



Lake Fyans Management Plan



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1. Foreword

The completion of the Wimmera Mallee Pipeline has resulted in changes to the management of a number of bulk water supply assets.

In September 2008, GWMWater confirmed the preferred future operating scenarios for 32 of these assets. The preferred scenarios, which were endorsed by a specially convened Reservoirs Review Stakeholder Working Group, followed consideration of well over 100 written submissions received in response to discussion papers released for community comment.

GWMWater has now moved into the second stage of the process, which is the development of Implementation Plans for identified assets in consultation with key stakeholders.

While the primary role of Lake Fyans is to provide a water supply to Stawell, Ararat, Great Western and some rural customers, it also is an important recreational lake. This plan recognises that recreational value and makes recommendations, which are primarily for implementation by the Lake Fyans Committee of Management as to what actions are required to leverage that value and ensure that the community receives the maximum benefit from the facility.

Mark Williams
Managing Director

2. Introduction

Lake Fyans is located in close proximity to the townships of Stawell and Ararat and the Grampians National Park in Western Victoria.

Lake Fyans is part of the GWMWater Grampians water supply system. Its primary role is to provide a water supply to Stawell, Ararat, Great Western and some rural customers. Its secondary role is as a recreational water lake for a range of water based pursuits including fishing, swimming, powered and non powered boating and sailing.

Lake Fyans was constructed as a water storage with the construction of earthen embankments in 1916. Refer to appendix 9.1 for a more detailed Lake Fyans history. It is classified as an off stream storage receiving its supply from the Stoney/Fyans Creeks or Lake Bellfield. It has a small 1,320 ha catchment. The main sources of inflow are regulated transfers from Stoney Creek or Lake Bellfield. The average annual inflow based on historic climatic data is 4,000 ML per year. The maximum operating volume (revised) for Lake Fyans is 18,460 ML and at this volume the lake surface area is 493 ha with a maximum depth of approximately 6.2 metres. The capacity of the Inlet channel is 200 ML/day and the maximum discharge is 120ML/day. There is no spillway for Lake Fyans.

Lake Fyans reserve area is vested in GWMWater and the Northern Grampians Shire Council is the boating Authority. Refer to map on page 13 for Lake Fyans reserve area boundaries. Refer to Appendix 9.5 for details existing legislation relevant to the management of Lake Lonsdale.

In recognition of Lake Fyans importance as a recreational water body, the Lake Fyans Committee of Management was established in 1979 by GWMWater's predecessors to manage the 'Recreational Area' to "develop and control the area as a recreational area in a manner compatible with interests of water supply. This 'Recreational Area' could be described as the Lake Fyans Reserve land surrounding the water's edge. Any areas of land while inundated by waters stored in Lake Fyans shall not be deemed to be within the recreational area". (There is a map in the rules establishing the Committee of Management in appendix 9.2.

Based on previous climate data, inflows to the lake and storage management rules, Lake Fyans will have a suitable water level for recreation (1.5 metres) in at least 95% of the time. In 5 % of the time it will experience levels which are marginal for recreation. Refer to Appendix 9.6.

2.1. Summary of Recreational Activities

The following popular activities are permitted at Lake Fyans.

Activity	Lake Fyans
Picnicking	Y
Walking	Y
Camping	Y
Firewood collection	Y
Fishing	Y
Canoeing	Y
Swimming	Y
Boating, skiing, sailing	Y

3. Purpose of Plan

3.1. Future Use of Reservoirs Review

The development of the Lake Fyans Management Plan is a key recommendation from the GWMWater Future Use of Reservoirs Review, where the operation of reservoirs in the Wimmera-Mallee area was reviewed between 2006-08 to determine the future operating arrangements for the GWMWater system and related assets, taking into account:

- a) the implementation of the Wimmera Mallee Pipeline and other likely water resource developments;
- b) broader community and environmental values of the reservoir system; and
- c) Government policy relating to reservoirs and their management.

The final strategy (preferred scenarios or operating regime) for the 32 bulk water supply reservoirs and associated infrastructure was developed in consultation with the Reservoirs Review Stakeholder Working Group. The process included consideration of feedback from six community information sessions and 165 written submissions received in response to discussion papers released for community comment in July 2007.

The strategy recommended that the reservoirs and weirs to be maintained as primary supply sources or infrastructure for the Wimmera Mallee Pipeline include Bellfield, Moora Moora, Rocklands, Taylors Lake, Wartook, Distribution Heads, most headworks channels and Huddleston's Weir (with modifications for environmental flow requirements).

Implementation plans will now be developed for each asset in consultation with key stakeholders. The Lake Fyans management plan is the second of these implementation plans.

Specific recommendations for Lake Fyans are that the lake will be operated at a lower level (203.80 mAHD, 18,460 ML) consistent with viable recreation amenity, current recreation amenity and urban supply requirements.

The strategy will be reviewed after five years to assess initial experiences with operation of the Wimmera Mallee Pipeline.

3.2. Management Plan Aims

The aims of the Lake Fyans Management Plan are to:

1. Maximise recreational opportunities to meet current and future user needs taking into consideration:
 - a) public safety
 - b) water quality management issues
 - c) protection of cultural heritage values
 - d) biodiversity issues
 - e) climate change impacts
 - f) links to other regional recreational initiatives e.g. existing and proposed walking trails
 - g) economic and socio values
2. Advise on future management responsibilities for the facility including:
 - a) future governance arrangements
 - b) foreshore management uses including beach access, caravan park, boating, scout club and Stawell Aquatic Club
 - c) short and long term maintenance and development plans

3.3. Lake Fyans and Lake Lonsdale Management Plan Working Group

A Management Plan Working Group has been formed to provide advice to GWMWater on the development of the Management Plan for Lake Fyans based on detailed water supply operational rules previously developed.

Working group participants are:

- Tony Dark - Northern Grampians Shire Council (Group Chair)
- Allan Ralph - Grampians Field and Game
- Geoffrey Swanton - Marine Safety Victoria
- Cr Andrea Cooper - Northern Grampians Shire Council
- Gary Hargreaves - Lake Fyans Committee of Management
- Jim Leeke - Lake Fyans Committee of Management
- Brian Myles - Lake Fyans Committee of Management
- Rob Loats - VR Fish
- Leigh Edwards - Stawell Yacht Club
- Andrew Pearce - Stawell Yacht Club
- Craig Murdoch - Department of Primary Industries
- Tony Baker - Wimmera Catchment Management Authority
- Ararat Rural City Council
- Aaron McGifford - AAV
- John Maddocks
- Sharon Douglas
- Steven Tyzzer
- Matthew Kindred
- Ross Hatton
- Denis McCann
- Terry Monaghan

4. Strategic Directions

4.1. Vision for Lake Fyans

A future visitor to Lake Fyans will find a commercial overnight and day visitor resort and a developed and well managed day visitor area at Hargreaves Beach which caters for both intensive and passive recreational pursuits. These pursuits will include active pursuits such as boating, fishing, swimming, water skiing, sailing, duck shooting (in season) and bike riding and more passive pursuits such as bush walking and bird watching.

4.2. Objectives

To:

- a) protect water quality
- b) review boating safety rules and implement recommendations
- c) maximise the number of years when the 14,000-18,000 ML recreational target operating level is achieved
- d) develop and manage the Hargreaves Beach area east of the Lake Fyans Inlet Channel to meet day visitor needs and improve day visitor access on the east side of the lake
- e) promote Lake Fyans as a major Grampians tourism attraction and especially the lake's recreational fishing values for salmonids (trout) and redfin
- f) protect and enhance the natural environment and manage vehicle access to these areas
- g) protect cultural heritage values
- h) communicate the values of Lake Fyans and its by-laws to visitors
- i) develop a walking and bike riding track around the lake and link this to proposed tracks to Lake Lonsdale, Stawell and Halls Gap

4.3. Guiding Principles

The Management Plans for both Lake Fyans and Lake Lonsdale are based upon the following guiding principles:

- a) The lakes' primary roles are consumptive water supply (Lake Fyans for Stawell, Ararat and Great Western) and environmental water supply (Lake Lonsdale) and recreation is a secondary role. Therefore Lake Fyans and Lake Lonsdale will be operated in accordance with the reservoir operating rules
- b) Water quality in Lake Fyans and Lake Lonsdale will be protected
- c) Lake Fyans and Lake Lonsdale complement each other by providing different recreational experiences, particularly for overnight visitors, where Lake Fyans provides a resort caravan park experience and Lake Lonsdale provides a more bush camping experience
- d) Public access only to designated and managed areas
- e) Manage recreational use to maximise compatibility between user groups.

4.4. Recreational/Tourism Values

- a) Lake Fyans is a significant aquatic recreational facility used by those living in Stawell, Ararat and the wider western district for over 100 years
- b) In 2002 a study found that when the lake was holding 7,000 ML, i.e. half of the Committee of Management’s desired minimum water level (14,000 ML) that recreational activity at Lake Fyans contributed in excess of \$4.095 million annually to the local economy. Using conservative multipliers, this equates to direct and indirect input in excess of \$12 million. Of this, 51% was the economic input related directly to the holiday resort. In terms of amenity, there were 46,686 recreational days spent at the lake in 2001/02. It was projected that should water levels increase to at least the Committee of Management desired minimum water level, then the annual recreation days would increase to 98,000 and the direct economic impact would exceed \$7.8 million. This study was repeated in 2011 and it was found “currently, the fishing, scouting, sailing, water skiing, swimming and holiday park patronage directly contribute in excess of \$7.776 million annually to the local economy. The employment generated by that economic input is 94.8 full-time equivalent jobs. Using a conservative multiplier, it equates to a total direct and indirect input in excess of \$23.3 million annually”.
- c) Suitable for a range of water based recreation activities including swimming, water skiing, canoeing, fishing and popular for duck shooting
- d) Fish species targeted by anglers include trout (available all year round) and redfin (prevalent between November and April)

Source: *Linqage International (2002) Lake Fyans – Its Contribution to the Local Economy.*



Fishing at Lake Fyans, January 2012 (photo G. Saunders)

5. Future Water Supply Management

5.1. Operating Rules

The Operating Rules for Lake Fyans are summarised in Appendix 9.3. The rules can be summarised as follows:

Operating Rules

- > To operate to the Full Supply Level throughout the year.
- > To direct excess water to reservoirs downstream where spare capacity exists.
- > If circumstances allow, to route water through the lake to maintain water quality.
- > As Lake Fyans is an off-stream reservoir and its capacity to receive flows from Fyans Creek is limited, it plays no role in flood mitigation.

5.2. Management and Operation of Existing Water Supply Infrastructure

An upgrade of the dam wall is scheduled for the GWMWater 2013-18 Water Plan period. A saddle embankment, some 800 m long and 4.5 m maximum height, known as Kelly's Bank, is constructed on the eastern side of the reservoir. This and sections of the main embankment require upgrading to comply with current dam safety standards. The likelihood of this failure is relatively low, and hence there is some flexibility in the timing of these works while other works of higher risk to GWMWater are undertaken.



Lake Fyans Water Supply Outlet Tower (photo – G. Saunders)

5.3. Water Quality Issues and Management

GWMWater regularly monitors the water quality at Lake Fyans. Historically, Blue Green Algae (BGA) blooms have occurred in the lake. In the event of a bloom, GWMWater advises lake users of the risks as per the frame work set out in the Department of Sustainability and Environment (DSE) publication of the Blue Green Algae Circular.

This can lead to the issuing of warnings stating the all primary contact with lake water should be avoided and the taking of fish or other aquatic animals could cause adverse health impacts and should be avoided.

Advice of this is provided by the erection of signs around the lake perimeter and by placing media releases in local papers.

5.4. Management of Flooding Impacts

The January 2011 event provides some insight on the impacts of floods and the role Lake Fyans has in a flood event.

The Lake Fyans catchment (1,320 ha) received about 155 mm of rain over a five-day period in January 2011. This rainfall resulted in significant stream flows within Stoney Creek and Fyans Creek. To minimise the impact of these flows, the Fyans Inlet Channel was closed during the peak of the flooding and re-opened shortly after. A volume of about 1,200 ML was harvested into the reservoir.

6. Recreational Uses and Facilities Development

This management plan will be holistic in terms of its implementation. Although the plan needs to be endorsed by the GWMWater Board, many of the actions will be the responsibility of other organisations. The plan will be an important document to support expenditure of local monies and support State and Federal grant applications for future facility developments.



Lake Fyans, January 2012 (photo G. Saunders)

6.1. Safe Boating

Lake Fyans is a popular powered and non powered boating venue. The *Marine Safety Act 2010* provides the legislative framework for the efficient and safe operation of vessels on State waters. Under the *Marine Safety Act 2010* the Northern Grampians Shire Council (NGSC) is the Waterway Manager for Lake Fyans in accordance with Section 216 of the Act. For the NGSC to meet its obligations as the Waterway Manager, an upgrade of the navigational aids is required under the Schedule for the waterway. An upgrade of the signage at the lake is also required to ensure compliance with Victorian standards.

The Australian Height Datum referred to in this section is the surveyed height above sea level. In the future it is proposed that the lake will be declared a 5 knot zone when the water level drops below 1.5 metres in depth within the unrestricted speed area bordered by the 5 knot buoys.

Action: Upgrade navigational aids under the Schedule for the waterway including an upgrade of the signage at the lake to compliance with Victorian standards.

Action: Erect signs at boat ramp to declare Lake Fyans a five knot zone when the water level drops below 1.5 metres in depth within the unrestricted speed area bordered by the 5 knot buoys and monitor and adjust where needed.

Prior to 2010, changes to boat operating rules, water skiing ‘in and out’ lanes were sign posted at South Beach area. Due to the submerged objects that became hazardous at a range of lake water levels and boats operating amongst swimmers, this area has now been declared a 5 knot zone. Advice from Department of Transport to the NGSC is that if ski lanes are to be reinstated, underwater hazards need to be removed and risks associated with skiers and swimmers in close proximity to one another need to be addressed. If this work is to be

undertaken, the relevant departments and groups must be consulted to ensure the impact on woody aquatic habitat is minimised

6.2. Recreational Facilities Development and Management

The Lake Fyans Committee of Management has the lead role in the implementation of the actions pertaining to recreational visitor facilities development and management. The promotion of Lake Fyans as a major component of Grampians tourism attractions is a role shared by the Lake Fyans Caravan and Camping Park, the Committee of Management and Grampians Tourism.

Lake Fyans Foreshore has two main existing and separate functional areas that provide holiday and recreational facilities for public use. These are the Lake Fyans Caravan and Camping Park and the South (Hargreaves) Beach area.

The issue of free, 24 hour public access to the eastern boat ramp was raised in submissions received on the draft management plan. Currently users of this boat ramp who are not staying at the Lake Fyans Holiday Park must pay a small fee and enter the boat ramp through the Holiday Park. Advice was sought by GWMWater from the Department of Transport who provided \$39,000 in 2002-3 towards the construction of this boat ramp facility. The Department of Transport have stated that the Caravan Park and Lake Fyans Committee of Management are entitled to manage the boat ramp as they see fit, and have no issues with a fee being charged, so long as the public have access.



Lake Fyans eastern Boat Ramp, January 2012 (photo G. Saunders)

6.3. Lake Fyans Holiday Park

The Lake Fyans Holiday Park is a commercial enterprise leased from GWMWater and managed on their behalf by a committee of management. The park contains holiday units, park cabins, powered and non powered camping sites.

6.4. Hargreaves Beach Day Visitor Precinct

South Beach Area, more recently referred to as Hargreaves Beach, currently comprises the Angling Club Caravan Park, the Scouts Camp, a high water level boat launching mariner and a public amenities block. Boat launching from a high water level marina with a channel link to the lake is unusable when water levels are low. The establishment of a second marina or

boat launching facility has been discussed for low water levels. This would increase launching success and reduce current practices of launching from what is more ideally the passive beach and swimming area. A risk assessment of the proposed low level launching facility causing increased leakage and/or salinity would need to be undertaken.

This precinct has been identified for development as the main area for future day visitors. This would include the area east of the Lake Fyans Inlet Channel to east of the boating marina channel.

The development of a precinct plan for this area should consider proposed future developments in the Lake Fyans Committee of Management Business Plan in 2002 including car parking areas, BBQ areas, children’s playground equipment, an enhanced beach, improved toilets and showers and address visitor management issues such as rubbish and fire protection.

In addition to these developments, the precinct plan should also consider:

- a) Zoning and development plan to cater for different users i.e. canoeing and swimming and 5 knot area at the scout camp to Lake Fyans inlet channel .
- b) Publicity of removal of ski access lane unless safety issues addressed.
- c) Proposed swimming beach report – east of inlet to marina.
- d) Upgrade of marina.
- e) Development of low water level boat launching ramp.
- f) Integration with proposed lake walking track.

Refer to map on page 13 for location of South (Hargreaves) Beach

Fluctuating water levels leads to regeneration of red gums which provide important future habitat for a range of aquatic species. In some cases this regeneration creates safety and access issues for visitor use. Areas where regeneration needs to be managed should be mapped and part of annual operational activities.

Action: Implement precinct plan developed for Hargreaves Beach area.



Hargreaves (South) Beach, January 2012 (photo G. Saunders)

6.5. Lake Fyans Walking Track

A walking and bike riding track around the lake and links to proposed tracks to Lake Lonsdale, Stawell and Halls Gap has been discussed locally for many years. This concept requires cultural heritage and biodiversity impact input to finalise the route, which should where possible use existing tracks.

Action: Develop a walking track around Lake Fyans.

6.6. Water Skiing

For the purpose of this plan water skiing includes the use of water skis, wakeboards and ski-tubes. Lake Fyans is currently used for all these activities. Actions pertaining to safe boating, including skiing are contained in section 6.1.

Trends in water skiing include the popularity of wakeboarding and wakeboard boats. These boats have the ability to create large wakes and hence increase bank erosion risks. This will need to be monitored in the future and appropriate action taken if required.



Lake Fyans, January 2012 (photo G. Saunders)



6.7. Swimming

There are many areas suitable for swimming at Lake Fyans due to the gentle grade. Popular areas are close to day visitor facilities and where there is shade. The proximity to boat users is an issue that needs to be addressed.

6.8. Duck Shooting

Shooting of game birds is a permitted activity at Lake Fyans during the open season declared under the provisions of the *Wildlife Act 1975*.

6.9. Fishing

Lake Fyans is popular for both boat and bank fishing. Restocking undertaken by Fisheries Victoria and Dept of Primary Industries is critical to the future salmonoid (trout) fishery as these fish do not breed in Lake Fyans. Redfin do breed in the lake, with fluctuating water levels and subsequent weed growth providing ideal habitat.

6.10. Recreational Club Leases

The existing club leases include the Scout camp, fishing club and yacht club. There are enquiries from other clubs to gain further leases and establish club facilities.

Proposed future approach:

- a) That there will be no further land leased for the purposes of recreation clubs.
- b) Footprints of existing lessees in the Hargreaves Beach area are to be adjusted and the standard of facilities improved.
- c) Any future enquiries regarding leasing Lake Fyans Foreshore land for establishment of club facilities is to be referred to the existing lessees to discuss opportunities for co-location of these existing lease areas.

Scout Camp area future works (provided by Scouts, 2011):

The Lake Fyans Scout Camp is the main water activities Scout Camp in the Western Region. Water activities include rowing, canoes, kayaks, sailing and swimming. Some equipment for these activities is stored at the camp site. The Lake Fyans Scout Camp Committee would like to expand the water activity program for Scouts in the Western District at Lake Fyans.

A tree replenishment program has begun at the site and will continue every year. This will encourage more wildlife at the site and the expansion of the sites environment program.

At Scout level, members aim to achieve 5 km and 10 km badges of achievement. It would be fantastic to have hike trails of these lengths and some smaller for use when camping. This would encourage longer camps at the site in the school holidays.

A long term building refurbishment plan has been started. The cabins will be painted and other general maintenance will be undertaken over the coming year. The toilet block tank has been replaced and some maintenance of the cisterns and showers has been done. The committee will be replacing equipment as funds are available in the coming year as this building is considered to be in the urgent need of upgrading.

New signs will be posted at the camp entrance to ensure the public are aware it is a Scout site. Signs will also be put up to ensure trees and firewood is not removed from the site.

Fencing will be mended or replaced where necessary and, in the long term, the addition of more cabins will be considered to enable larger groups of younger Scouts (Cubs are aged 8 to 10 years old) to use the camp.

6.11. Providing for a Safe Visitor Experience

Visitors and campers currently have fires around the lake foreshore. This can pose a risk for reserve land and neighbouring properties if not managed properly and can also impact on cultural heritage, given the majority of artefacts are found close to the soil surface. The *CFA Act* (1958) requires the manager 'to take all practicable steps (including burning) to prevent the occurrence of fires on, and minimise the danger of the spread of fires on and from any land vested in it or under its control or management'. To meet this responsibility fires are only to be permitted in designated camp fire areas.

Action: Develop and implement an operational fire plan for Lake Fyans.

Action: Develop designated fire place areas to regulation standards and publicise and enforce regulations and restrictions on the use of fire within the area.

6.12. Improving the Visitor Amenities

The range of natural, cultural and recreational values and permitted and prohibited activities need to be clearly communicated at Lake Fyans. Good signage and information needs to be designed and erected at the main visitor areas.

Action: Develop visitor interpretation signage including recreational, cultural heritage and conservation values.

An improved road network and attractive signage is required from all directions to Lake Fyans.

Action: Current Lake Fyans access and signage to be reviewed and implement an improved access network.

6.13. Biodiversity Protection and Improvement

Lake Fyans is largely used for passive recreation. Although the lake has been disturbed by recreational activities, it still contains significant environmental values.

Advice has been sought from DSE including information from Flora and Fauna databases (also in a spatial sense) on the lakes conservation significance. Further advice on appropriate management with proposed developments should be sought from DSE.

6.14. Management of Pine Plantation Area

There is a 28 ha Radiata Pine plantation established in 1979 in the north east corner of the Lake Fyans Reserve land. This plantation is owned by GWMWater and has only recently been managed in terms of commercial thinning and fertilised in 2006/07. A 2010 Plantation Management Report by Heartwood Plantations has recommended a second thinning, fenceline and fire break maintenance. The options for the future use of this site beyond the final harvest in approximately 2020-25 include continuing with the current forestry landuse or revegetation with native species.

6.15. Pest Plants and Animals

There are a number of introduced plants at the Lake Fyans reserve area. Introduced animals such as rabbits, hares, foxes and feral cats pose a threat to native plants and animals. The Lake Fyans Committee of Management has responsibilities under the *Catchment and Land Protection (CALP) Act 1994* to control and/or eradicate pest plant and animal species. GWMWater has responsibility for areas deemed as operational for water supply purposes including the embankment wall and within the pump station facility.

Action: Undertake pest plant and animal responsibilities as per *CALP Act, 1994*.

7. Monitoring and Evaluation

A review of the Management Plan will be undertaken in 2017.

8. Implementation Plan

The following priorities have been adopted:

1. Short term (year one) – public safety and basic amenities
2. Medium term (year two) - increasing visitor amenities
3. Longer term - meeting users needs

No	Action	Responsibility	Priority
1	Upgrade navigational aids under the Schedule for the waterway including an upgrade of the signage at the lake to compliance with Marine Safety Victoria standards.	NGSC	1
2	Erect signs at boat ramp to declare Lake Fyans a five knot zone when the water level drops below 1.5 metres in depth within the unrestricted speed area bordered by the 5 knot buoys (..... metres AHD) and monitor and adjust where needed.	NGSC	1
3	Implement precinct plan developed for Hargreaves Beach area.	Lake Fyans Committee of Management	2
4	Develop a walking track around Lake Fyans.	Lake Fyans Committee of Management	2
5	Develop and implement an operational fire plan for Lake Fyans.	Lake Fyans Committee of Management	1
6	Develop designated fire place areas to regulation standards and publicise and enforce regulations and restrictions on the use of fire within the area.	Lake Fyans Committee of Management	1
7	Develop visitor interpretation signage including recreational, cultural heritage and conservation values.	Lake Fyans Committee of Management	1
8	Current Lake Fyans access and signage to be reviewed and implement an improved access network.	NGSC / Lake Fyans Committee of Management	2
9	Undertake pest plant and animal responsibilities as per <i>CALP Act, 1994</i> .	Lake Fyans Committee of Management / GWMWater	Ongoing
10	Undertake a Cultural Heritage management plan for proposed works that are deemed as a high impact activity or within an area of cultural sensitivity.	Lake Fyans Committee of Management	1

9. Appendices

9.1. Lake Fyans History

Lake Fyans was constructed in the period 1914-1916 on the site of the Black Swamp approximately 15 kilometres southwest of Stawell. The reservoir is principally an off-stream storage filled from the Fyans Creek via a diversion and an Inlet channel. The reservoir was designed and constructed by the State Rivers and Water Supply Commission using various local contractors.

The main embankment at Lake Fyans is approximately 2.7 km. long with a maximum height of 5.5 metres. On average the crest is 2.2 metres wide at an elevation of 206.2 m. AHD with an upstream batter slope of 2.5:1 and a downstream batter slope of 1.9: 1. The secondary embankment is a saddle embankment, known as Kelly's Bank, which is 0.8 km long with a maximum height of 4.5 metres. On average the crest is 2.8 wide at 206.5 m. AHD with an average upstream batter slope of 3.3:1 and a downstream slope of 2.1:1.

Both of the earthen embankments were constructed on the natural levees around the perimeter of the Black Swamp using earthfill materials borrowed from within the storage. The embankments are shown on the original design drawings to comprise a "selected fill" central core, "superior material" upstream shell, and an "inferior material" downstream shell. The embankment is faced with rock beaching which provides erosion protection to the upstream slope of the embankment.

There is no spillway. The reservoir has historically been operated at a flood reserve level of 204.0 m AHD, 300 mm below its notional FSL, to allow for a flood reserve of approximately 1,590 ML.

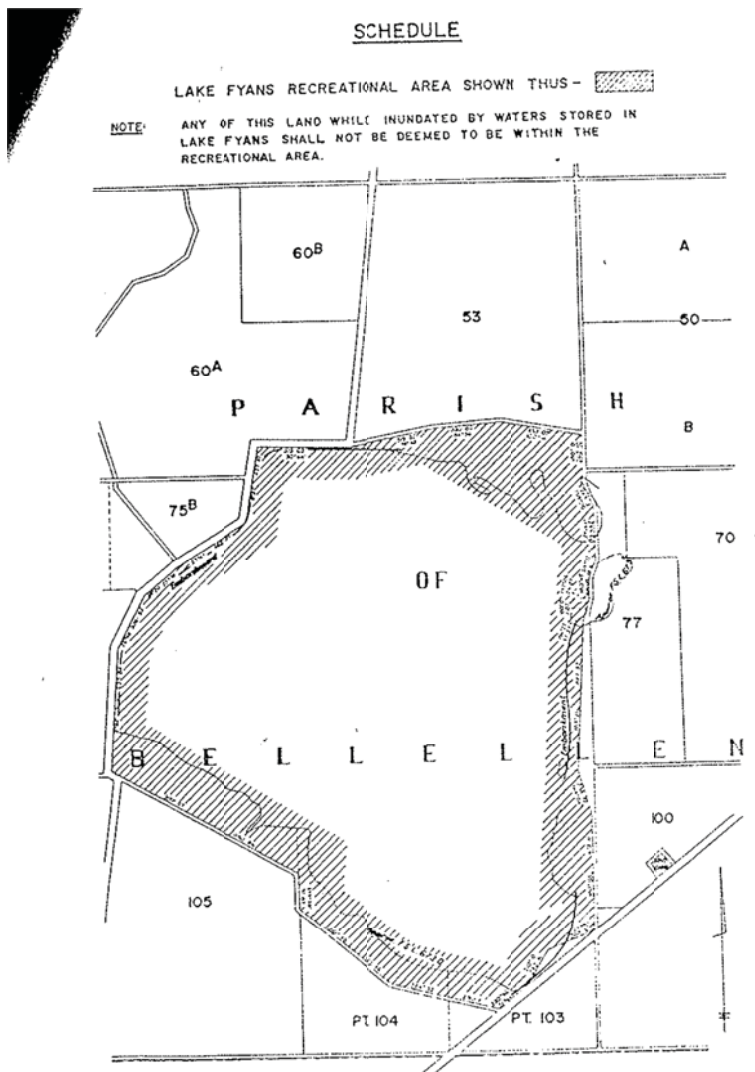
It is likely that poor compaction of the embankment has led to uneven settlement causing depressions to form in the crest. The ponding of rainwater on dispersive crest material has caused the migration of fine clay particles into the embankment creating narrow vertical sinkholes. As these narrow holes become filled with water, the sides tend to collapse forming large irregular holes in the crest with a deposit of loose saturated material at the bottom of the hole. Such sinkholes are very prevalent in the north-south and east-west sections of the embankment northeast of the outlet, particularly over an 800-metre length of the embankment from RD 1670 to RD 2470 m. Due to the embankment condition the reservoir has been operated at a 'revised' FSL of 203.8 m AHD since the 1980's.

The outlet works comprise an 8 metre high concrete outlet tower upstream of a single 1.1 metre diameter, 32 metre long cast in situ cut-and-cover concrete conduit. A 760 mm diameter cast iron vertical piston valve located in the base of the tower regulates flow.

9.2. Land Tenure and Management

Lake Fyans reserve area is vested in GWMWater and Northern Grampians Shire Council is the boating Authority.

In recognition of Lake Fyans importance as a recreational water body, the Lake Fyans Committee of Management was established by GWMWater (its predecessors) to manage the “Recreational Area” in 1979 to “develop and control the Area as a recreational area in a manner compatible with interests of water supply. This “Recreational Area” could be described as the Lake Fyans Reserve land surrounding the waters edge. Any areas of land while inundated by waters stored in Lake Fyans shall not be deemed to be within the recreational area. (The map in the Schedule establishing the CoM is below.



9.3. Future Lake Operating Scenarios

Lake Fyans is a relatively small off-stream reservoir with a small natural catchment. Its main function is to supply water to Ararat, Stawell and Great Western and some Supply-by-Agreement customers.

The principal operating objective for Lake Fyans is to keep it as full as practicable throughout the year, up to its current full supply level of 203.80 m AHD (18,460 ML). This level is 0.50 metres below the historic full supply level (FSL) of 204.30 metres (21,060 ML). The lower operating level is due to the condition of the embankment and provides additional freeboard as the lake has no spillway.

Water can be harvested into Lake Fyans from Fyans Creek at a rate of up to 200 ML/day. Stoney Creek, which runs through Halls Gap, is a major tributary on this system. During periods of high flows in Fyans Creek the inlet channel is closed to minimise the impact of uncontrolled inflows from localised runoff and flooding that can exceed the channel capacity. The inlet channel is re-opened as soon as it is safe to do so.

Water can be transferred into Lake Fyans from Lake Bellfield, if required, to support customers dependent on the Lake.

The outlet channel from Lake Fyans has a capacity of 120 ML/day. Once levels within Lake Fyans reach the full supply level, releases are made and water is directed either into Lake Lonsdale or into the lower Mt William Creek. Water may also be routed through Lake Fyans, to assist in maintaining water quality. Under this arrangement inflows and outflows are balanced to ensure that the full supply level is not exceeded. Figure 2 presents the general layout of Lake Fyans in relation to nearby reservoirs.

As Lake Fyans also supports many recreational pursuits and businesses, GWMWater maintains the level as close as practicable to the full supply level.

Table 2: Lake Fyans Facts and Figures

Full Supply Level	203.80m AHD
Full Supply Volume	18,460 ML
Spillway Level	No spillway
Crest Level	206.20m AHD
Inlet Channel Capacity	200 ML/d
Outlet Capacity	120 ML/d
Catchment Area	13.2 km ²
Surface Area When Full	5.3 km ²
Major Tributary	Fyans Creek via Fyans Inlet Channel

Operating Rules

- To operate to Full Supply Level throughout the year.
- To direct excess water to reservoirs downstream where spare capacity exists.
- If circumstances allow, to route water through the lake to maintain water quality.
- As Lake Fyans is an off-stream reservoir and its capacity to receive flows from Fyans Creek is limited, it plays no role in flood mitigation.

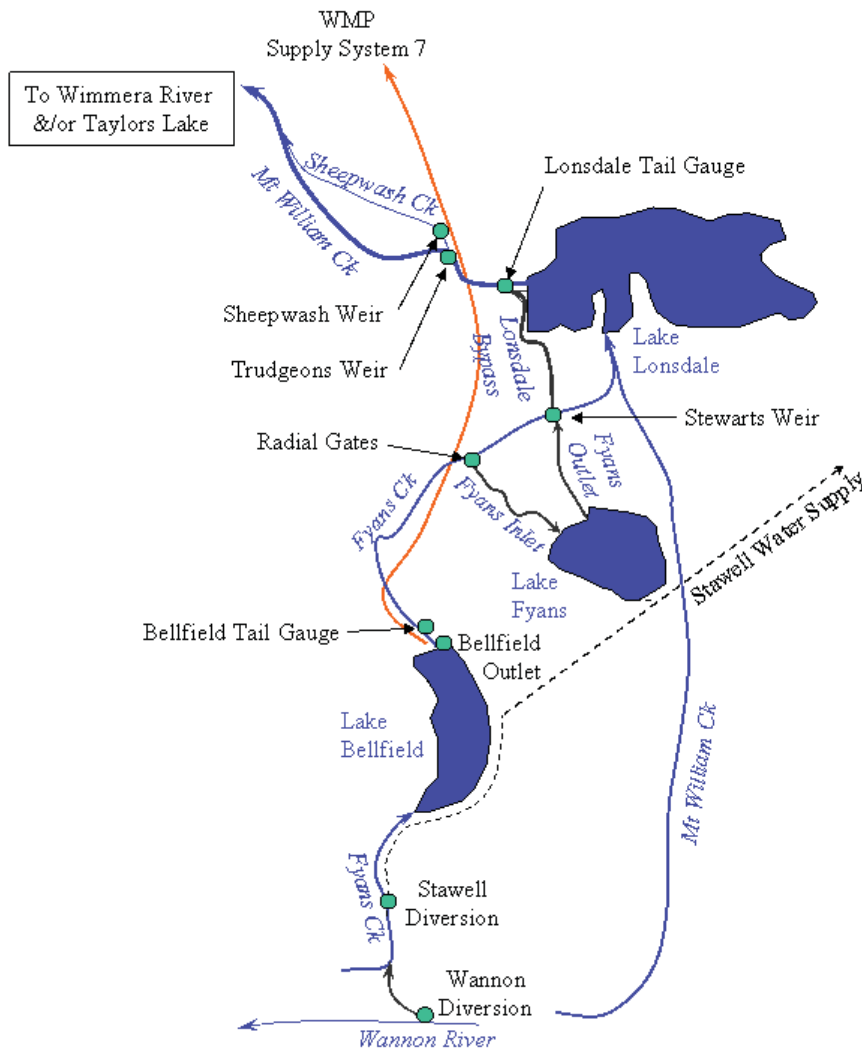
Glossary

AHD - Australian Height Datum, used for altitude measurement. Zero is the mean sea level for the period 1966-68.

Freeboard - Height between maximum design operating level and the top of the bank.

Full Supply Level - The maximum normal operating level of a reservoir behind a dam.

* - these rules are not subject to negotiation as they are necessary for water supply purposes.



9.4. Existing Values

Lake Fyans has a range of natural, cultural and recreational and tourism values including:

Natural values

Department of Sustainability and Environment databases indicate that the following flora species have been recorded at Lake Fyans

		Victorian Listing
<i>Caladenia versicolor</i>	Candy Spider Orchid	endangered
<i>Diuris daltonii</i>	Purple Donkey Orchid	Found in immediate vicinity of Lake Lakes reserve
<i>Quinetia urvellei</i>	Quinetia	rare
<i>Thelymitra luteocillium</i>	Fringed Sun Orchid	rare

Department of Sustainability and Environment databases indicate that the following fauna species have been recorded at Lake Fyans

		Victorian Listing
<i>Ardea modesta</i>	Eastern Great Egret	vulnerable
<i>Biziura lobata</i>	Musk Duck	vulnerable
<i>Gallinago hardwickii</i>	Japanese or Latham's Snipe	Near threatened
<i>Hallaeetus leucogaster</i>	White-bellied Sea Eagle	vulnerable
<i>Pomatostomus temporalis temporalis</i>	Grey Crowned babler	endangered

Cultural Values

The nearby Grampians has a long history of aboriginal occupation. Whilst extensive surveys and studies have been undertaken at Lake Lonsdale, this work has not been undertaken at Lake Fyans. Lake Fyans has been mapped as an area of cultural heritage sensitivity, under the Aboriginal Heritage Act 2006.

Recreational/Tourism Values

- a) Lake Fyans is a significant aquatic recreational facility used by those living in Stawell, Ararat and wider western district for over 100 years.
- b) In 2002 a study found that when the lake was holding 7,000 ML, i.e. half the Committee of Management's desired minimum water level (14,000ML) that recreational activity at Lake Fyans contributed in excess of \$4.095 million annually to the local economy. Using conservative multipliers, this equates to direct and indirect input in excess of \$12 million. Of this, 51% was the economic input related directly to the holiday resort. In terms of amenity, there were 46,686 recreational days spent at the lake in 2001/02. It was projected that should water levels increase to at least the Committee of Management minimum water level (14,000ML) then the annual recreation days would increase to 98,000 and the direct economic impact would exceed \$7.8 million. *(Note/this work is currently being updated, October 2011)*
- c) Suitable for a range of water based recreation activities including swimming, water skiing, canoeing, fishing and popular for duck shooting.

- d) Fish species targeted by anglers include trout (available all year round) and redfin (prevalent between November and April),

Source: Linqage International (2002) Lake Fyans – Its Contribution to the Local Economy.

9.5. Existing Legislation

Water Act 1989

Lake Fyans is managed under the *Water Act 1989*, in accordance with the provisions of the Bulk Entitlements for the Wimmera-Glenelg system.

Marine Act 1988

One of the main purposes of the *Marine Act 1988* is to provide for the efficient and safe operation of vessels on State waters. The Northern Grampians Shire Council is the boating authority for Lake Fyans.

Planning and Environment Act 1987

The purpose of the *Planning and Environment Act 1987* is to establish a framework for planning the use, development and protection of land in Victoria in the present and long-term interests of all Victorians.

At a municipal level, planning schemes are established including zones which determine permitted and prohibited to implement the State Planning Policy Framework and the Local Planning Policy Framework including the Municipal Strategic Statement and local planning policies.

Aboriginal Heritage Act

The aim of the *Aboriginal Heritage Act* is to provide for the protection of areas or items of cultural heritage significance within Victoria.

Aboriginal Affairs Victoria (AAV) is the primary agency that provides advice to the Victorian Government on Aboriginal issues and administers the legislation that protects Aboriginal cultural heritage. Martang is the Registered Aboriginal Party (RAP) applicants for the area containing Lake Fyans.

Lake Fyans and the surrounding reserve land is mapped as an area of Cultural Heritage Significance.

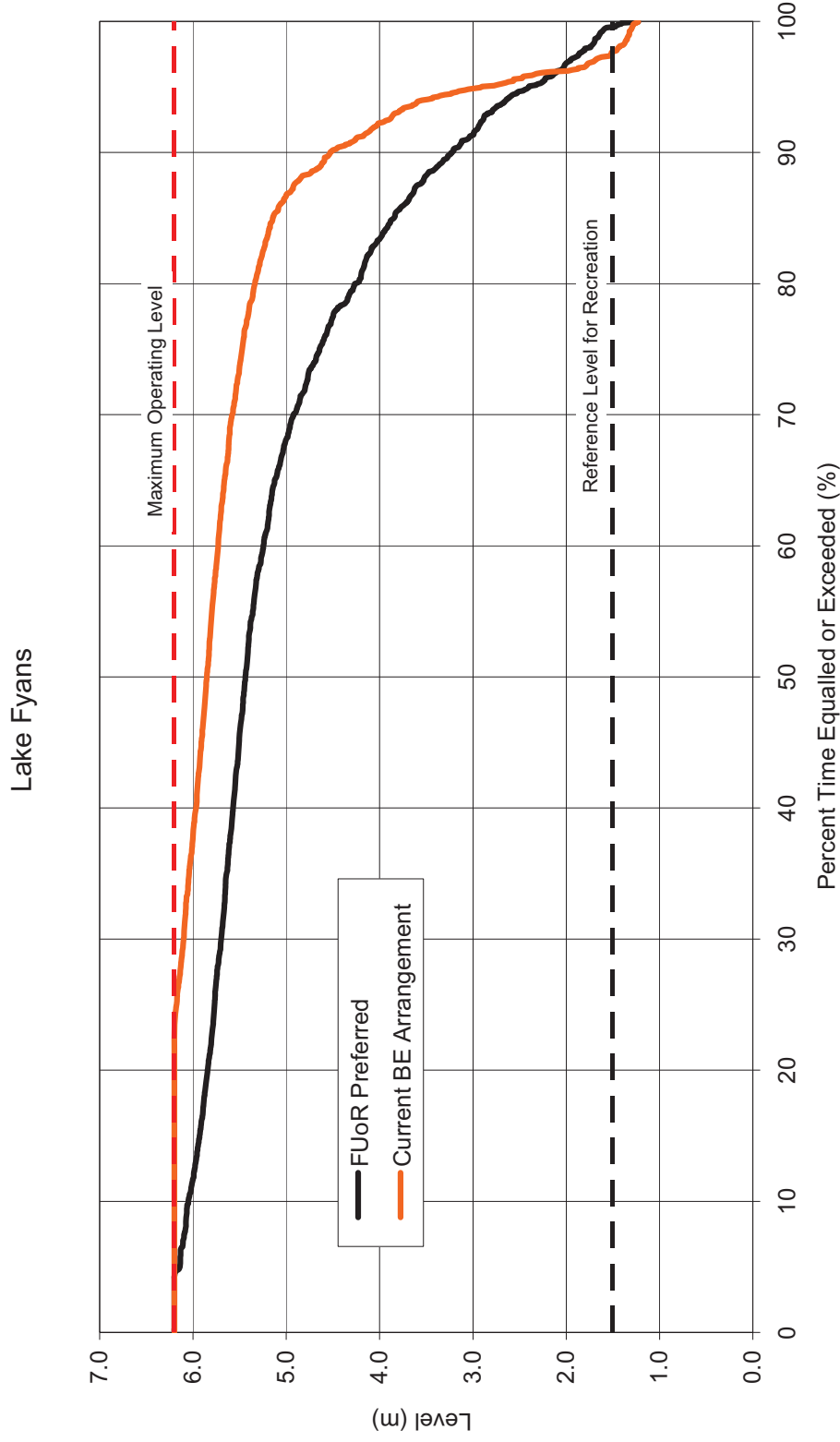
The implementation of the recommendations of this Management Plan will in some cases require actions to comply with the Act:

- a) A Cultural Heritage Management Plan (CHMP) must be undertaken if proposed works or activity are a 'high impact activity' according to the Aboriginal Heritage Act Regulations (i.e. road or bicycle track that extends for more than 500 metres, construction of three or more dwellings on a lot) and/or is within an 'area of cultural sensitivity' (i.e. lunette on eastern side of lake, 50 metres from registered cultural heritage place, 200 metres from waterway or prior waterway). Some activities are only high impact if they result in 'significant ground disturbance'.
- b) If a CHMP is not required, depending upon the impact other courses of action include a voluntary Cultural Heritage Plan, a basic agreement with the RAP on the management of Aboriginal Heritage Issues for the project may include actions such as a site monitor present during works.

Other Acts

- a) *Environment Protection and Biodiversity Conservation (EPBC) Act 1999* - This act requires that an action that is likely to have a significant impact on a matter of national environmental significance requires approval from the Federal Environment Minister.
- b) *Flora and Fauna Guarantee (FFG) Act 1988* - This is the primary legislation for the protection of flora and fauna in Victoria. The purpose of the Act is to protect and conserve a wide range of species and communities, manage threatening processes, maintain genetic diversity and encourage cooperative management.
- c) *Victorian River Health Strategy 2002* – This strategy provides an overview of government policy relating to the management of activities affecting river health, including environmental flows and water allocation.
- d) *National Strategy for the Conservation of Australia’s Biological Diversity 1998* – This strategy relates to the conservation of biodiversity, the sustainable use of its components and the equitable sharing of benefits arising out of the utilisation of natural resources.
- e) *Victoria’s Biodiversity Strategy 1997* – This strategy is essentially a state analogue of the commonwealth strategy, providing for the conservation of biodiversity in Victoria.
- f) *Catchment and Land Protection Act 1994* - Aims to set up a framework for the integrated management and protection of catchments and set up a system for the control of noxious weeds and pest animals.
- g) *Fisheries Act 1995 and Wildlife Act 1975*
- h) *Environment Protection Act 1970*
- i) *Litter Act 1983*
- j) *CFA Act 1958*

9.6. Lake Fyans Operating Level



Key Points: Modelling indicates:

Lake Fyans will have a suitable water level for recreation (1.5 metres) in at least 95% of months
 In 5 % of months the suitable level for recreation will be marginal

Note/ FUoR = Future Use of Reservoirs preferred operating rules (2007)
 Current BE arrangement = Wimmera Glenelg Bulk Entitlement (2010)

References:

Clark, I.D (1990) Aboriginal Languages and Clans: An Historical Atlas of Western and Central Victoria, 1800-1900. Monash Publications in Geography no. 37.

Linguage International (2011) Lake Fyans Economic Input to the Regional Economy