

23 March 2020

Our ref: 20SYD-15546

Universal Property Group
c/-Bathla Group
PO BOX 270
Wentworthville 2145

Attention: Graeme Allen

Dear Graeme,

Dam Decommissioning Plan – 182 Guntawong Road Riverstone (Lot 4 DP 30186)

Eco Logical Australia (ELA) was engaged to prepare a Dam Decommissioning Plan for the property at 182 Guntawong Road, Riverstone. Following a visit to the site on 6 March 2020 and receiving the results of water quality samples collected during the visit, ELA has prepared a Dam Decommissioning Plan suitable for submission to Blacktown City Council to satisfy Contention 8 'Dam Dewatering' of the Statement of Facts and Contentions 2019/00390447.

If you have any questions regarding the content of this plan, please feel free to contact me on 9259 3712.

Kind regards,



Claire Wheeler
Aquatic Ecologist

1. Dam and catchment characteristics

At capacity, the surface area of the dam at 182 Guntawong Road, Riverstone, is approximately 2200 m² with a maximum depth estimated at 2 m and an approximate catchment area of 10 ha. The dam could potentially hold 1.76 ML (0.4 x Surface Area x Depth / 1000). The surrounding land is semi-rural, in the process of being urbanised. The drainage slopes from north east to south west at a slope of approximately 7%. The dam is online, but the nearest significant creek is First Ponds Creek, a 3rd order stream located approximately 390 m downslope to the west.

2. Likely contamination issues

The water quality results are outlined in Table 1. Heavy metals and faecal coliforms are below ANZECC trigger values. This water is suitable for irrigation and secondary human contact. Total phosphorus, total nitrogen, NO_x and ammonia concentration exceed ANZECC guidelines. Dissolved oxygen was outside of ANZECC guidelines and turbidity and conductivity exceed the ANZECC guidelines. All other physicochemical parameters are inside the guideline range.

Table 1: Water quality results and reference guideline values

Analyte	Dam 6/3/2020 10:40am	Guidelines	Units
Total Metals (water)		ANZECC (1)	
Arsenic (As III / As V)	0.001	0.024 / 0.013	mg/L
Cadmium	<0.0001	0.0002	mg/L
Chromium (Cr VI)	0.001	0.001 (VI)	mg/L
Copper	<0.001	0.0014	mg/L
Lead	<0.001	0.0034	mg/L
Mercury (inorganic)	<0.0001	0.0006	mg/L
Nickel	0.001	0.011	mg/L
Zinc	<0.005	0.008	mg/L
Nutrients		ANZECC (2)	
Ammonia as N	0.18	0.02	mg/L
Nitrite + Nitrate as N (NO _x)	0.06	0.04	mg/L
Total Kjeldahl Nitrogen as N (TKN)	1.3		mg/L
Total Nitrogen as N (NO _x + TKN)	1.4	0.35	mg/L
Total Phosphorus as P	0.08	0.025	mg/L
Biological		ANZECC (3)	
Faecal Coliforms	200	1000	CFU/100mL
Physicochemical		ANZECC (2)	
Temperature	24.28		°C
pH	8.31	6.5 - 8	pH units

Analyte	Dam 6/3/2020 10:40am	Guidelines	Units
Dissolved Oxygen (% saturation)	72.3	85 - 110	% sat
Dissolved Oxygen (mg/L)	5.95		mg/L
Turbidity	78.8	50	NTU
Oxidation reduction potential (ORP)	133.5		mV
Conductivity	892	300	µS/cm
Salinity	0.38		ppt

*values in bold outside ANZECC trigger values

(1) 95% Level of Protection for Freshwater.

(2) Default trigger values for lowland rivers in south-east Australia (values for NSW & Vic east flowing coastal rivers).

(3) Guidelines for recreational water quality and aesthetics: Secondary contact.

3. Method of dewatering and fate of water

The dam is online, in that it is directly connected to a mapped watercourse. Dewatering of the dam is recommended prior to site earthworks to allow irrigation over vegetated land. The decommissioning of this dam is expected to take no longer than a week and the works could be completed at any time of the year, provided that daytime temperatures do not exceed 36 °C. It is recommended that water be used to irrigate the grass area on the southern side of the dam prior to the removal of any vegetation or disturbance of the land (see Figure 1). The intake pipe should be caged to minimise injury to aquatic fauna. Pumped water should be released at the highest ground and allowed to infiltrate the soil with minimal overland flow (estimated irrigation rate of 36 mm/hr, however this can vary with soil conditions). If soil becomes saturated, irrigation should be adjusted accordingly. Sediment controls (e.g. silt fence or hay bales) are recommended to filter sediments from any excess overland flow and prevent water flowing back into the dam. It may take 2 - 3 days of pumping to remove the free-standing water, and an extra day to pump the muddy water. Bottom sludge material and any remaining turbid water should be excavated and dried on site. Fauna relocation would occur on the final day (last 0.3 m of free-standing water).

4. Timeline

Table 2: Proposed dam decommissioning timeline

Day 1	Day 2 – 6 (or longer)	Day 7	Day 8 – 9	Ongoing
<p>Install bunds to divert surface flow. Install erosion controls (e.g. silt fence, hay bales and/or geotextile fabric) and prepare pump pad. The pump intake head is best positioned on a floating device above the deepest part of dam, held in position with ropes spanning the dam. It is difficult to move the pipe when the water is low, so it's easiest to install when dam is full. Test discharge and diversion to ensure no erosion/sedimentation occurs downslope or downstream. Avoid disturbing vegetation (grass) where water will travel. Notify Aquatic Ecologist.</p>	<p>Pump water and irrigate overland at a rate that allows infiltration to the soil.</p> <p>Check sediment controls if irrigation saturates soil causing surface runoff. Adjust pumping rate to slow runoff.</p> <p>Update Aquatic Ecologist.</p>	<p>During dewatering of final 0.3 m of observable water, allow Aquatic Ecologist to rescue fauna in one day.</p> <p>Water will become turbid as levels drop and when ecologists wade over muddy bottom. This water should be discharged away from drainage lines. To allow rapid fauna rescue, pump inlet needs to be large enough to suck sediment (e.g. 4 - 6 inch). Earthworks machinery can push sediment across the dam to assist final fish capture (adjusted to suit conditions and ecologist's instructions).</p> <p>Partially remove wall to prevent re-filling. Stabilise if needed. Grade escape ramp for overnight escape for fauna hidden in the mud, such as turtles and eels which can move overland.</p>	<p>Leave escape ramp for fauna hidden in sediment (two nights).</p>	<p>Remove sediment and wall and commence remaining earthworks</p>

5. Dam Decommissioning Work Method Procedure and Sediment and Erosion Control

The process of decommissioning the dam should be in accordance with the Contractor's/Proponent's specifications as well as recommendations in this report. Placement of erosion and sediment controls has been suggested in the proposed site layout in Figure 1.

6. Appropriate permit applications

This dam removal is part of a DA. If the dam is licensed with WaterNSW, they will require notification of dam decommissioning to remove it from the register. Contact details are as follows:

- Website: www.water.nsw.gov.au/Water-licensing/Applications/default.aspx
- Email: water.enquiries@dpi.nsw.gov.au
- Phone: 1800 353 104.

7. Presence of fauna (terrestrial and aquatic) and action plan for any species detected.

A brief field survey (06/03/2020) identified a number of aquatic plant species growing around and within the dam, including the native species *Typha orientalis* (Cumbungi) and a weed of regional concern, *Juncus acutus* (Sharp Rush). No fauna were observed while on site, however it is predicted that the following native aquatic fauna could inhabit the dam: *Anguilla australis* (Shortfin Eel), *Anguilla reinhardtii* (Longfin Eel) and *Chelodina longicollis* (Eastern Long-necked Turtle). The following pest aquatic fauna have the potential to occur: *Carassius auratus* (Wild Goldfish), *Cyprinus carpio* (European Carp) and *Gambusia holbrooki* (Plague Minnow).

8. Fauna handling procedures

During dewatering, an aquatic ecologist should be on site to handle aquatic fauna. This will only be performed by a person with the following licenses/approvals:

- Section 37 *Fisheries Management Act 1994* (for fish)
- Biodiversity Conservation Licence – *Biodiversity Conservation Act 2016* (for turtles, frogs, wetland birds) (may not be required if the DA Conditions specify an Aquatic Ecologist is to be involved)
- Animal Research Authority (issued by the Secretary's Animal Care & Ethic Committee).

The proposed **aquatic fauna handling procedures** are:

1. **NOTICE:** The Aquatic Ecologist is to notify NSW Fisheries of the activity 48 hours prior to fish relocation (unless an agreement is in place), including locations of dewatered and relocation sites

(see regional office contacts <https://www.dpi.nsw.gov.au/contact-us/local-office>). Fisheries require permits to be carried by the licensed ecologist; who should also display a sign clearly showing licence number (if working in public areas, especially when releasing fauna to local creek).

2. **PLANNING:** The dewatering schedule should allow time for fish rescue, especially during the final 0.3 m water depth (to be advised by Aquatic Ecologist). Fauna should be captured in one day, so pumps need to be of an adequate size and placed in an area free from mud and debris (e.g. inside excavator bucket or screened sump pit). If wetland birds are observed nesting, or young birds (chicks) are using the dam, advise the Aquatic Ecologist immediately for guidance. Depending on species and age, birds may be able to relocate themselves. Chicks will need temporary refuge during dewatering; or works may need to be postponed.
3. **CAPTURE:** Fish are to be collected by hand nets during the final day of dewatering. This is most effective when the water is <0.3 m deep. Dissolved oxygen concentration will drop rapidly as water volume decreases, especially in warm water or if lots of fish are present. Larger bodied fish should be targeted first. Wetland birds will scavenge for small fish in the shallows (e.g. *Gambusia*). Most small fauna will likely remain uncaptured in the dam until the water becomes very shallow (especially eels and turtles). Eels are best captured by large hand nets in water <0.3 m deep, although they burrow into mud. When the water is extremely low, turtles and fish may head towards the intake pump (placed in deepest part). This area should be monitored to intercept fauna (e.g. stand in water next to intake). Turtles will burrow into mud and may require observation and rescue the following morning but can also move themselves to suitable nearby habitat if an escape ramp is graded. For safety, at least two people are required when wading and handling heavy tubs of water/fish up banks (excavator can dig access steps/ramp).
4. **RELOCATE:** Native fish healthy enough for relocation are to be contained and transported in an aerated tub/bucket/tank to an appropriate dam/lake/waterhole/creek. It is recommended that native species are relocated to nearby Second Ponds Creek, accessed from Greenview Parade, The Ponds. NSW Fisheries advise that the host location should be large enough to accommodate additional fish, especially predatory eels. If a large number of predatory fish such as *Anguilla reinhardtii* are captured during the aquatic fauna relocation process, an additional release point may be required. A publicly-accessible section of First Ponds Creek, adjacent to Windsor Road may be suitable. Tubs should not be overstocked or left in direct sun for extended periods. Aeration can be provided by battery aquarium pumps or manual turbulence if only stored for a short period. Turtles can be transported in a shaded tub with a wet hessian bag placed inside for moisture and support during transport. Tadpoles can be transported in small buckets.
5. **RELEASE:** Water from the receiving waterbody should be mixed slowly over 5 - 10 minutes with the tank water to allow fish to acclimatise to the new water quality. Care should be taken when releasing fauna not to also transfer weeds or invasive species (e.g. Carp eggs and *Gambusia*). Animals should be transferred via hand nets, rather than directly pouring them from the tub. Eels can be released on land a few metres from edge and pointed towards the water. The number of each species are to be counted upon release and later incorporated into the summary report.

6. **PESTS:** Exotic fish (e.g. Carp, Gambusia, Goldfish, Redfin Perch, Spotted Livebearer) are to be intercepted, euthanised and disposed of in accordance with the ecologist's Animal Research Authority (issued by the Secretary's Animal Care & Ethic Committee). Exotic *Trachemys scripta* (Red-eared Slider Turtle) are to be contained humanly and Department of Planning, Industry and Environment (DPIE) immediately notified (Environment Line - 131 555). They will collect the live turtle from the ecologist. A tally of the number and species of animals euthanised would be recorded and later incorporated into the summary report.
7. **POST-DEWATERING:** An escape ramp should be graded to allow trapped fauna to escape overnight. Sediment should be left up to two nights to allow hidden fauna to emerge, unless the ecologist confirms there are no fauna remaining (site specific assessment). Earthworks staff should notify the appointed aquatic ecologist if stranded fish or turtles are observed post-dewatering.
8. **REPORTING:** The Aquatic Ecologist should prepare a summary report suitable for submission to Blacktown City Council's Natural Areas Team within 14 days of completing the aquatic fauna relocation works. The report would detail that the works have been completed in accordance with this Dam Decommissioning Plan and would include information relating to the location of the dam decommissioning works, the licences held by the staff involved in the works, the number and type of native species relocated, location of release point/s for native fauna and the number and type of exotic species dispatched.

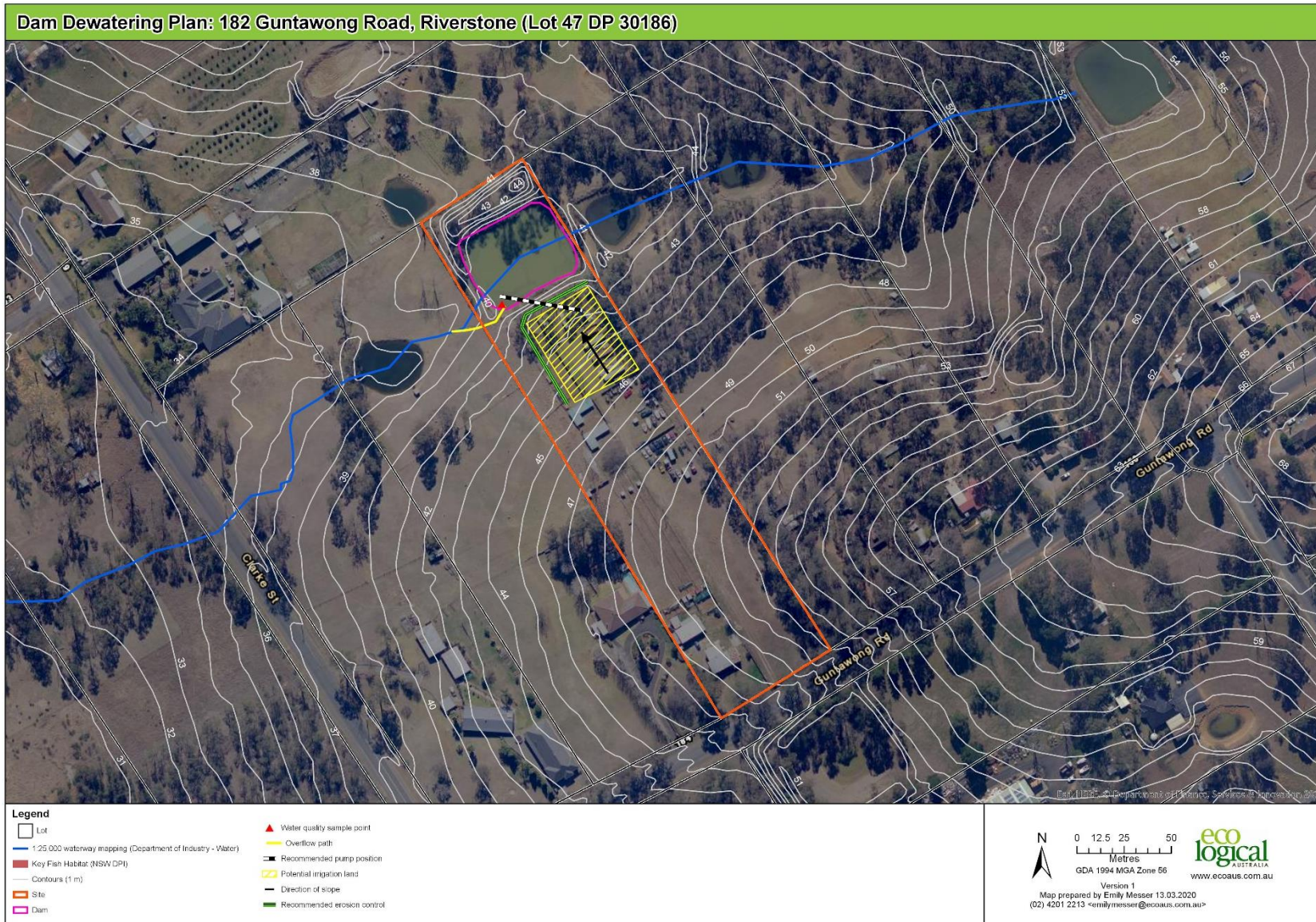


Figure 1: Suggested site layout for dam dewatering