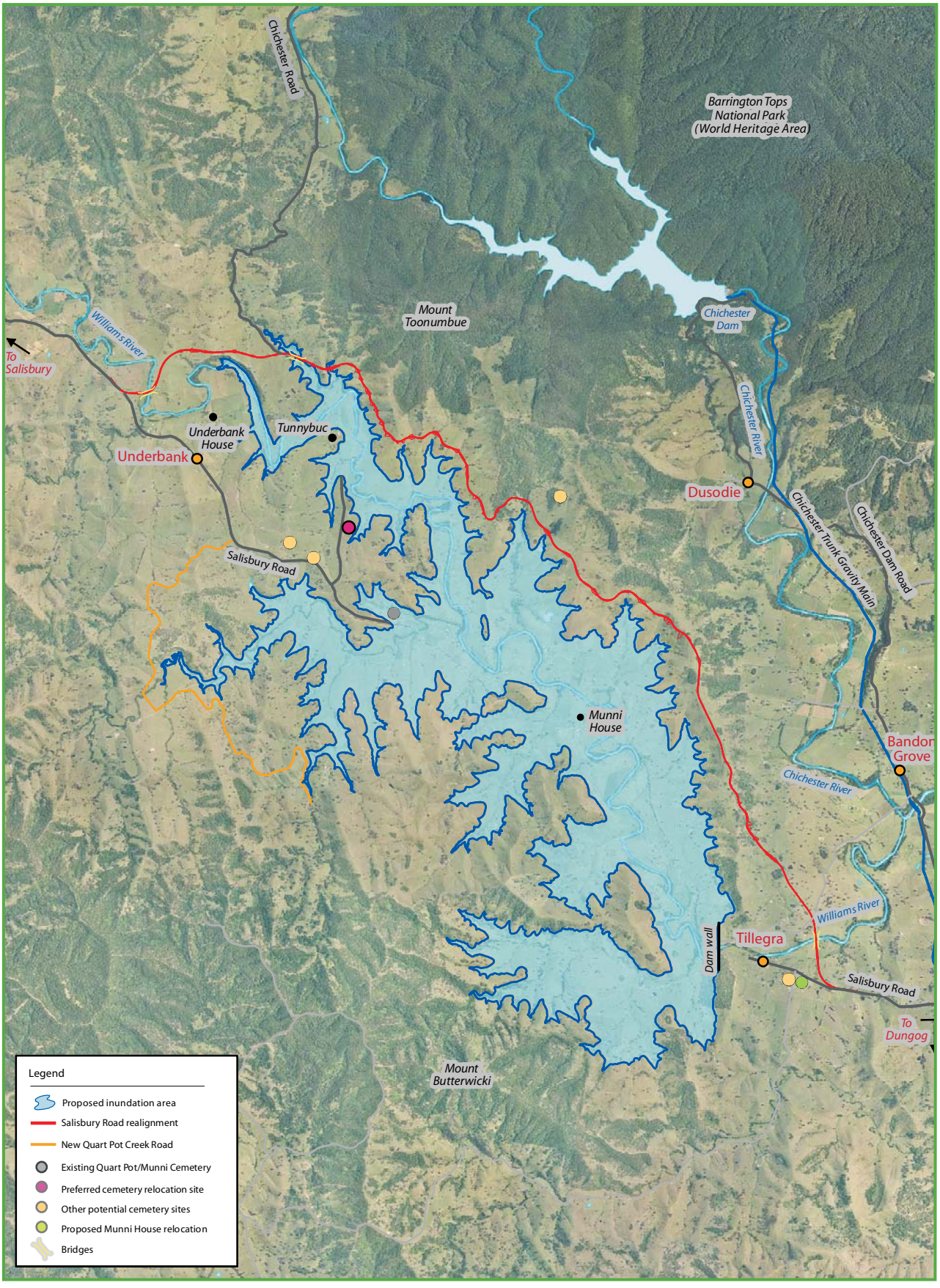

FIGURE 6.1 MUNNI HOUSE AND QUART POT-MUNNI CEMETERY RELOCATION OPTIONS

- separation distance from water bodies to minimise risks to water quality
- nature of soil, mainly in relation to ease of excavation, erosion risk, drainage, depth to groundwater (this would also consider the minimum depth requirement required for a burial site)
- amenity and views to surrounding area
- risk of vandalism
- the need for any clearance of vegetation
- land ownership
- ability to establish new cemetery in short term.

The preferred site is on land owned by HWC and would be accessed from Chichester Road (which is also known locally as 'Upper Chichester Road').

General layout of new cemetery

The new cemetery would be of sufficient area to cater for the relocation of the existing burials and reasonable future expansion. Soils in the upper reaches of the Williams River catchment where the cemetery would be located are relatively shallow (less than one metre). The site would need to be built up to provide sufficient depth for burials to meet public health regulations. Fill to build up the site would be sourced from a borrow pit established within the inundation area, located within close proximity to the new site.

As far as practicable, the locations of individual burials relative to each other would mirror the existing cemetery.

The new cemetery would include a columbarium. This would likely take the form of a wall with niches to accommodate cremated remains.

As far as practicable existing vegetation at the new site would be retained. Where required additional planting would be undertaken on and around the site in accordance with a landscaping plan.

A heritage interpretation board would be provided to explain how the new cemetery came into being. This would be located near the entrance to the cemetery.

Memorial

The original cemetery would be commemorated through the erection of a memorial located near the current location but above the full supply level of the storage. Appropriate signage would be provided to explain the history of the cemetery. Access to the memorial would be provided via a walking track.

The area of water directly over the cemetery would be designated a 'No-go' zone as a sign of respect. Buoys may be installed to exclude water craft from this area. Signs could also be erected requesting visitors to respect the area and not to use it for swimming etc.

Figure 8.4 displays the locations for the proposed designated 'No-go' zone and memorial. With the permission of Dungog Shire Council, the memorial may be re-sited to the opposite side of the road on the edge of the road reserve. This area is currently used as a roadside lookout back across to Quart Pot Creek. Due to its scenic outlook, this would reflect a preferred location for the memorial as expressed by members of the TDCRG cemetery subcommittee.

ACTION:
- **Relocate cemetery**
- **Establish memorial and interpretive signage**

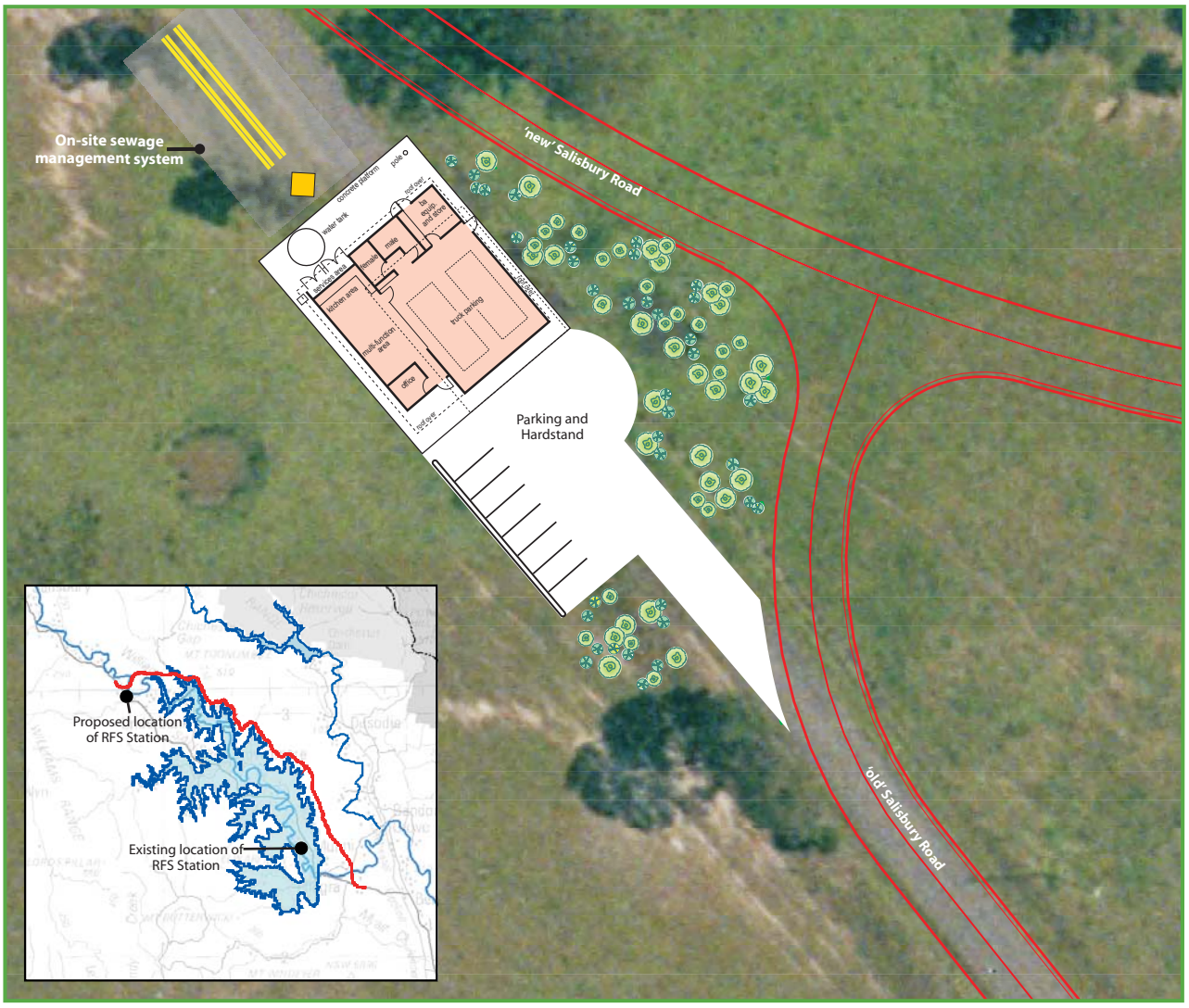

FIGURE 6.2 POTENTIAL LOCATION AND LAYOUT OF THE NEW RURAL FIRE STATION

6.3 Rural Fire Service station relocation

The RFS has a station located along Salisbury Road between Tillegra Bridge and Munni. This is within the inundation area and an alternative site is therefore required. Following consultation between the RFS and HWC, an alternative location has been identified above the dam. The preferred site is located at the junction of the new section of Salisbury Road and existing Salisbury Road (see figure 6.2) and would be built over a section of the old road. The prominent location would minimise the risk of vandalism. The location also addresses RFS concerns over quick and efficient access up and down the valley, as well as a desire to be closer to Salisbury.

6.3.1 Constraints

The new RFS station would be a category 2C station building with a floor plan of approximately 15 metres by 20 metres. The station would include parking space for two fire trucks, office space, kitchen and multi-function area, storeroom and amenities.

It is desirable to have the station set back from the road and there must be sufficient room for trucks to reverse safely. For safety reasons the new RFS station would be located a sufficient distance from

the intersection of the new section of Salisbury Road and the existing Salisbury Road. The station would also require an on-site sewage management system which would need to consider the following constraints as identified in the NSW Government guideline *On-Site sewage Management for Single Households* (Dept of Local Government 1998):

- a septic tank must be located at least 1.5 metres from any building
- standard septic tank size is approximately 3,200 litres which equates to roughly a tank that is two metres high with a diameter of two metres. Tanks must be designed to Australian Standard 1546:1998
- effluent is passed through or is pumped into an absorption field which is a series of channels placed 30-90 centimetres in the ground. The exact dimensions for an absorption field would be determined after a soil survey (which determines soil type and permeability, etc). Generally trenches are located
  1.5 metres from the septic tank, may extend to 15 metres in length and are spaced 2.5 metres apart. They are aligned parallel to the contours of the land.

Council suggests the following buffer distances for septic systems which are the same as those listed in the above mentioned guideline:

- 100 metres from permanent surface waters (eg river, streams, lakes, etc)
- 250 metres from domestic groundwater wells
- 40 metres from other waters (eg farm dams, intermittent waterways and drainage channels, etc).

More specifically the following buffers are recommended for absorption systems:

- distance from property boundary: 12 metres if area up-gradient and six metres if area down-gradient
- distance from swimming pools, driveways and buildings: six metres if area up-gradient and three metres if down-gradient.

Climate, flooding, sun and wind exposure, slope, landform, erosion potential, rocks and rock outcrops are all matters that need to be considered when installing an on site sewage management system. The final placement of the actual building on the site may need to be adjusted and refined to provide sufficient space for the construction of absorption trenches.

6.3.2 Proposed location and layout

The RFS and HWC have taken into account the constraints and selected a site near the intersection of the new section of Salisbury Road and the existing Salisbury Road for the new station. The location and layout of the new station are shown in Figure 6.2. The proposed site is located in close proximity to the settlement of Salisbury and nearby houses which may help to deter possible vandalism. Car parking for eight cars would be provided. It is expected there would be sufficient space for a sewage management system to be installed that would meet all current guidelines.

ACTION:

- **If the Tillegra Dam proposal is approved, commission detail design for the new RFS station and determine its optimum placement on the proposed site to accommodate parking, water tanks, an on-site sewage management system and general landscaping.**

7. Visitor and recreation management

Once Tillegra Dam is constructed and filled, the storage and surrounding area would provide an opportunity for a variety of recreation facilities and activities. This chapter provides information on a range of possible activities and development considerations.

7.1 Chapter guide

The following symbols aid understanding, the timing, and responsibility for the actions included in this section of the ILUP. They are a quick way of identifying responsibility and likely timing for implementation. Where a number of actions have the same responsibility and timing, the symbols are placed at the end of that grouping.

HUNTER WATER	The opportunity would be implemented by Hunter Water Corporation (HWC).
.com.au	The opportunities would be implemented by a commercial third-party – with or without HWC assistance.
	The opportunities would be implemented by a government organisation – with or without HWC assistance.
	Potential short-term activities. These opportunities could be in operation within one year of the storage reaching 90 per cent capacity.
	Unknown term activities. These opportunities would be implemented at a future date, depending on community and visitor interests.

Zoning and legislative controls are considered for each of the activities according to the Dungog LEP.

The key management issues are brought together in Chapter 8 to show a concept for the entire storage, with three identified precincts – Tillegra, Munni and Underbank.

7.2 Visitor information

Objective

To provide visitors with information about the dam through the use of interpretive signage, an educational facility and an interpretive centre, including information about dam construction, history of the area, flora and fauna, activities and walks available.

Existing opportunities in the area

Currently information relating to the planning of Tillegra Dam is provided at Munni House and on HWC's website.

Tourist information is available at the Dungog Information Centre and on various websites.

Zoning/legislative controls

The erection of signage and establishing of an interpretive centre and educational facility is permissible with consent under the Rural 1(a) zone of the Dungog LEP.

Potential opportunities at Tillegra

Information about the dam and storage, European and Aboriginal history of the area and recreational activities would be provided at an interpretive centre, other tourist information centres nearby and on the HWC website.

Interpretive signage could be established at picnic areas/camping grounds and along walking tracks.

The Tillegra Cricket Ground is an important community asset that would be retained. There is potential to locate an interpretive centre on adjacent land to further complement the community assets. Operation of an interpretive centre could commence during early construction to provide the community with information on the construction phases. An indicative layout of the interpretive centre is shown in Figure 7.1.

A time lapse video could be compiled to demonstrate the changes occurring during construction.

An educational facility could be established to cater for school visits, such as environmental (for example a water quality monitoring module) or historical education (display of photographs and Aboriginal artefacts). This facility could be tied into the interpretive centre or as a stand alone entity.

Benefits

- An interpretive signs are a cost-effective way of communicating information
- An interpretive centre could become a focal point for the community and tourists, particularly if located near the existing Tillegra Cricket Ground
- An interpretive centre could include a commercially operated kiosk
- Educational facility would support school programmes and provide a valuable resource for the Hunter Valley.

Risks

- Signs and interpretive centre could be at risk from vandals
- An interpretive centre/educational facility may not receive visitor numbers to remain viable
- Potential impacts on amenity of neighbouring properties.

Actions

- **Munni House to be assessed for use as an interpretive centre which would display information on the dam's construction and the European and Aboriginal heritage of the area**
- **Assess the possibility of opening the interpretive centre during construction and investigate the operational and management options, such as opening hours**
- **Develop interactive and interpretive signage along walking tracks around the storage**
- **Investigate the use of website for visitor information and time lapse video to show the filling of the dam and dam construction**
- **Investigate the potential to establish an educational facility**

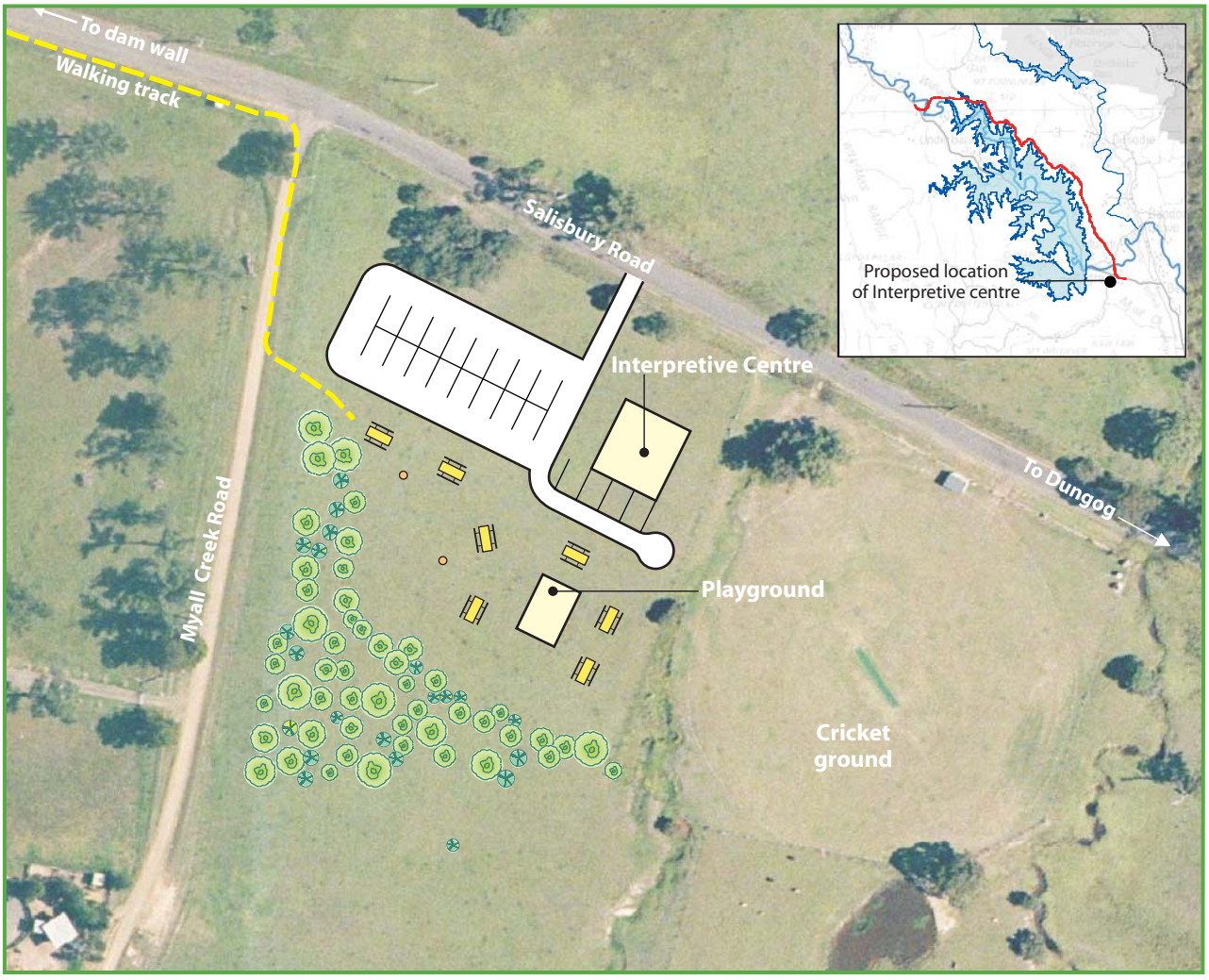

FIGURE 7.1 POTENTIAL LOCATION AND LAYOUT OF THE INTERPRETIVE CENTRE

7.3 Walking tracks

Objective

To create suitable access to the storage and leisure areas without compromising public safety, water quality, environment and operational activities and to highlight the possible walking tracks that could be developed for visitors to the dam and storage.

Existing opportunities in the area

Several walking tracks exist at Barrington Tops, Lostock Dam, Lake St Clair, Myall Lakes, Wallaroo and Karuah Nature Reserves. There are also two walking tracks in the Chichester State Forest.

Zoning/legislative controls

Roads and walking tracks are permissible with consent under the Rural 1(a) zone of the Dungog LEP.

Potential opportunities at Tillegra

Offer visitors different views of dam infrastructure, storage and native vegetation.

Create a number of walking tracks that cater for different fitness levels. Potential to provide wheelchair access for at least one walking track, or portion of track.

One walking track could begin at the interpretive centre, cross the spillway and dam wall and extend north adjacent the storage rim, and then continue through to a Twin Dams Walk (see Figure 7.2). This longer and more challenging walk would extend through natural and revegetated bushland to Chichester Dam. A day shelter at a halfway point could also be established.

Another track from the interpretive centre could extend in a western direction towards Butterwicki Conservation Area. A shorter walking track could wind around the proposed Underbank precinct area and incorporate the cemetery memorial (see Figure 7.2).

There may also be the possibility to create a shared walkway/cycleway to accommodate pedestrians and cyclists. Alternatively cyclists may be accommodated along Salisbury Road.

Walking track

Benefits

- Allows the community to access and enjoy the storage and surrounding areas
- Complements potential recreational activities
- Walking tracks could be graded so that visitors can gauge which walk they would like to experience and how long it is likely to take them. There is the opportunity to create a number of walking tracks around the storage that could fall under different track classifications and would help to cater to the varying fitness levels of visitors
- A Twin Dam Walk capitalises on the fact that the Chichester and Tillegra Dams (both operated by HWC) are located in close vicinity to each other and is another opportunity to connect the mountains to the storage
- A shared walking/cycling track would allow for an additional activity.

Risks

- Additional access/tracks would incur further costs to the Project
- Potential for public to access 'No-go' zones
- Access cannot be provided to all areas of the storage as the riparian buffer needs to be safeguarded
- Materials to construct an environmentally sensitive track may be costly
- Some vegetation may have to be removed to construct walking tracks and access roads
- Other environmental impacts associated with construction, such as erosion and sedimentation
- Maintenance costs
- There are safety concerns over a shared walking/cycling track and issues how to best manage these uses.

Actions

- **Prepare and display information available for the community and visitors to show publicly accessible areas and reasons for controlled access**
- **Investigate wheelchair access to publicly accessible areas, including some walking tracks and the interpretive centre**
- **Further refine possible routes for walking tracks including design and location to ensure minimal removal of vegetation**
- **Identify resource reuse opportunities for inundation area materials in the walking track construction**
- **Investigate potential for and suitability of a shared walking/cycling track**
- **Investigate options within the roads realignment to facilitate access to the storage**

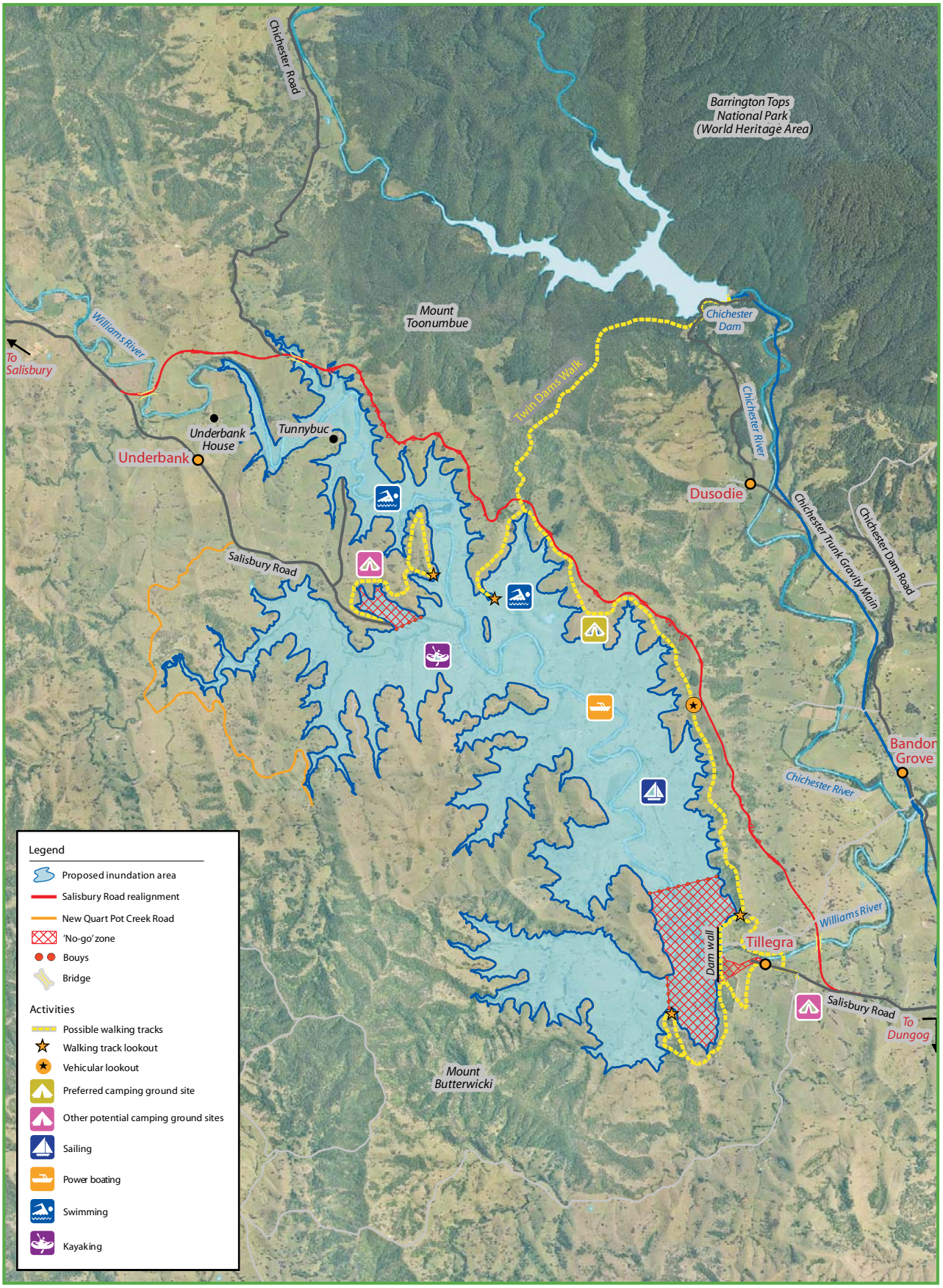

FIGURE 7.2 POSSIBLE ACTIVITY LOCATIONS

7.4 Visitor lookouts

Objective

To give visitors the opportunity to view the dam wall, storage and rural surrounds from a variety of vantage points during and after construction.

Existing opportunities in the area

Lookouts exist along some of the walking tracks within Barrington Tops. The closest lookout is Mt Knob located north east of Tillegra, near Chichester Dam.

Zoning/legislative controls

Visitor viewing platforms/lookouts are permissible with consent under the Rural 1(a) zone of the Dungog LEP.

Potential opportunities at Tillegra

Potential sites for lookouts around the dam are shown in Figure 7.2. Viewsheds are shown in Figure 7.3. Not all lookout sites require 'formed' or constructed platforms – the natural vantage point of these locations could be a sufficient (particularly where located along a walking track).

The lookout adjacent to the dam wall could also be utilised as a viewing point during the construction period provided all necessary safety requirements could be met.

Some lookouts may be in areas where access should be restricted beyond the lookouts as this becomes either private or environmentally sensitive land.

Benefits

- Establishing viewing platforms enhances visitor experience
- Platforms with seating can be a place to rest along walking tracks
- Viewing platforms with interpretive signage could inform visitors of the history of the area, dam and flora and fauna species.

Risks

- Signage may be at risk from vandalism
- Some viewing platforms may require regular maintenance/pruning to ensure views and safety are maintained
- Potential environmental impacts associated with construction.

Actions

- **Install lookouts**
- **Providing seating at some or all locations**
- **Investigate resource reuse opportunities**
- **Provide a pedestrian/vehicular lookout with sufficient distance to pull entirely off the road**

7.5 Amenities

Objective

To provide visitors with access to non-potable water, toilets, picnic and barbeque facilities

Existing opportunities in the area

The area around Tillegra is not on mains water.

There are 10 public toilets in Dungog, and one in Salisbury.

There is existing electricity supply along Salisbury Road.

There are a number of picnic areas located throughout the region including at Chichester Dam, Barrington Tops, Dungog, Lostock Dam, Lake St Clair, Karuah and Myall Lakes.

Zoning/legislative controls

Amenities including picnic facilities are permissible with consent under the Rural 1(a) zone Dungog LEP.

Potential opportunities at Tillegra

Possibility of water tanks to provide water for visitor areas. Alternatively, water could be brought to and stored on site.

Toilets would be located at all picnic and camping grounds.

Provide picnic seating and coin operated barbeques at a number of locations around the storage.

Benefits

- Visitors are encouraged to stay for longer periods as picnic facilities allow for eating and relaxation
- Picnic facilities would be a complementary activity near an interpretive centre
- The proposed Munni precinct could be easily accessed from Salisbury Road and the gradual slope of the area and access to water would make it a fitting place for a picnic area
- A picnic area at Underbank would service visitors to the north of the storage. The access road from old Salisbury Road is appropriate and the land around Underbank is of a suitable slope, with access to the water
- Coin operated barbecues would remove the need for open fireplaces which are a bush fire risk.

Risks

- Need to provide water sources for toilets, personal hygiene, drinking/cooking and other recreational uses
- Toilets need to be located a safe distance from the storage so that water quality of the dam is maintained.
- Maintenance costs
- Amenities may be at risk from vandals
- Visitor waste policy – to be disposed of onsite or take home waste, as there is potential for waste to end up in the storage
- There are many locations around the storage that do not have road access or a suitable slope which limits the areas where picnic areas can be established.

Actions

- **Method of providing potable and non potable water to be investigated**
- **Investigate toilet options to minimise impact on storage**
- **Determine layout and construct picnic area and amenities block**
- **Implement site management and waste disposal**

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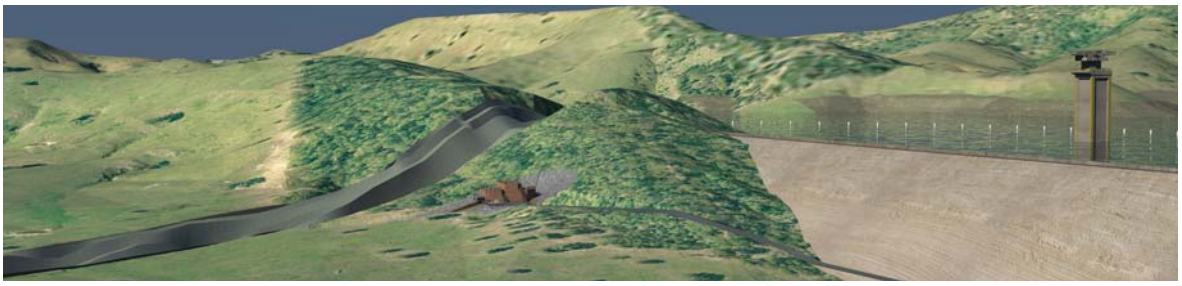

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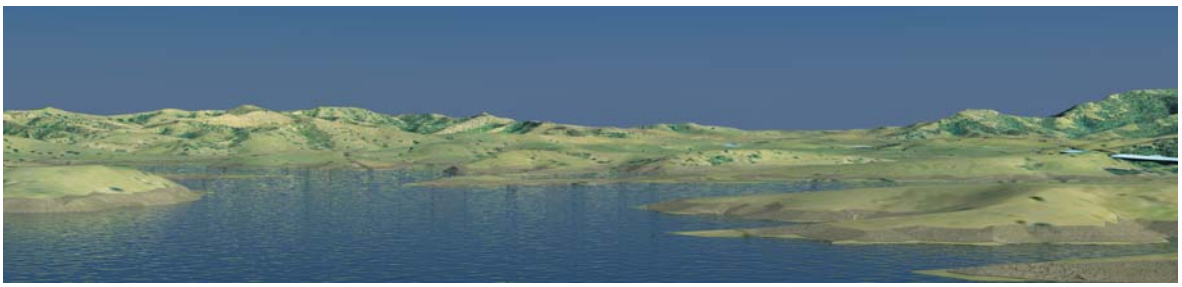

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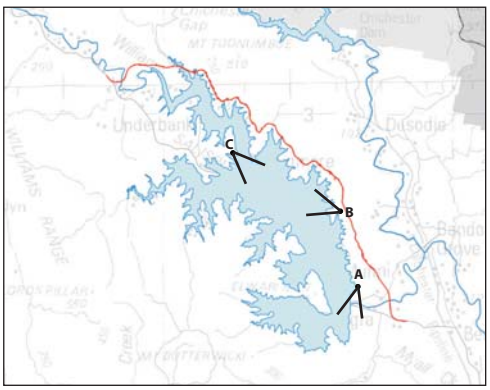

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FIGURE 7.3 POTENTIAL VIEWSHEDS

7.6 Camping grounds

Objective

To provide visitors with camping ground facilities at designated locations around the storage

Existing opportunities in the area

Camping grounds are currently permitted at several locations around Barrington Tops eg Frying Pan Creek. Other camping grounds in the region are located at Lake St Clair, Chichester Dam, Lostock Dam and Karuah Nature Reserve.

Zoning/legislative controls

Camping ground facilities are permissible with consent under the Rural 1(a) zone Dungog LEP.

Potential opportunities at Tillegra

There is the opportunity to establish a camping ground in the proposed Munni precinct. HWC would call for expressions of interest from commercial operators for development of the site, compatible with the conservation of the surrounding environment. Development would be subject to the consent of Dungog Shire Council. If no expressions of interests are received, HWC would develop a low key camping ground, similar to those provided in adjacent State Forests and National Parks. Approval is sought for this contingent action as a component of the Part 3A planning approval for the Project. It is envisaged that if a camping ground was developed by HWC the area would accommodate 20 camping sites as well as the following facilities:

- toilets
- car parking
- picnic/barbecue facilities
- non-potable water
- waste bins.

The sites would be non-powered.

It is envisioned that a small camping fee would be paid to an honesty box.

Other locations for potential camping grounds include Underbank and near the dam wall. See Figure 7.2 for the location of potential camping grounds. Refer also Section 5.11 Commercial Accommodation.

Overall benefits	Overall risks
• Ability to attract visitors from outside the local area, particularly from Newcastle and Sydney • An opportunity for visitors to enjoy a range of experiences in the area.	• Accommodation would need to be managed so that the water quality of the storage is not compromised • Providing potable water is a consideration as the area is not connected to mains water • Camping ground and facilities may be at risk from vandals • Maintenance costs.

Benefits	Risks
Munni precinct • A camping ground at Munni is an appropriate location given the low slope, access to the storage and potential access from Salisbury Road • Existing properties are located on the other side of the ridgeline and are unlikely to be impacted by noise and activities resulting from the camping ground.	• The site would create a break in the land available for habitat corridor.
Underbank precinct • A camping ground could be located near Underbank. The slope of the area is appropriate for camping and there is access from roads, as well as access to the storage • A camping ground would attract visitors to the north and west of the storage.	• The new cemetery and memorial may be located close by and visitors to these sites may not wish to have a camping ground located so close • Underbank is further away from Dungog than Munni or Tillegra • The area around Underbank may be more influenced by water level fluctuations.
Tillegra precinct • A camping ground located near the dam wall would be advantageous given its proximity to Dungog and other facilities • The slope of the area is appropriate for camping and it would be accessible via existing roads.	• A camping ground near the dam may have an impact on nearby residents • This location may be noisier than Munni and Underbank precinct areas due to dam operations • Access to water for recreational purposes are non-existent in this area given the presence of the wall and 'No-go' zone.

Actions

- **HWC to call for expressions of interest for the commercial development of a camping ground at Munni, Underbank or Tillegra.**
- **Provide information to the public on the areas where they may camp and what facilities are available (potential release locations include: interpretive information centre, tourist information centre in Dungog and on the Internet)**

7.7 Swimming

Objective

To provide safe and appropriate areas for swimming.

Existing opportunities in the area

Swimming is not permitted at Chichester Dam. Swimming is allowed at Lostock Dam, Lake St Clair, Myall Lakes and some spots within Barrington Tops.

Council manages swimming pools in Dungog and Clarence Town.

Zoning/legislative controls

There are no specific controls on swimming under the Dungog LEP.

Potential opportunities at Tillegra

Potential to designate an area for swimming in inlets around Munni precinct and at locations around Underbank. See Figure 7.2 for potential swimming areas.

These swimming areas could have floating pontoons.

Benefits	Risks
Munni precinct • A designated inlet for swimming around Munni is highly appropriate given the potential for camping ground and picnicking in the area • The water depth is sufficient for swimming.	• The water would be shared by boats and swimmers which is a safety risk, so swimming areas would need to be identified to restrict boat access/speed • Tall trees and other hazards would need to be removed from swimming areas for safety reasons.
Underbank precinct • A swimming area located in an inlet around Underbank would be useful for visitors utilising a camping ground or picnic area • The water depth in this area at the 90-100 per cent supply level is deep enough for swimming.	• The water would be shared by boats and swimmers which is a safety risk, so swimming areas would need to be identified to restrict boat access/speed • Tall trees and other hazards would need to be removed from swimming areas for safety reasons • The swimming area should not be located in the vicinity of Quart Pot/Munni Cemetery as this is a culturally sensitive area.

Benefits	Risks
Other • If commercial accommodation was established at other locations around the storage, other potential swimming locations should consider water level fluctuations.	• Swimming is not permissible in the 'No-go' zone close to the dam wall. This restriction is for health and safety reasons • Currently there are no roads to access the south west perimeter of the storage therefore a designated swimming area for the public in this area is not practical.

Actions

- **Appropriate water marking and management of the swimming areas**

- **Education programme/signage to be developed so the public understand the different areas available for water activities and where restrictions apply**

7.8 Boating

Objective

To allow recreational boating in specified areas on the storage

Existing opportunities in the area

Boating is not permitted at Chichester Dam. Boating is permitted on the Williams River and at Lake St Clair and Lostock Dam.

Passive boating activities such as canoeing and kayaking are permissible at certain locations in Barrington Tops, Karuah, Myall Lakes and at Lake St Clair and Lostock Dam.

Zoning/legislative controls

The construction of boat ramps is permissible with consent under the Rural 1(a) zone of the Dungog LEP. Navigable waters would be under the authority and control of NSW Maritime.

Potential opportunities at Tillegra

Potential 'No-go' zones have been identified in the vicinity of Quart Pot/Munni Cemetery and near the dam wall. Boating would not be allowed in these areas for cultural and safety reasons. Restrictions on speed would also be put in place around swimming areas and close to shore and for navigating more enclosed areas.

One suitable location for a boat ramp is in the vicinity of the Munni picnic and camping ground This would give access to a large expanse of deep water. Depending on demand for boating facilities another boat ramp could be constructed.

The boat ramp design would need to accommodate launching at and between the 90 per cent and 100 per cent full supply levels.

Benefits	Risks
Boating	
• Chichester Dam does not allow boating so there is great potential to encourage boating at Tillegra Dam.	• There is the potential for power boat wakes to cause foreshore erosions. Speed restrictions may be required in areas that are deemed high erosion risk • There are many forms of recreational boating both powered and non-powered, and there may be some conflict of uses • Remnant trees and other vegetation remaining in the inundation area could be potential snags for boats.
Boat ramps	
Munni precinct	
• A boat ramp at Munni would be appropriately located given the close vicinity of potential camping grounds and picnic areas to the water.	• There is the potential for conflict between boating and swimming.

Benefits	Risks
Other • A second boat ramp could be constructed in the north-west section of the storage • Other areas that are commercially developed in the future may be able to construct boat ramps.	• There is the potential for conflict between boat and swimming • Water depths at Underbank are shallower than Munni, particularly at the 90 per cent supply level • Construction of other boat ramps is likely to be dependent on whether commercial development takes place.

Actions

- **Create 'No-go' zone from offtake tower/dam wall**

- **Education programme/signage to be undertaken so public is aware of the different areas available for water activities which would help to minimise user conflicts**

- **Explore funding opportunities for boat ramps and other marine structures**

- **Boating and boating zones/restrictions to be monitored and reviewed every five years by Maritime**

7.9 Fishing

Objective

To allow visitors to engage in recreational fishing from the shore and on boats

Existing opportunities in the area

Some fishing occurs at the Barrington Tops, Karuah and Myall Lakes. Lostock Dam and Lake St Clair are both stocked dams that allow recreational fishing. Australian bass and catfish are some of the fish species that have been used to stock dams.

Zoning/legislative controls

Fishing is permissible with a fishing license from DPI (Fisheries).

Potential opportunities at Tillegra

There is the opportunity for the storage to be stocked with various species of fish. The Department of Primary Industries has indicated that it would be permissible to stock the storage with Australian bass.

There is also the opportunity for local business to stock fishing equipment for rent or sale and to sell fishing licences.

Benefits

- Such a large expanse of water would provide a great location for fishing which is valued by inland communities. As the storage would be kept at between 90-100 per cent full for most of the time, recreational fishing would be viable.

Risks

- There may be some delay from initial fish stocking to allow growth of the stock at which time fishing would become an attractive activity.

Actions

- **Liaising with DPI (Fisheries) to ascertain types of fish to be introduced and construct a timeline of when this should begin**

- **DPI (Fisheries) to monitor fish stock levels**

7.10 Children's playground

Objective

To provide a playground for families with young children and enhance the visitor experience

Existing opportunities in the area

Playgrounds are currently located in Dungog and at Chichester Dam.

Zoning/legislative controls

Playgrounds are permissible with consent under the Rural 1(a) zone of the Dungog LEP.

Potential opportunities at Tillegra

There is the potential for a unique and interactive playground to be constructed in one of the potential picnic areas identified in Section 7.5.

A playground could also be part of a commercial/community development.

Benefits	Risks
• A playground attracts families and provides an additional form of recreation • Potential to locate a playground near the interpretive centre/Munni House (refer to Figure 7.1).	• Play equipment would need to be maintained and could be at risk from vandals • There are public liability and safety issues associated with play equipment.

Actions

- **Investigate the opportunity to construct a children's playground, and whether Council has a playground strategy**

- **Investigate children's playground equipment to facilitate the use of sustainable materials**

7.11 Commercial accommodation

Objective

To provide for a variety of commercially operated accommodation opportunities around the storage

Existing opportunities in the area

Caravan parks are located near Lostock Dam, Myall Lakes and there are caravan sites at Barrington Tops.

There are a number of cottages, farmstays and bed and breakfasts within the area. Hotel accommodation and conference facilities are available in the vicinity of Chichester Dam.

Zoning/legislative controls

Hotel and camping ground facilities are permissible with consent under the Rural 1(a) zone of the Dungog LEP.

Potential opportunities at Tillegra

It is possible that commercial camping grounds, caravan park/self contained cabins or other commercial style accommodation could be established around Underbank.

A commercial establishment such as a bed and breakfast, retreat, hotel or conference centre could be suitable in a number of locations around the perimeter of the storage, where residual land could be sold to developers.

Any accommodation would need to operate in a manner so that the water quality of the storage is not compromised.

Benefits	Risks
Underbank precinct • The Underbank area has a low slope, access to storage and access from old Salisbury Road making it appropriate for future development.	• Waste disposal and impacts on water quality • Additional environmental impacts during construction • Dungog LEP may not allow for potential commercial accommodation (see Chapter 4).
Other • The southwestern side of the dam is slightly more isolated which may suit an eco-accommodation development • Accommodation established in this area would have access to the storage.	• Access roads may need to be extended in some areas which would be an additional cost to a developer • Waste disposal and impacts on water quality • Additional environmental impacts during construction • Dungog LEP may not allow for potential commercial accommodation (see Chapter 4) • Phone, power and water connections.

Actions

- **Any third-party commercial operator that wishes to develop/manage accommodation or conference facilities to undertake their own commercial investigations and gain planning approval**

7.12 Other potential commercial activities

Objective

To highlight the possibility of other commercial activities (both relating to and independent of the dam) that could occur in or around the storage

Existing opportunities in the area

Chichester conference centre.

Dungog has a golf course that is semi-private, and there are limited opportunities for non-members to play.

These activities within the surrounding area could result in similar facilities at Tillegra Dam not being viable or could provide further opportunities for alternative activities/facilities at Tillegra Dam.

Zoning/legislative controls

Any commercial activity would be subject to its own development approval by Council.

Any activity which requires access to Tillegra Dam or any associated HWC operated activities/areas would require approval from HWC.

Some activities may also require approval from NSW Maritime or other statutory bodies which would need to be complied with prior to the activity becoming operational on or around the dam.

Potential opportunities at Tillegra

Kiosk/restaurants/bar/café
Gondola/sky rail
Conference Centre/sport and recreation camp
Environment studies camp complex
Aboriginal and European heritage centre
Swamp experience
Golf/mini golf
Water bikes
Agriculture
Amphitheatre/outdoor cinema/ entertainment venue.
Dam climb
Sky walk
Flying fox/climbing ropes
Commercial fish farm
Helicopter transport/tours
House boats
Adventure cycling/bike hire
Shop
Competitions/festivals

This is not an exhaustive list but reflects the inputs from the community. Such activities require outside investment and are dependent on community/tourist needs. It is anticipated that such activities could be established in the long term once other recreation activities have been established.

Risks

- Council's planning controls may not allow for potential commercial activities (see Chapter 4)
- Activities that are identified as prohibited in the Dungog LEP may require rezoning.
- Some commercial activities may be incompatible with dam operation/maintenance
- Agriculture in or near the vicinity of the storage has the potential to impact on water quality but could be mitigated through fencing and buffer zone
- Implementation and management.

Actions

- **Scoping of possible activities and the demand for additional recreation to be undertaken in the future**
- **Any third-party commercial developer/operator that wishes to open recreation facilities to undertake their own commercial investigations and gain planning approval**

8. Potential recreational concept

The potential recreational facilities are located at three identified precincts around the storage (see Figure 8.1). These are:

- Tillegra
- Munni
- Underbank

These three precincts have been identified as having suitable land and road access for potential recreational and commercial facilities as well as providing access to the storage. The precincts enable recreational facilities to be spread around the storage and to be accessible to as many people as possible. Concept layouts for an area within each of the precincts are shown in Figures 8.2-8.4 with an overall concept map provided as Figure 8.5.

The three precincts, while providing diverse recreational activities and facilities, each have a 'primary' or 'key' recreational activity. The Tillegra precinct contains the proposed interpretive centre and is in close proximity to the dam wall enabling the introduction to the Tillegra Dam experience. Munni fulfils the role as a camping ground location, with Underbank being provided as a family picnic area. The Underbank precinct has potential for many uses given its flatter topography and formed access. Consequently there is no 'hard boundary' for this precinct, rather the boundary will be determined by the land use within the area. Similarly, the roles outlined here are not the only roles of each of the precincts. The following sections outline what activities and facilities would be available for each of the three precincts.

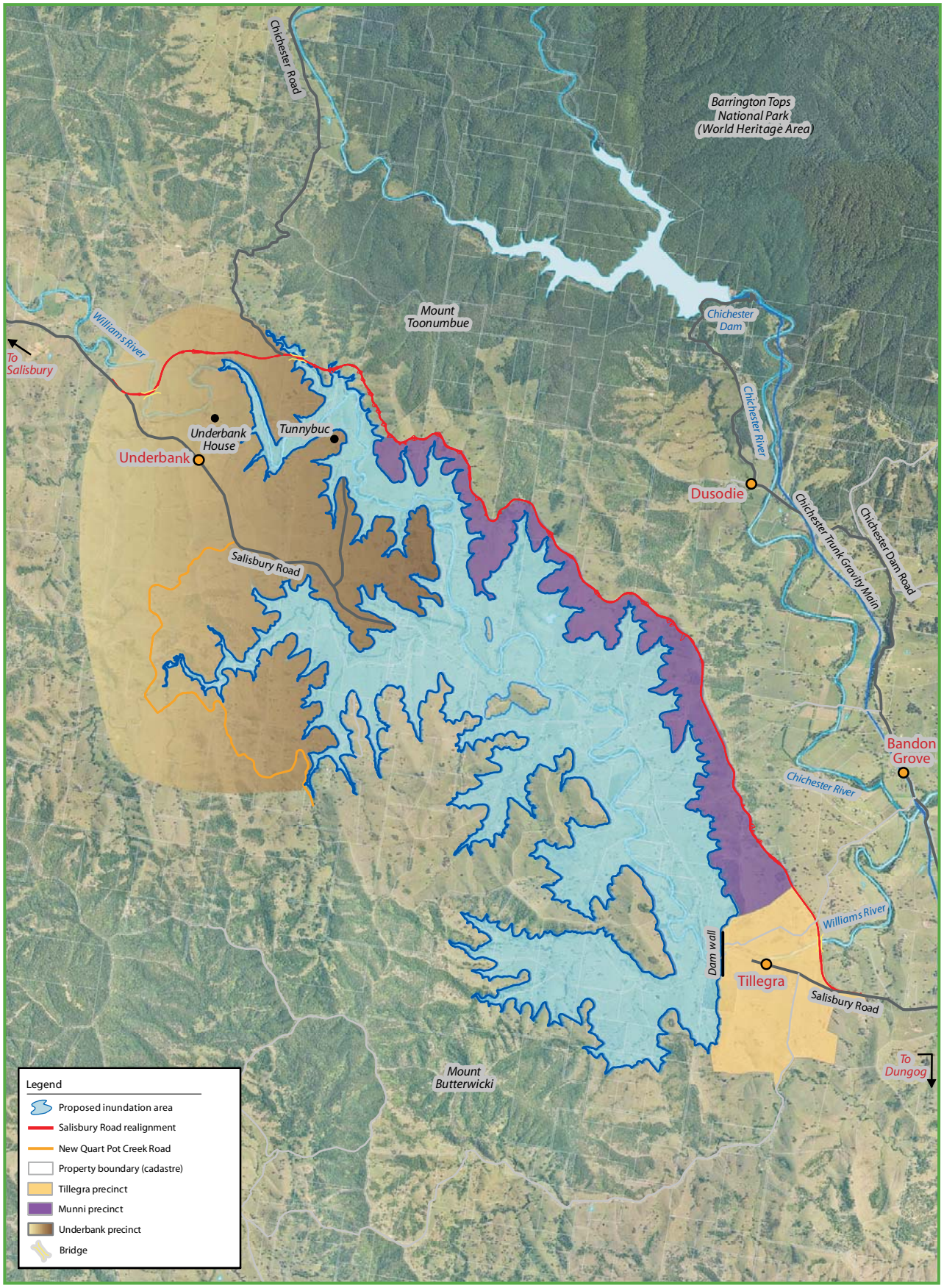


FIGURE 8.1 POTENTIAL PRECINCT AREAS

8.1 Recreation development principles

There are a number of guiding principles which should be adhered to in developing recreational facilities, whether these are developed by HWC, Council or a third party. They should:

- incorporate the area's natural, cultural and scenic values within recreational facilities and areas
- be compatible with the dam's operational use
- develop facilities to enhance the recreational experience of the area.

8.2 Proposed recreational outcomes

In order to provide guidance for potential recreational activities, the following outcomes are proposed for recreational facilities and activities:

- recreational facilities/activities to complement and interact with the area's natural, cultural and scenic values
- recreational and visitor facilities to complement and build on the existing recreational facilities in the area
- entice additional visitors to the area through well planned, functional and varied facilities
- minimise conflicts between recreational activities/users around the storage area
- minimise any impacts on surrounding land uses (particularly the rural nature of the area), that are not part of the Tillegra Dam project.

8.3 Tillegra precinct

Objective

To provide a community and education resource and provide for passive and active recreational activities

8.3.1 What community facilities are there?

- interpretive centre/educational facility
- children's playground
- picnic areas
- barbeque
- toilets
- parking area
- walking track
- interpretive signage
- non-potable water
- cricket ground (*retention of existing facility – subject to ongoing community use and support*).

8.3.2 What operational facilities are there?

- dam wall, spillway, (*limited public access via formed walkway*)
- offtake tower (*no public access*)
- caretaker cottages (*no public access*)
- HWC site office (*no public access*)
- mini hydro-electric plant (*no public access*)
- chlorination plant (*no public access*)
- other operational facilities (*no public access*).

8.3.3 What facilities could there be?

- kiosk, shop, café etc (*potential commercial enterprise*)
- gondola/flying fox (*potential commercial enterprise*).

8.3.4 What activities can we do?

- walking
- picnicking
- visiting the interpretive centre/educational facility
- play cricket, etc.

8.3.5 What management issues are there?

- lighting fires outside designated areas
- unlawful caravanning or camping
- not abiding by the rules of use of the storage for activities
- accessing non-public/restricted areas
- maintaining facilities.

8.3.6 Special events/opportunities

- community volunteers to work in the interpretive centre/conduct walks
- community events/meetings could be held in the interpretive centre
- school environmental programmes/school excursions could be held in the educational facility with walking tours of the dam or Butterwicki voluntary conservation area.

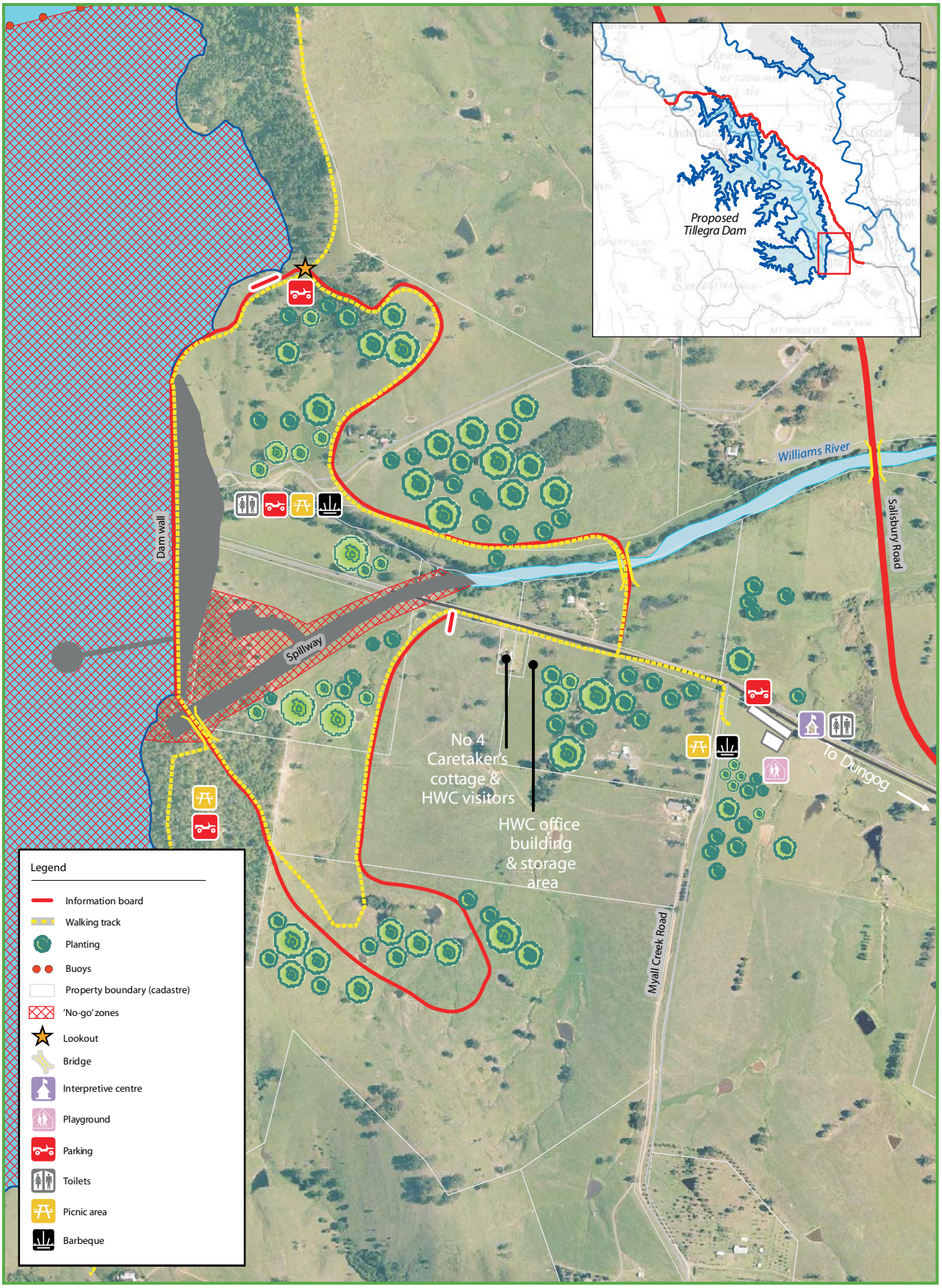


FIGURE 8.2 TILLEGRA PRECINCT ACTIVITY AREA CONCEPT

8.4 Munni precinct

Objective

To provide a community and visitor based camping ground and boating precinct for visitors and locals

8.4.1 What community facilities are there?

- camping ground
- toilets
- picnic area
- barbeque
- parking area
- walking tracks
- lookouts
- interpretive signage
- boat ramp and jetty
- swimming area
- non-potable water.

8.4.2 What facilities could there be?

- boating supplies/tours (*potential commercial enterprise*)
- kiosk (*potential commercial enterprise*)
- eco lodges/accommodation.

8.4.3 What activities can we do?

- camping
- boating
- swimming
- walking
- fishing
- picnicking.

8.4.4 What management issues are there?

- lighting fires outside the designated areas
- unlawful use of camping ground eg caravans
- using the storage for cleaning items or people
- launching boats at undesignated locations
- not abiding by the rules of use of camping ground and the use of the storage for activities
- maintaining facilities
- risk of vandalism.

8.4.5 Special events/opportunities

- Dungog Pedalfest.

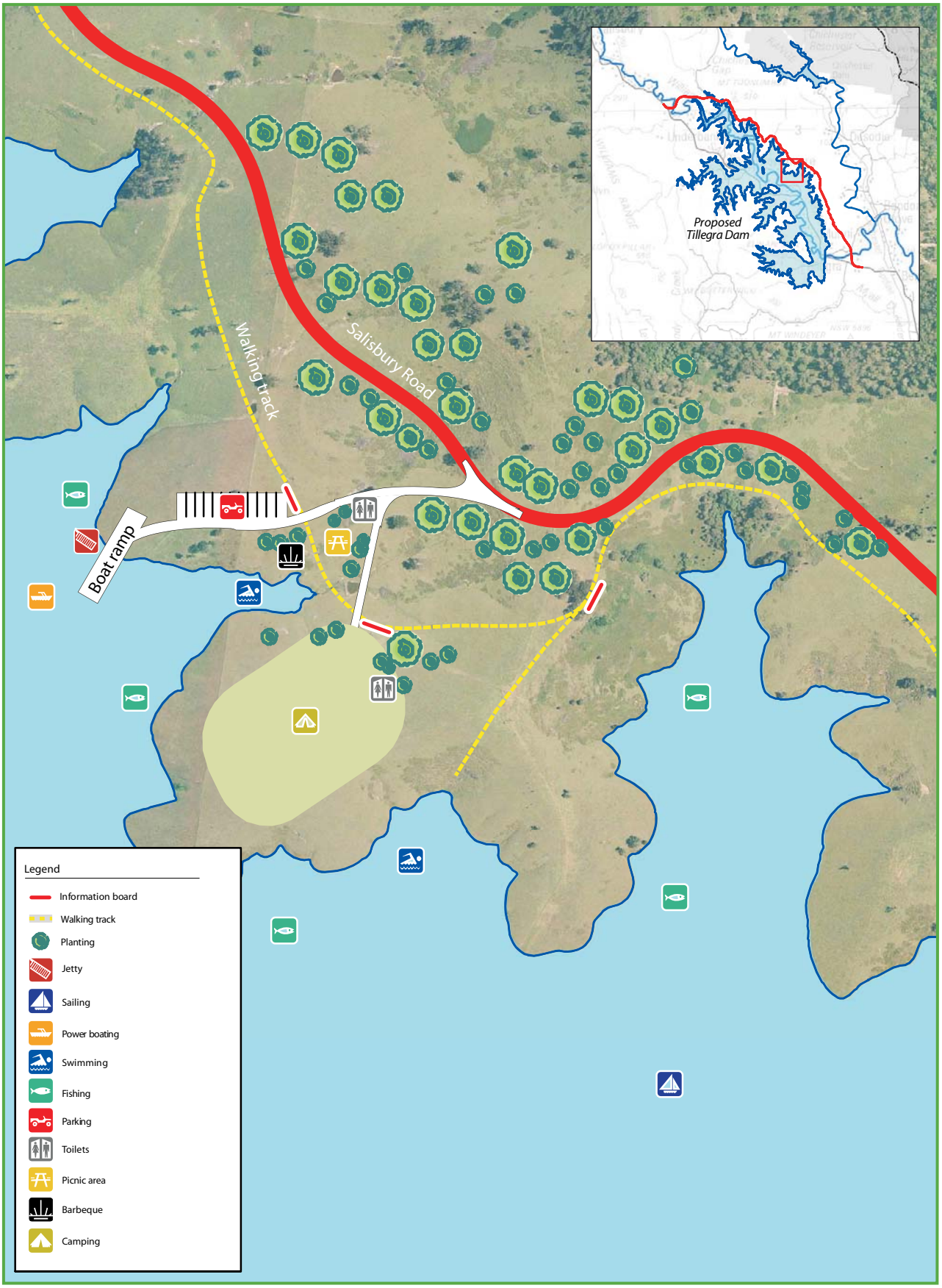


FIGURE 8.3 MUNNI PRECINCT ACTIVITY AREA CONCEPT

8.5 Underbank precinct

Objective

To provide an area for differing activities and land uses to encourage recreational opportunities while appreciating the cultural history and surrounding rural nature of the land

8.5.1 What community facilities are there?

- cemetery memorial
- picnic areas
- toilets
- parking areas
- walking track (Quart Pot/Munni Cemetery walk)
- interpretive signage
- non-potable water.

8.5.2 What facilities could there be?

- children's playground/BMX track (*potential commercial enterprise*)
- water craft hire (*potential commercial enterprise*)
- golf course/mini golf(*potential commercial enterprise*)
- caravan park (*potential commercial enterprise*)
- lodges/accommodation (*potential commercial enterprise*).

8.5.3 What activities can we do?

- swimming
- walking
- fishing
- picnicking.

8.5.4 What management issues are there?

- lighting fires
- launching boats at undesignated locations
- unlawful camping
- accessing the 'No-go' zone
- vandalising of cemetery monument
- maintaining facilities
- risk of vandalism.

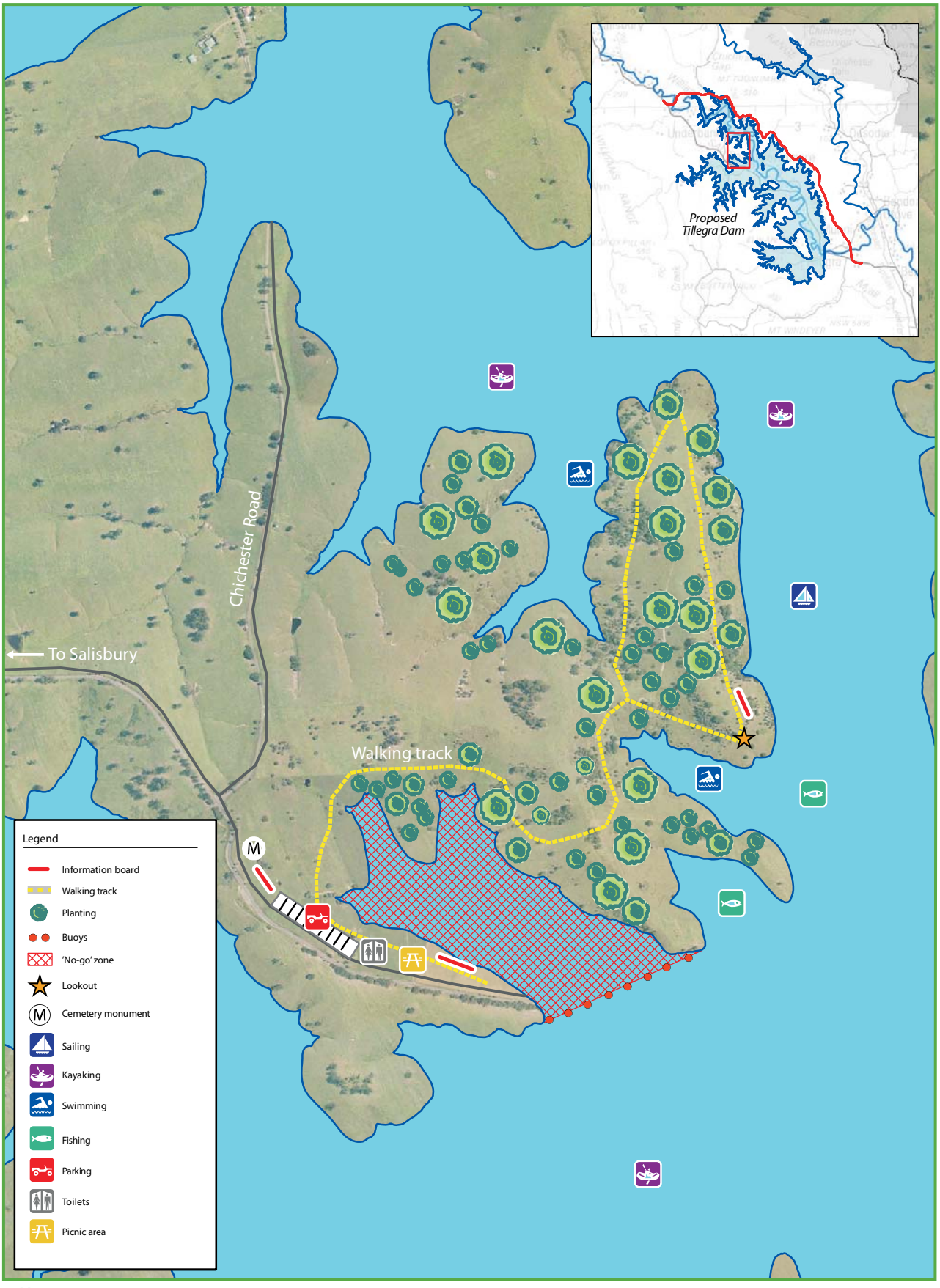


FIGURE 8.4 UNDERBANK PRECINCT ACTIVITY AREA CONCEPT

8.6 Overall recreational concept

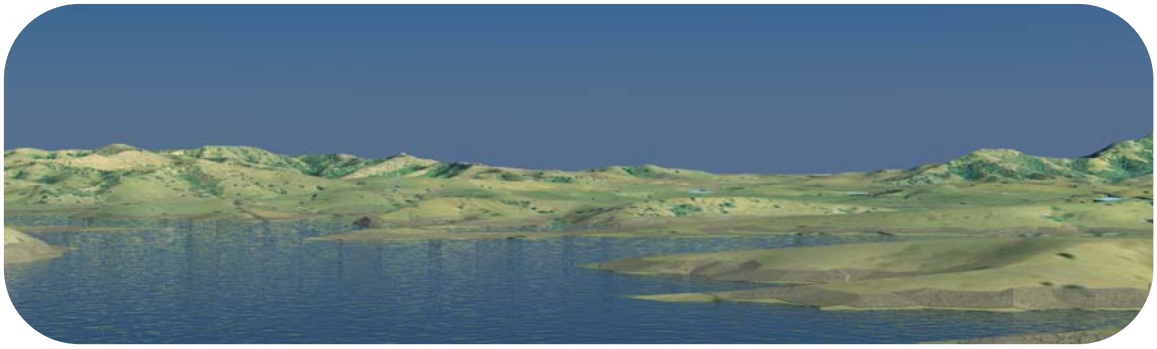
It is proposed that Tillegra Dam, the storage and surrounds become a recreational and community facility that appeals to both the local community and tourists. Facilities such as walking tracks, an interpretive centre, a camping ground and picnic areas are all proposed around the storage. In future, there is the potential to include commercial activities such as a kiosk, caravan park or other accommodation facilities and other recreational activities such as mini-golf or an entertainment venue to enhance the recreational experience.

These uses need to be managed and balanced against Tillegra Dam's primary role as a drought security storage. The ILUP seeks to outline issues and a range of actions to be implemented in order to balance the needs of recreational and operational activities around the dam.

8.6.1 The Tillegra experience

The following is the experience that visitors and the community could have of the Tillegra Dam:

- a place where the local community go to relax and unwind with family and friends
- a destination for visitors who wish to experience the expansive storage and native surrounds
- a venue for community and tourist events
- a place that recognises and educates about the contemporary and Aboriginal history of the area
- a place that showcases sustainable tourism and facilities
- a place that connects Barrington Tops to Chichester Dam and Tillegra Dam via the Twin Dams Walk.



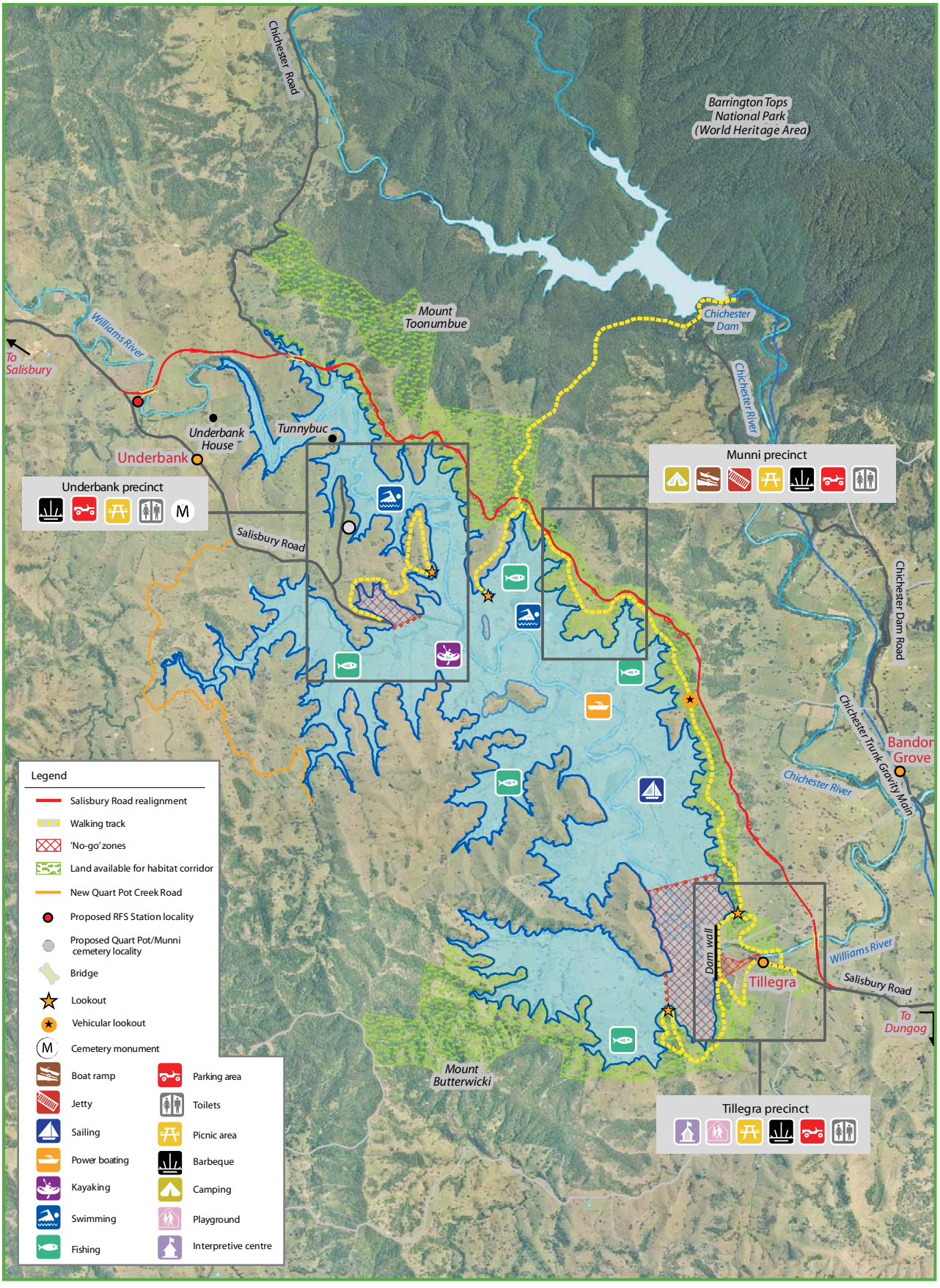


FIGURE 8.5 OVERALL CONCEPT

9. References

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