Proposals for restoring Lake Jualbup

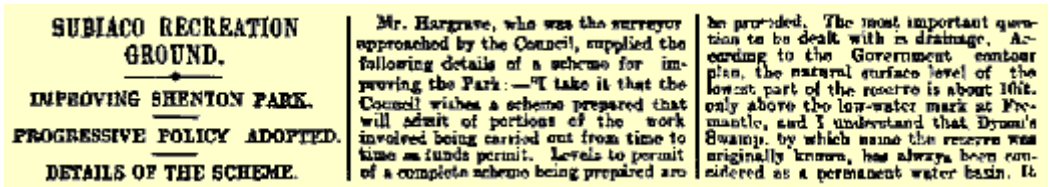
A concept plan from a group of Shenton Park residents, convenor Allan Stoney, May 2011

This October 2015 update repeats the original proposals, most of which were adopted by Subiaco Council at its February 2012 meeting. At the end is a map of the adopted restoration for comparison.

As shown by four petitions to Subiaco Council during 2001-2008, and more recently by letters to the POST, there is strong community support for restoring Lake Jualbup to its former glory – to a time when its water and wildlife were a year-round delight to young and old. But is restoration possible? What should it involve? In November 2010 we presented draft proposals to a meeting of local ratepayers. The proposals listed here are the outcome of that meeting. But first, four myths:

Myth 1.The lake is short of water. **Wrong.** Each year it gets enough water from storm runoff (left) and pumpage from Aberdare Rd (right) to fill it about eight times. Most of it leaks away through the lake floor. So, to fill the lake, just plug the leak.

Myth 2. The lake is a natural wetland. **Wrong.** The lake is man-made. Originally a wetland, it was Subiaco's rubbish tip from the 1910s until bulldozed in 1956. ***Left:*** Aerial view of the tip c.1940 looking south (photo from Subiaco Museum). Thirty years of rubbish tipping has filled nearly half the wetland. ***Right:*** Same in May 2008 (photo from Google Earth). The grassed areas, big trees and eastern half of the lake are all on reclaimed land. The island was made in the 1970s. Lake Jualbup today is a man-made holding pond for road runoff that would otherwise overwhelm the road drains.



SUBIACO RECREATION GROUND.

IMPROVING SHENTON PARK.

PROGRESSIVE POLICY ADOPTED.

DETAILS OF THE SCHEME.

Mr. Hargrave, who was the surveyor approached by the Council, supplied the following details of a scheme for improving the Park:—"I take it that the Council wishes a scheme prepared that will admit of portions of the work involved being carried out from time to time as funds permit. Levels to permit of a complete scheme being prepared are be provided. The most important question to be dealt with is drainage. According to the Government contour plan, the natural surface level of the lowest part of the reserve is about 10ft. only above the low-water mark at Fremantle, and I understand that Dyson's Swamp, by which name the reserve was originally known, has always been considered as a permanent water basin. It

Did the lake dry up in the early days? Not according to these snippets from the *West Australian* 30 March 1905. *From the NLA archive.*

Myth 3. Restoring permanent water is an irresponsible dream. It shows no concern for the environment or for climate change. The lake should be allowed to dry out as shown below.

Wrong. When the lake dries out it is invaded by foreign weeds ***left*** that can reach shoulder height. When the rains come, ***right,*** the weeds rot, the lake stinks, water quality drops, and seeds survive for a bigger crop next year. ***Left,*** in 2011 the council was forced to spray the entire dry lake bed with herbicides, killing the weeds – and also the plants needed by bottom feeders, hardly a desirable outcome. A dry lake has almost no wildlife and the island sanctuary is open to dogs and children. Drying out in an urban environment is not a sensible option.

In February 2005, Subiaco's environmental consultants wrote: *"Visitors can still get to enjoy the wildlife by using the viewing platform constructed to the east of the lake".* Yes, but what lake? What wildlife? What enjoyment?

Did you really want more of this?

Myth 4. The lake is purely an environmental issue.

Wrong. The lake is an iconic community asset surrounded by urban development. People need the lake as much as wildlife does. So its future is not "purely an environmental issue" – it is a community issue.

Some topics such as toilets are not covered by our proposals because they are already covered by existing council plans.

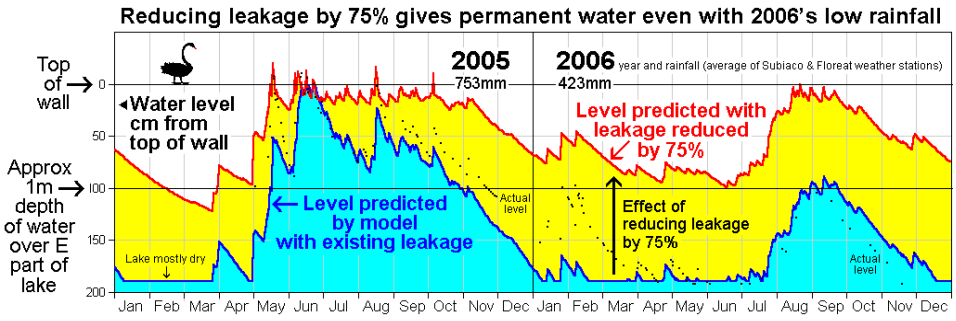
Our proposals (in red) for restoring Lake Jualbup

These proposals have one aim – to restore the character of the lake and park

Ensure permanent water

Replace the natural seal lost by dredging. Naturally occurring clays such as bentonite have long been used to seal farm dams in sandy soils. Synthetic polymers are cheaper and were originally considered. But the lake was found to leak mostly around its sandy edges where natural clays are more easily applied (and automatically as part of the planned infill next to the walls to make the lake safer, see below), for details and pictures see Follow-Up to Our Proposals.

How much treatment is needed? Research by Dr Geoffrey Dean, a local resident formerly with the Soil Bureau in NZ and CSIRO Soils Division in Perth, suggests that reducing leakage by 75% will allow the lake to retain water year-round and function naturally even with 20% less rainfall. From his daily measurements of lake level in 2008 and 2009 he derived a computer model that allows lake level to be predicted from daily rainfall. Here are the model's predictions for 2005 and 2006



◀ The model predicted the lake would flood in June 2005, a year with above average rainfall. And it did. In June 2005 the flood was >10 cm deep over the footpath. The following year 2006 happened to have very low rainfall (20% lower than in 2010) and the lake was dry for nearly six months. Dr Dean's ◀ model predicts that reducing leakage by 75% would have led to year-round water never less than a metre deep over the eastern part.

Above: Dots show the actual levels recorded independently by Allan Stoney. Each rainfall causes a peak in the plots, and the predicted peaks accurately coincide with the actual peaks. Predicted levels can differ from the actual levels, but for a good reason – pumpage from Aberdare Road cannot be exactly predicted, so the model has to use an average. For more than 600 predictions of level from Jan 2005 to Dec 2010 the average error was only 15 cm. As expected, reducing leakage also increases flooding over the footpath, which is normally limited by the outlet. Therefore to minimise loss of water via the outlet, a balance between leakage and outlet conditions is needed, best achieved (in view of the many unknowns) by proceeding in stages. For details click **Hydrology** on the home page. The model has been judged OK for the purpose by hydrologists at CSIRO, Water Corporation, Fisheries, Dept of Water, and Rockwater.

Raise the outlet

to reduce water being lost to the ocean. Less leakage means more flooding over the footpath but this will eventually soak back into the groundwater, as in 2005.

The deciding design factor is the maximum intensity of rain + runoff + pumpage expected in a **100-year event** (about 350 mm/hr), which means that any changes to leakage (max 5 mm/hr) will have negligible effect. So the Water Corporation's modelling that requires the present outlet height still applies regardless of any changes to leakage. An alternative to raising the outlet would be a barrier across the outlet that could be opened as needed.

Repair or rebuild the existing wall

The existing wall suffered from years of neglect. But the City has now begun to repair it. Where necessary, concrete fill is placed behind the wall without disturbing the lake bed.

Build calming chambers around inlets to stop incoming water eroding the lake floor, and to remove any rubbish it may contain. If roads are dry, about 2 mm of rain are needed before runoff occurs. Water then reaches the lake very quickly.

◀ Shown is the inflow five minutes after a 10-minute storm had dumped 6 mm of rain.

Replace slab path around the lake's edge with a wider concrete path, allowing everyone to safely enjoy the relationship with water and wildlife. For most visitors, especially those with children, the lake's most-appreciated feature is not being isolated from its water and wildlife by a wall of scrub.

Form graded shallows out from the eastern edge of the island, and planted with non-invasive rushes and sedges to create varying water depths during the year for wading birds (about eight wading species are regular visitors), and to improve water quality.

Replace weeds in NE corner with non-invasive rushes and sedges to extend the above improvements.

◀ Photo shows sedges in the distance and grassy weeds in the right foreground.

Keep access ramps for young wildlife and long-necked tortoises i.e. no change. But reduce access to the island (as shown here and in Replace slab path) to minimise intrusion by dogs and children.

All dogs entering the reserve must of course be on a leash. But some dog owners seem not to care, with distressing results.

Reduce depth of lake next to wall Add to existing fill around lake edge to reduce maximum water depth at wall to around 0.7 metre. This will also make the wall stronger and easier to maintain.

Terrace NW area to provide natural spectator seating, with shade for the disabled, at concerts and activities on the level areas.

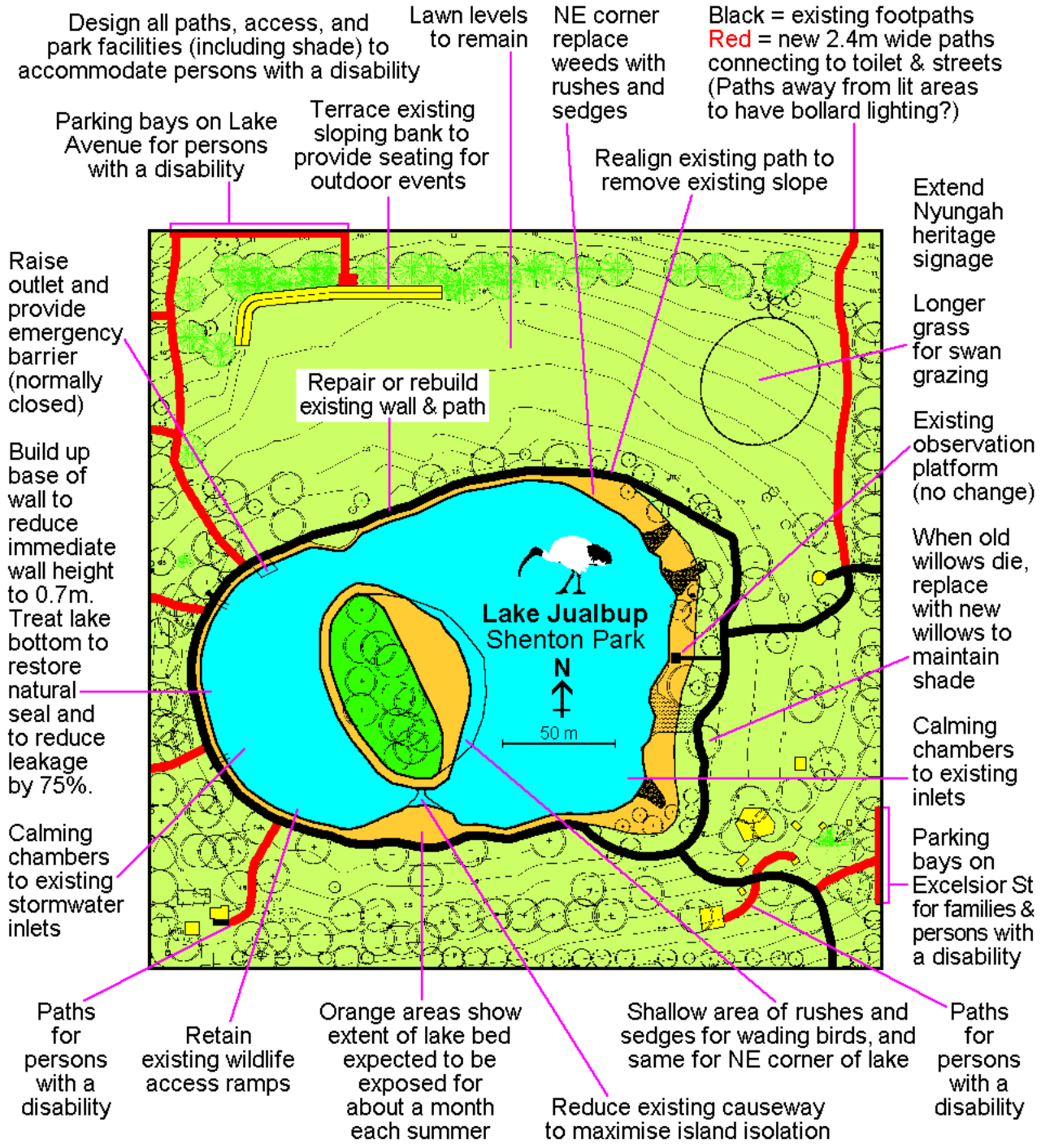
Plant new willows when old willows die to ensure continuity of shade around the water's edge. As noted in the Ecoscape (2003) environmental report on Mabel Talbot in Jolimont, willows *"have beautiful form and substantially contribute to the reserve's aesthetics"* (p.36). Most public parks have a mix of native and exotic plants that provide both environmental and visual diversity. Willows provide a very visual way of experiencing the seasons, and drop no more leaf litter than native trees.

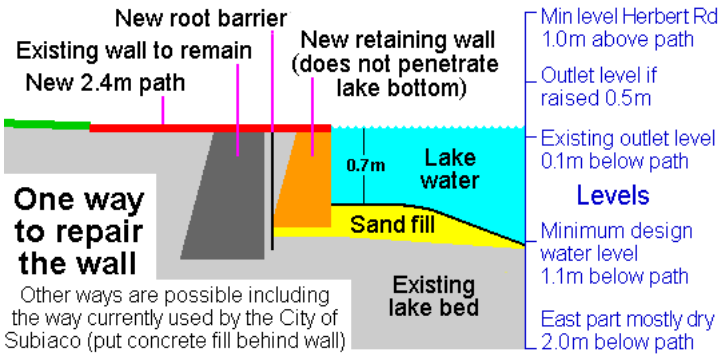
Longer grass for grazing swans
Let some lawn grass grow longer to provide grazing for swans. In fact the rest of the reserve might benefit from less severe mowing – longer grass is environmentally sound, conserves water, and is softer to walk on.

Aboriginal heritage
Consult with the Nyungah community and obtain approval from the DIA, see **Aboriginal Heritage** on home page. Clean iron stains from existing sign, add more signs (as in Kings Park) explaining Nyungah connections.

Universal enjoyment
The park should be **accessible to all** including persons with a disability.

Putting it all together





The present **footpath circuit** is about 700 m (2.3 laps = 1 mile). About 90% of the footpath next to water is within 10 cm of the average path height. When full, the water area is about 26,000 sq m, volume is about 42,000 cu m (enough to fill 17 Olympic-size swimming pools), average depth is about 1.6 m (maximum about 2.0 m). **Waterbirds** (mostly ducks, coots) average about 40 in winter and can reach 400 in season. For comparison the number of waterbirds at Lake Monger (30x the water area) was 4584 in Jan 1992 according to Storey et al, *Waterbird usage of wetlands on the Swan Coastal Plain*, EPA 1993:29.

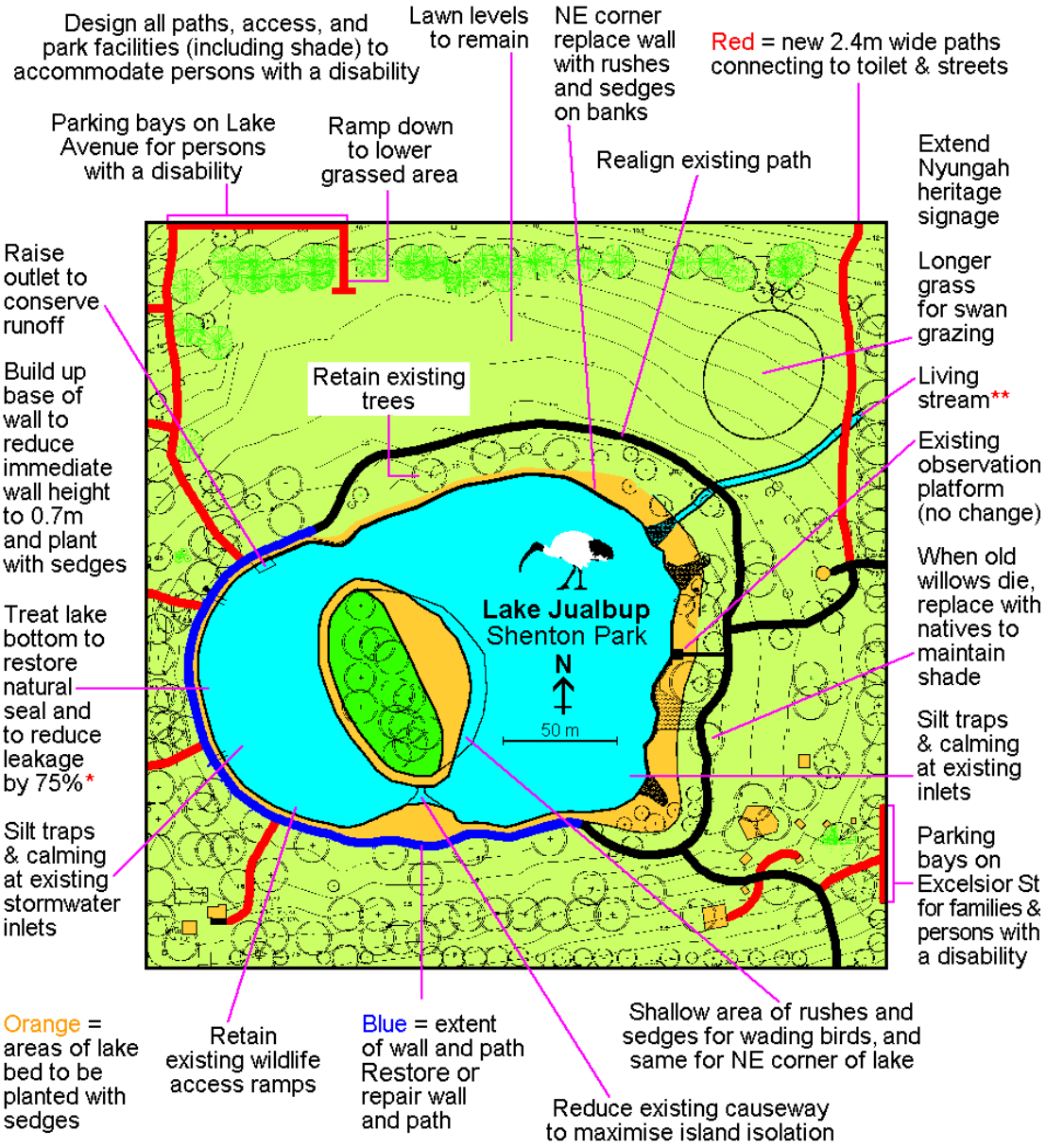
How to pronounce Jualbup

Not Joolbup or Joolbup or Jualbup or Jualbup or Jooberlup but Jowlbup (rhymes with owl)

With thanks to Denise Smith-Ali, language teacher and project officer at the Noongar learning centre

Restoration of Lake Jualbup

adopted by Subiaco council 28 February 2012



Main differences from SoJ proposals are: retaining only the wall shown in blue, realigning path along northern edge, no tiered seating in NW corner, even more reeds and sedges.

***Treating the lake bottom** involves reducing the overall permeability of the lake by around 75%. SoJ's original idea was to achieve this by sprinkling a white insoluble powder on the lake's surface when full. The powder was a polymer that slowly sinks to the bottom, is drawn into porous areas, and expands to reduce permeability. But SoJ subsequently found that the lake leaked mostly through its perimeter sand areas, and not through its largely impermeable sludge areas that occupied up to 80% of the lake area. The sand perimeter was more easily and more efficiently treated by adding a natural clay such as bentonite to the planned buildup of the base next to the walls, whose actual horizontal extent is a matter for experiment. By partially (not completely) reducing permeability, permanent water can be retained in most years. Water will continue to flow to the underlying aquifer but at a slower rate.

****Living stream** is a rocky stream bed densely planted with reeds and sedges over which the road runoff in this area will flow to the lake instead of through an underground pipe. The actual location of the living stream may differ from SoJ's suggestion shown above.