FFVS Crossley Native Fish and Yabby Biosecurity and Health Management Plan

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Business details

Trading name: Old Gold Fisheries

Applicant name: Martin Crossley

Aquaculture Permit:

EPA Licence Number: TBA

All Permits Holder name: Martin Crossley

Farm manager name: Martin Crossley

Postal Address: 6 Reno Rd, Jones Creek, NSW 2722

Aquatic veterinarian: Dr Matt Landos, Future Fisheries Veterinary Service Pty Ltd

NSW DPI Aquatic Biosecurity Contacts for reporting unexpected mortalities and suspicions of prohibited and notifiable matter: (02) 4982 1232; 1800 675 88 (Emergency Animal Disease and Pest Hotline); Jeffrey Go (0418 482 951); Melissa Walker (0439 312 095); Emma Wilkie (02) 4916 3845.

General location and maps

The farm site is located approximately 3.5km along Reno Rd from the junction with Burra Rd which runs back to the nearest town, Gundagai, NSW.

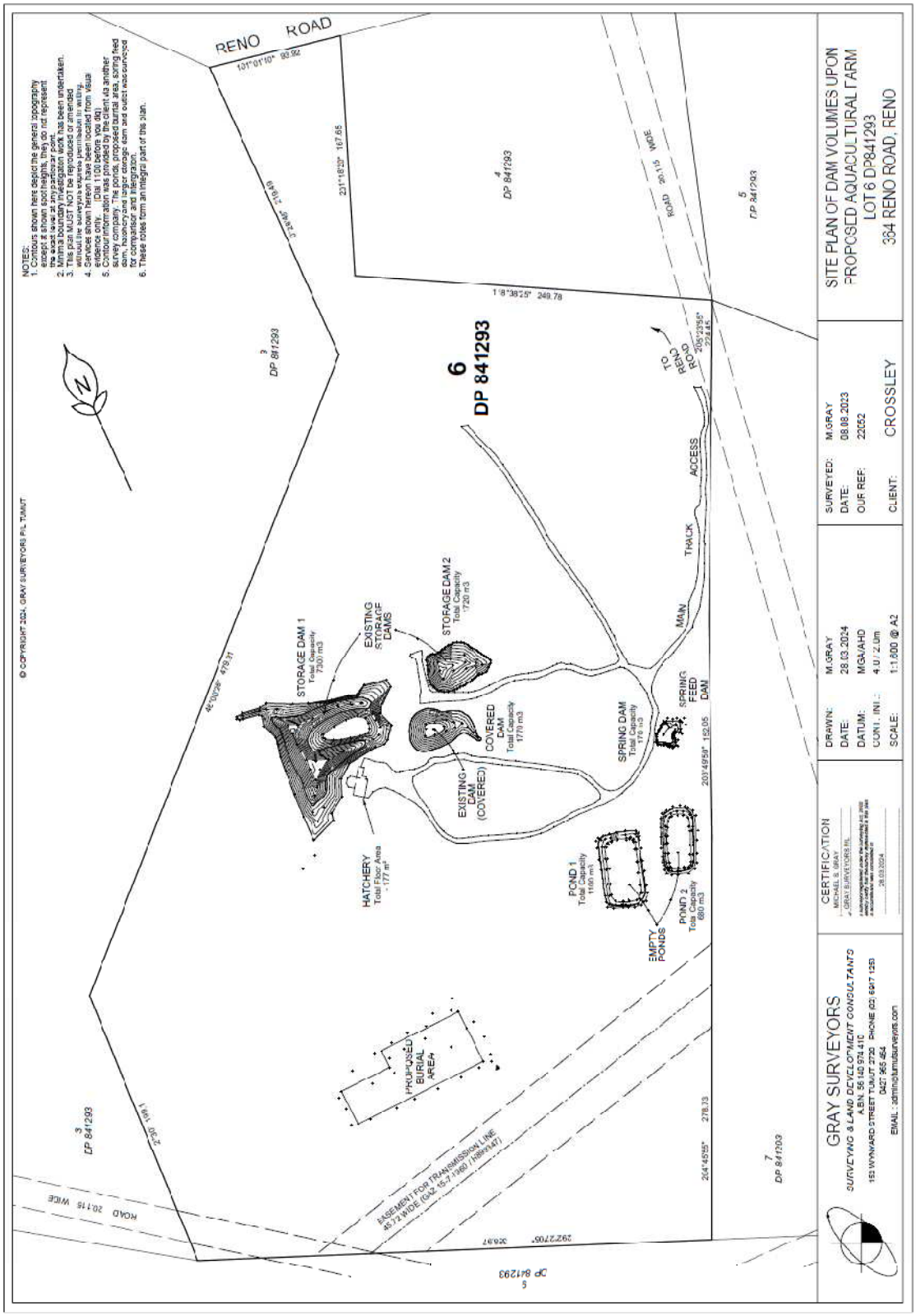


Figure 1: Site plan with dam volumes

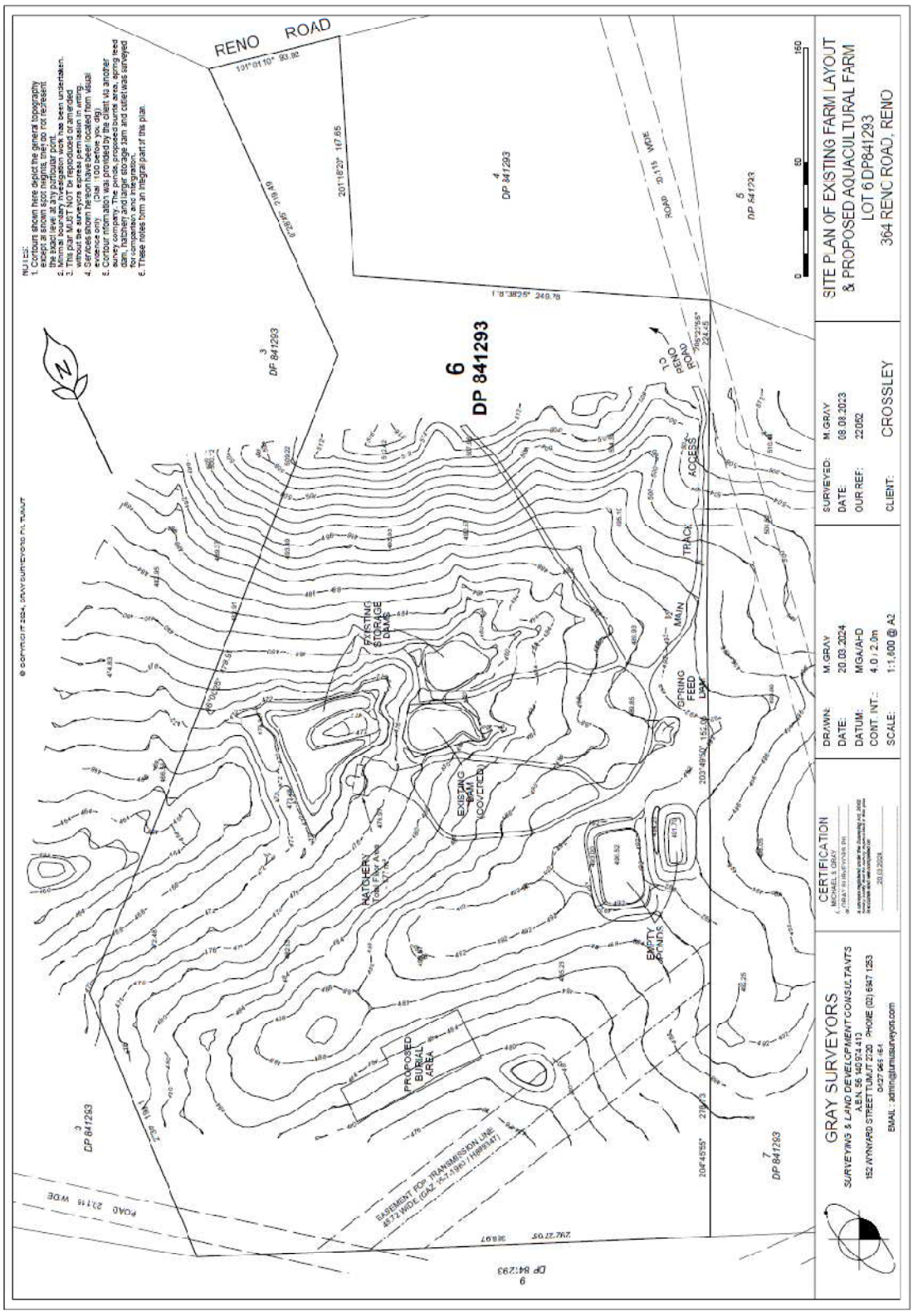


Figure 2: Topographic site plan Old Gold Fisheries

Figure 3: Satellite Google Earth Image of Old Gold Fisheries Proposed Hatchery Site (hatchery building yellow arrow)

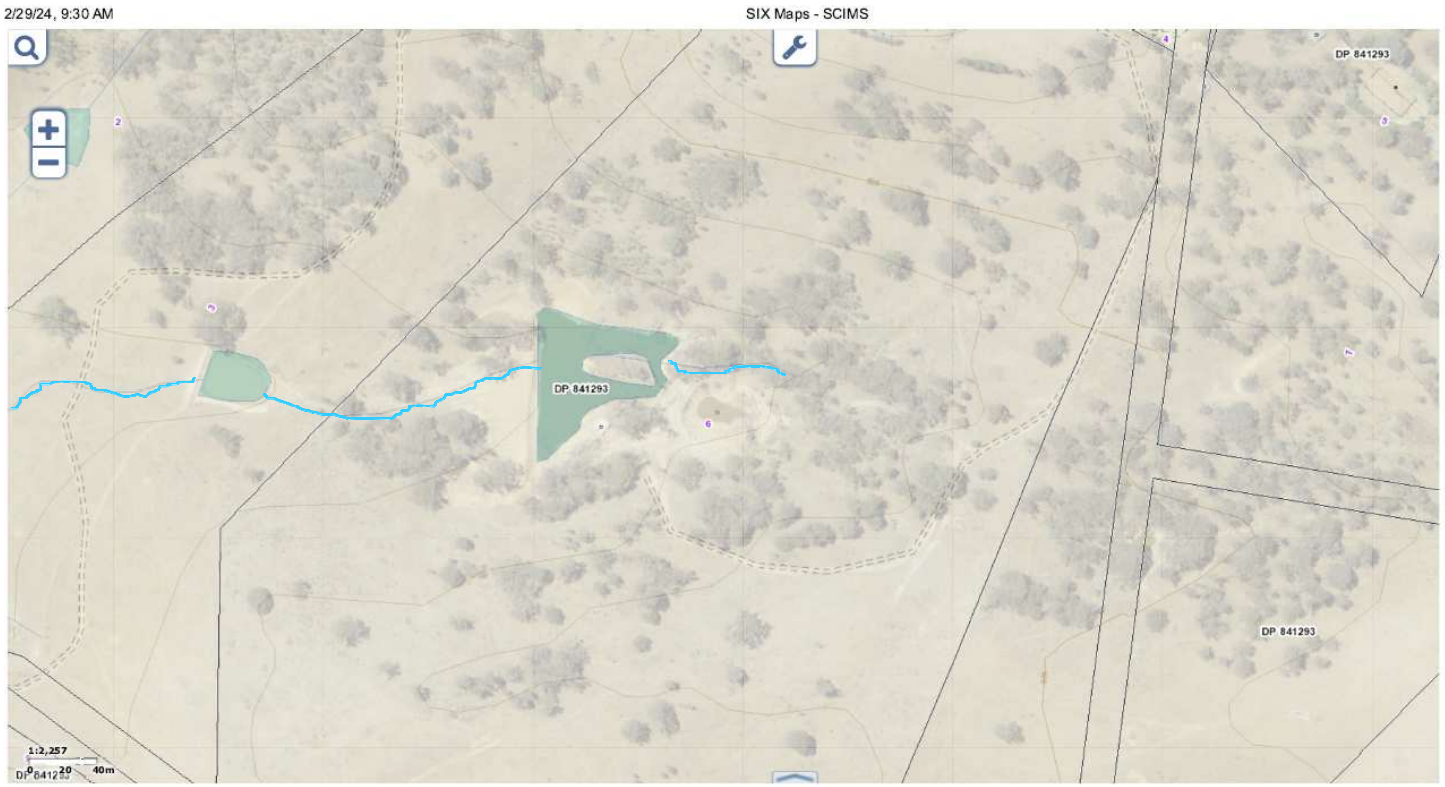


Figure 4: Location of storage dams and designated water course-image source: https://maps.six.nsw.gov.au/scims.html?config=scims$token=754b169f88052a76d6d487f5fdb6cda6 (blue line highlighted for emphasis)

Figure 5: Potential overland flood flow between multiple farm dams with drainage into Back Station Creek which joins the Murrumbidgee River

Figure 6: Old Gold Fisheries proposed hatchery site (red tag) with nearest aquaculture ventures marked

Snowy Mountains Trout is ~ 54km by road from Old Gold Fisheries.

Triton Trout is around 61km by road from Old Gold Fisheries.

Murray Cod hatcheries is 81.8km by road from Old Gold Fisheries.

Murray Darling Fisheries is 107km by road from Old Gold Fisheries.

The nearest aquaculture business is Snowy Mountains Trout approximately 54km by road away.

The high-quality treated effluent from hatchery ponds and holding tanks is returned to the water storage dam via a treatment wetland, for re-use. The drainage lines in major rainfall, from the storage dam would extend to the Murrumbidgee River, via Back Station Creek.

Farm address: 6 Reno Rd, Jones Creek, NSW 2722

Business outline

Old Gold Fisheries is a proposed multi-species aquaculture facility currently seeking Class C, D, and H permits for development of facilities on private land.

The facility is planning to culture a range of species including:

1) Murray cod (*Maccullochella peelii*)
2) Golden perch (*Macquaria ambigua*)
3) Silver perch (*Bidyanus bidyanus*)
4) Rainbow trout (*Oncorhynchus mykiss)*
5) Brown trout (*Salmo trutta*)
6) Eel-tailed catfish (*Tandanus tandanus*)
7) Yabbies (*Cherax destructor*)

The farm is located remote to main roads and urban areas.

It is proposed that the facility will operate on catchment dam water, which is remediated in constructed wetland settlement channels for reuse.

Power for the operation of aeration at the site is proposed to come from the residence site located immediately above the ponds, up the hill.

Oxygen demand is to be managed through conservative stocking densities in ponds, with some supplemental aeration.

The catchment is largely agricultural activities of grazing with some cropping in lower country. The water source is exposed to drought risks.

Rainbow Trout (*Oncorhynchus mykiss*), native blackfish (*Gadopsis marmoratus*), murray cod (*Maccullochella peelii*), redfin perch (*Perca fluviatilis*), eel-tailed catfish (*Tandanus tandanus*), yabbies (*Cherax destructor*) and golden perch (*Macquaria ambigua*) are all known to be present in the waterways of the wider catchment around the proposed Old Gold Fisheries aquaculture enterprise.

There are no aquaculture enterprises upstream of the farms water source, and none in the near vicinity downstream.

The nearest aquaculture enterprise is Snowy Mountains Trout which is located on Tumut River below Blowering Dam, on a separate sub-catchment to the proposed Old Gold Fisheries enterprise.

This biosecurity plan has been prepared with information provided by the farm operator and from a visit undertaken by Dr Matt Landos, Director, Future Fisheries Veterinary Service Pty Ltd on 19/08/2020 and subsequently revised after a further site visit on 02/01/2024. The plan must be reviewed in not more than 2 years time from date of final publication, should the farm be successful in acquiring permits and commence production.

Should regional disease circumstances change prior to the review, earlier modifications to the plan may be required.

Self-auditing is encouraged, to demonstrate compliance to the plan. Documentation of the audit process is required. Third party audits are also encouraged to help ensure the biosecurity plan can deliver protection of Old Gold Fisheries from adverse disease outbreaks.

Site layout

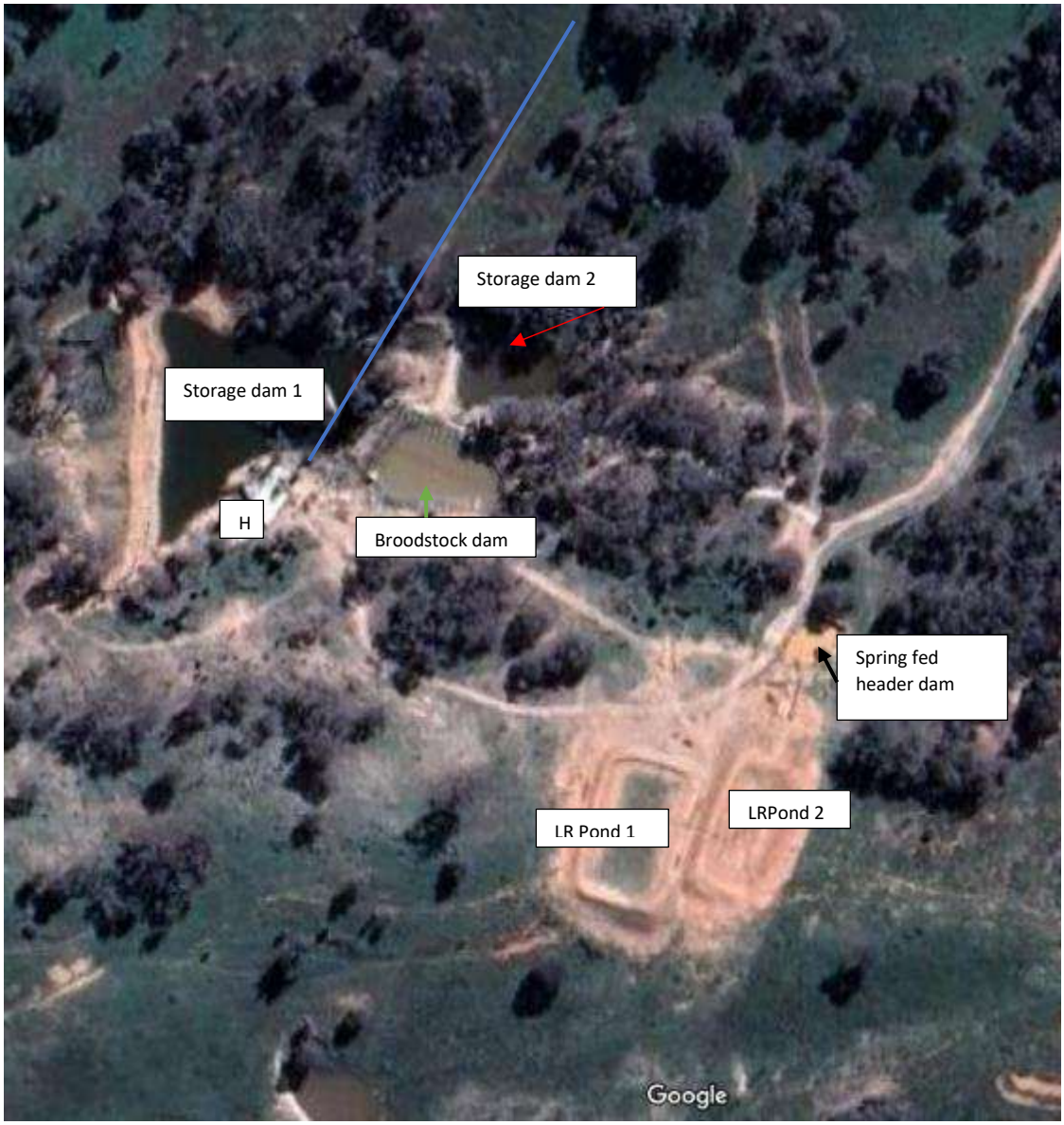


Figure 7:Storage dam 1, storage dam 2 (red arrow), broodstock dam (covered dam (green arrow)), larval rearing pond 1 and 2 (LR Pond 1, LR Pond 2), Hatchery shed (H), proposed blower air line to hatchery (blue line), Spring feed header dam (black arrow)

Figure 8: Storage dam 2 water storage pond - estimated 1.72ML capacity

Figure 9 Broodstock Covered Dam- Estimated capacity 1.77ML

Figure 10: Storage dam 1- estimated 7.3ML capacity

Figure 11: Hatchery building (floor area ~ 177m2) on gravity fed water with effluent pumped to water treatment wetland

Figure 12: Hatchery Shed- Filtration Plant room (not installed) for recirculating system to hold harvested fingerlings and hold yabbies.

Figure 13: hatchery-view from filtration plant nursery room to the hatchery area where eggs will be incubated, hatched and held prior to stocking into larval rearing ponds (systems not installed yet). Plan to have 30 x 12L plastic larvae rearing containers, troughs ~3m(L) x 0.55m(W) x 0.2m (D) 2 x 2000L polywater tanks with aeration on flow through water.

Figure 14: Larval rearing pond 1 (1.1ML) with blower aeration line (black hose) and central sump.

Figure 15: Larval rearing pond 2 (0.68ML)- central drainage sump for fingerling capture at harvest. Pond standpipes (not in image) will have screens on them to prevent stock loss.

Figure 16: Location of mortality pit (see also plan in Figure 1). The pit will be quite small (0.5m wide x 2-3m long x 3m deep), if required, as total biomass likely to be~50kg in a mass mortality event. The drainage from pit will be diverted via a small diversion drain to run southwest such that any surface water will flow away from the gully which is below this location.

Hatchery Systems

Operators will collect Murray cod fertilised eggs in spawning drums (200L containers) from broodstock covered pond and move these into the hatchery. The drums will be maintained on flow through water with aeration until hatch. Effluent water will be directed to a common pump sump to be pumped up into the treatment and settlement wetlands.

Formalin treatments will be utilised under the APVMA Minor Use Permit 87759 to control fungal infection of eggs if required.

A compliant chemical storage shed is yet to be constructed to hold chemicals.

As cod hatch they will be siphoned from the drums and moved to the Larvae will be transferred to ~21 x 12L plastic larval rearing containers and 6 x trough system for holding until stocking out into the larval rearing ponds. Effluent will run to a common pump sump, to be pumped up into the treatment and settlement wetlands. (Figure 17)

Operators plan to install troughs where larvae can be offered artemia and plankton prior to stocking into a prepared, fertilised larval rearing pond.

Operators to keep records of the estimate of numbers of eggs and larvae, and the pond origin and destination of each drum of eggs and larvae.

As the farm develops it is envisaged that it will progress to include the other species which are being sought on its licence, into its annual hatchery production cycle. Similar extensive larval rearing techniques will be employed.

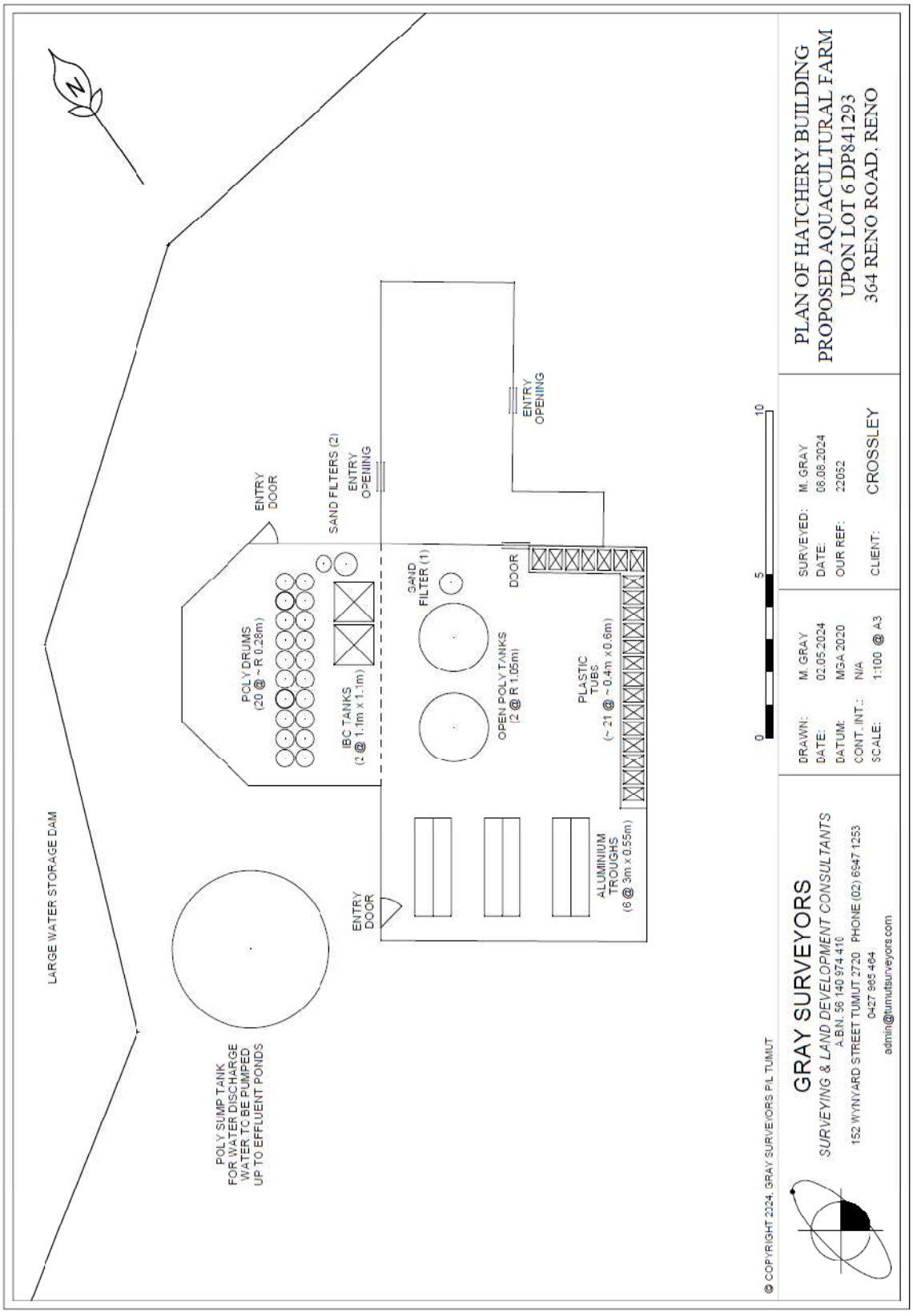


Figure 17: Hatchery building layout

Fingerling systems in hatchery complex

A ute-mounted transport tank will be utilised with supplemental oxygenation provided to transport harvested fingerlings from the ponds to the hatchery tanks.

Hatchery tanks will initially be on a flow through system, with effluent flowing to the common pump sump of the hatchery, to be returned to the treatment and settlement wetland.

As the farm develops it is envisaged that power will be connected to the hatchery building to allow a recirculation system to be installed for holding fingerlings prior to sale.

Fingerlings will be screened for ectoparasitic diseases using a microscope. Resources for identifying common freshwater parasites have been provided and FFVS will offer support services where required.

Grading will be performed where required with a bar grader.

Bathes with formalin (under APVMA permit) where indicated will be used to reduce post-harvest infestations with maintenance of good water quality through water exchange. Stock will be examined daily for any signs of the development of disease.

Tank outlets will be screened to prevent escapees.

Larval rearing ponds

Two purpose build ponds will be utilised for larval rearing.

Larval rearing pond volumes:

1: ~1.1ML

2: ~0.68ML

Techniques learnt from workshops and other hatchery operators will be employed to fertilise the ponds and ensure ample live feeds for stocked larvae. Ponds will be drained and dried in the off-season.

Duration of a crop is typically 5-8 weeks total.

The outlet of the ponds will be screened at the time of harvest to ensure nil escape, as fish are harvested from sump in bottom of pond.

Where algal blooms may be slow to establish, approved pond dyes may be utilised to inhibit benthic filamentous algal growth. Manual removal of filamentous algae will be practiced where necessary around the edges of the pond.

At water temperatures of 20-22°C eggs commence hatching 5-7 days after fertilisation and continue to hatch for 3-4 days ((Rowland, 1983); (Cadwallader & Gooley, 1985); (Rowland, 1986)). Newly hatched larvae are 5- 8 mm in length, and commence feeding about 10 days after hatching is completed ((Rowland, 1983) (Cadwallader & Gooley, 1985) (Rowland, 1986)). In the hatchery the larvae are initially fed on brine shrimp (Artemia), though in tank trials, (Rowland, 1992) showed that at commencement of feeding Murray cod larvae consumed copepodites, copepods and cladocerans, but rarely consumed rotifers.[1]

[1] https://www.frdc.com.au/sites/default/files/products/1999-328-DLD.pdf

Proposed fertilisation regime which will be refined iteratively:

Fertiliser type	Rate per hectare	Frequency
Super phosphate (8.8%P)	47kg/ha	14 days
Sulphate of ammonia (21% N)	40kg/ha	14 days
Potash	7kg/ha	14 days
Poultry manure (3.9%N, 1.1%P)	150kg/ha	At pond filling once
Poultry manure	47kg/ha	7 days
Lucerne hay (2%N; 0.2%P)	190kg/ha	At pond filling once
Lucerne hay	73kg/ha	7 days

Fertiliser will be carried to ponds in back of ute and distributed into ponds by hand with a scoop.

Comparison of NSW DPI rates of fertiliser to terrestrial pasture applications[2][3][4].

Superphosphate: 125kg/ha

Sulphate of ammonia: 195kg/ha (note ~ 70% N not used by plants can run-off)

Poultry manure: 1540kg/ha

It is noted that rates of addition to the aquaculture ponds are lower than rates commonly applied to thousands of hectares of agricultural land along the Murrumbidgee River. The footprint of the ponds is also vastly smaller than the scale of agricultural applications.

Under extensive pond culture conditions fish are stocked at low densities and there is no supplementary feeding. Instead, naturally occurring aquatic organisms are the sole source of food for fish. Ponds are run static with top-ups for evaporation and seepage. Fertilisers are added to the ponds at rates around levels in Table above, to enhance productivity and encourage plankton growth. Usually, fish are stocked into ponds shortly after consuming artemia and feeding has commenced and when a sufficient amount of plankton of a preferred composition and size range is present in the ponds. Timing for stocking will vary with season but is often 7-14 days after ponds are filled.

At stocking fish are about 15mm in length and about 45 mm (average 0.5-1.1 g) at harvest. Ponds are stocked with 15-50/m2 and, on average, 75-80% are recovered at harvest (Ingram, 2001) (Ingram, 2009). The stocking rate can vary widely, depending on desired market size of fingerlings and the condition of larvae. The stocking rate does not widely alter the harvest biomass (kg) as the larval rearing ponds can only produce a limited amount of natural feed. Hence higher stocking densities tend to produce smaller sized fish at harvest, where similar survival is achieved.

Conservative stocking rates will be utilised to ensure rapid larval growth and larger sized fingerlings at harvest within the limits of aeration.

The abundance of natural feed supply (plankton and zooplankton) in the ponds will be monitored through daily observation of the blooms and with use of a secchi disc reading and the contents of a plankton net throw.

[2] https://www.lls.nsw.gov.au/__data/assets/pdf_file/0007/1323529/fertilisers-for-pastures.pdf
[3] https://www.dpi.nsw.gov.au/__data/assets/pdf_file/0004/166153/fertiliser-calculations.pdf
[4] https://www.lls.nsw.gov.au/help-and-advice/growing,-grazing-and-land/pastures/fertilisers-for-pastures-guide

General advice on larval rearing from peer reviewed articles such as (Rowland, 1983) (Ingram, 2009) (Ingram & De Silva, 2004) will be utilised.

Dissolved oxygen will be monitored in ponds with a handheld dissolved oxygen probe. Aeration will be provided constantly via a diffuser line from a blower.

A compound microscope will be purchased to facilitate the regular screening of larvae and fingerlings every 2-3 days to ensure ectoparasites are detected early, to allow time for an approved treatment to be utilised.

Chemical treatments

Depending on the diagnosis, treatment options may include: copper sulfate; potassium permanganate; formalin; hydrogen peroxide, sodium percarbonate. The operator should ensure that chemical permits are in place with the APVMA, and they have not expired prior to any use. Check permits using search engine at www.apvma.gov.au

The most likely chemical that may be required is formalin. Larval rearing ponds may be treated with formalin between 0-3 times per crop to control ectoparasite burdens.

The diagnosis should also be confirmed with the farm veterinarian, to ensure appropriate choice of treatment and the correct dose is selected. Farm veterinary support will be available via phone/email and farm visits where required.

It is anticipated that formalin (~40L), 20kg sodium percarbonate and 20kg copper sulphate will be stored on site, in compliance with SafeWork NSW guidance.

https://www.safework.nsw.gov.au/__data/assets/pdf_file/0004/52870/Safe-use-and-storage-of-chemicals-including-pesticides-and-herbicides-in-agriculture.pdf

Useful information is also available from the following sites:

https://vfa.vic.gov.au/aquaculture/murray-cod-aquaculture

https://www.frdc.gov.au/project/2018-084

http://frdc.com.au/Archived-Reports/FRDC%20Projects/1999-328-DLD.pdf

https://www.dpi.nsw.gov.au/fishing/aquaculture/publications/species-freshwater/collecting-finfish-broodstock/info-sheet

https://www.dpi.nsw.gov.au/__data/assets/pdf_file/0010/638416/Silver-Perch-Diseases-Manual.pdf

Effluent treatment and re-use

The effluent flow from larval rearing ponds and the hatchery is directed to treatment constructed wetlands in the yellow highlighted area, labelled proposed effluent pond and filtration system, in Figure 18 prior to flowing back to the broodstock covered dam. Re-use can occur from this dam through pumping it uphill to hatchery ponds and the hatchery tanks. The constructed wetland channels will follow the land contours to slowly gravity flow water through approximately 500m of wetland channels that are approximately 3-4m wide and with capacity to hold water up to 0.5m depth. The vegetation in the channels will remove some of the nitrogen, phosphorus and suspended sediment. Once this water returns to the broodstock covered dam, the effect of dilution is likely to bring levels down to levels similar to the regional waterways (see calculations below). There is no addition of pelletised aquaculture feed into the larval rearing ponds. The majority of the added

fertiliser in the ponds, moves into the aquatic food web and into fingerlings and is mineralised in the sediments of the larval rearing ponds. The maximum number of crops per pond per year is two. So the total water volumes moving through the channels is low.

Constructed wetland systems commonly remove 30-40% TN (93g/m^2/yr) and 46% TP (1.2g/m^2/year) (Land, et al., 2016)

It is likely that the total N and total P in the larval rearing ponds at the end of each culture cycle will be lower than published levels in (Ingram, 2009), as ~20-30% less fertiliser is likely to be used at Old Gold Fisheries, due to reduced aeration capacity. The Ingram et al 2009 study used paddlewheel aeration which delivers more dissolved oxygen than the diffuser aeration which is proposed for Old Gold Fisheries.

0.64mg/L total inorganic nitrogen (TIN) (Ingram, 2009) ~

0.74mg/L orthophosphate (PO_4) (Ingram, 2001)

Anticipated Old Gold Fisheries levels 0.51mg/L TIN; 0.592mg/L PO_4 in a total culture cycle volume of 1.78 ML. Total volume will contain ~ 909g TIN, and 1062g PO_4.

Approximate surface area of constructed wetland 2000m^2 provides capacity for capture of ~186kg of TN, and 2.4kg of TP per annum.

Post wetland treatment is likely to reduce levels to around 0.36mg/L TIN, 0.319mg/L PO_4.

Not accounting for water volume loss by evaporation and infiltration within the wetland, there will significant dilution within the broodstock dam, where treated water is returned.

This does not account for further additional dilution with rainfall. Hence should rainfall lead to overflow of the storage dam, the levels of nutrients will be well under the levels reported at the nearest monitoring station at Adelong Creek[5] which were approximately 0.06-0.08mg/L TP and 0.6-1.1mg/L TN.

The anticipated levels in water which could flow from the storage dam of the Old Gold Fisheries site are below the area specific water quality targets for water dependent ecosystems for the upper Murrumbidgee which are 0.035mg/L TP and 0.6mg/L TN[6].

It should be acknowledged that the volumes of water being used are also very small relative to the flows in the Murrumbidgee which could join under high rainfall. Current flows are 9430.6ML/D[7] metered at Gundagai station. Under drought conditions where there is lower flow in the Murrumbidgee, there may not be any overflow from the dam to reach the Murrumbidgee River.

[5] https://water.nsw.gov.au/__data/assets/pdf_file/0008/545831/murrumbidgee-valley-annual-surface-water-quality-report-2021-2022.pdf

[6] https://www.industry.nsw.gov.au/__data/assets/pdf_file/0004/305743/Water-quality-technical-report-for-the-Murrumbidgee-surface-water-resource-plan-area-SW9.pdf

[7] https://waterinsights.waternsw.com.au/11982-murrumbidgee-regulated-river/updates

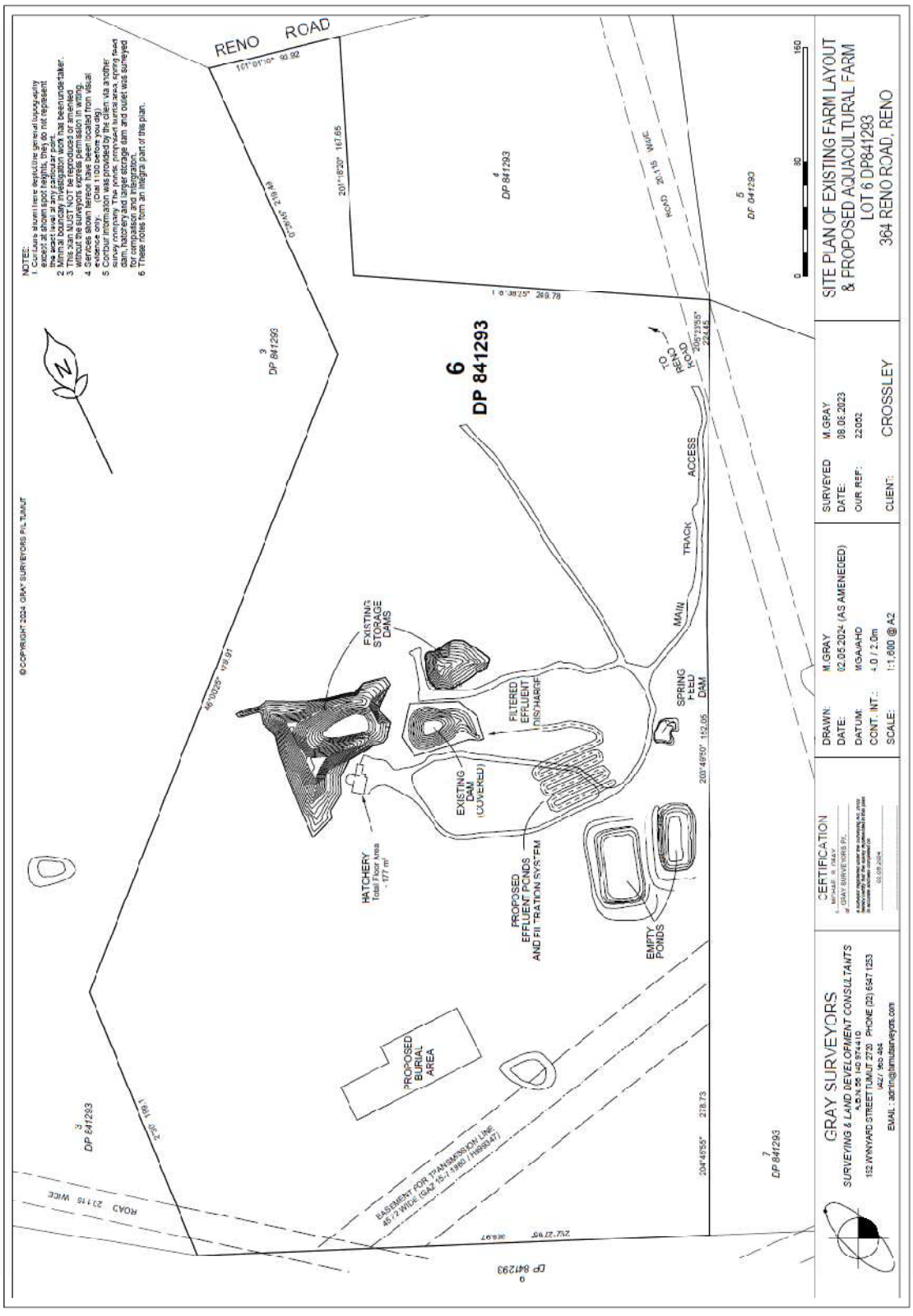


Figure 18: Proposed effluent and filtration area receiving flow from larval rearing ponds 1 & 2, and effluent from hatchery shed sump (pumped) for re-use to the broodstock covered dam

Broodstock source

The property outside of the proposed hatchery area has numerous large murray cod resident in farm dams which date back to stockings > 25 years ago. It is not envisaged that murray cod broodstock from outside the property will need to be sourced initially, so no new entries to the site will take place, initially negating the need for a quarantine facility. The designated broodfish pond will become the site for holding broodfish. The outlet of this pond will be screened to prevent any risk of escapes.

Where required broodstock permits will be sought. New entry broodstock pose a risk for introduction of pathogens (disease causing organisms). Veterinary advice will be sought on appropriate treatment and holding protocols to avoid entry of novel pathogens in the establishment of a quarantine facility.

An area of the hatchery building can be designed as a quarantine system as required at that time, utilising temporary fabricated walls to minimise aerosol dispersal risk, with a foot bath and hand wash station on entry/exit.

A quarantine fish entry protocol will be utilised if required. (Appendix 9)

Risk assessment process

Identify the hazards

Hazards are both endemic and exotic disease agents to which your species of interest is potentially susceptible.

The process of identifying which hazards apply to your enterprise, triggers the next phase of the risk analysis, “risk assessment”. Identified hazards will be those which have caused adverse impacts on fish/yabby health and production in the past. Additionally, those diseases which are recognised as threats to fish/yabby health and production, but have not occurred on the farm, will be assessed during the risk analysis phase.

Risk Assessment of hazards

To assign a level of risk to a hazard, two factors need to be determined;

- ✓ the likelihood of occurrence on your farm; and
- ✓ the consequences of it occurring on your farm.

Likelihood of occurrence of hazards

The likelihood of disease occurrence can be assessed through considering the transmission pathways required for exposure of a population of fish/ yabbies to a disease-causing agent and the likelihood that exposure will result in disease expression.

The likelihood rating will vary depending on:

- ✓ the properties of the disease
- ✓ occurrence of the disease outside the farm or in nearby farms
- ✓ the possible pathways onto the farm.

Likelihood ratings and descriptors are shown in Table 5.

Table 5: *Assessment of disease likelihood*

Rating	Descriptor
Remote (1)	Never heard of, but not impossible here (less than once in 20 years)
Unlikely (2)	May occur here, but only in exceptional circumstances – more than once in 20 years
Possible (3)	Clear evidence to suggest this is possible in this situation – more than once in 3 years
Likely (4)	It is likely, but not certain, to occur here – more than once in 2 years (>50%)
Certain (5)	It is certain to occur – every year

Consequences

The consequence of disease occurrence is assessed through consideration of the impacts of disease outbreaks on the productivity of your farm. The consequences could include increased mortality, reduced growth rate, reduced fingerling quality, reduced market access, and/or increased treatment costs.

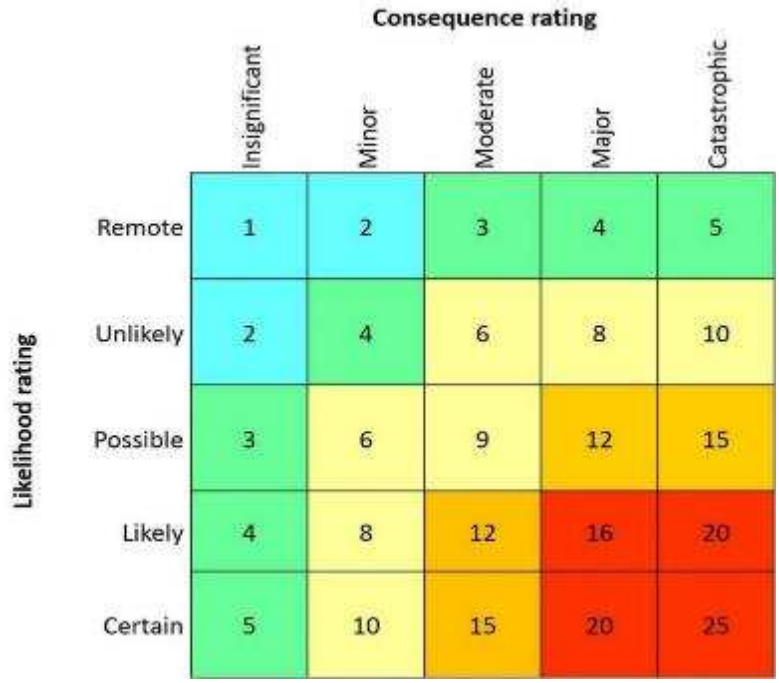
Consequence ratings and descriptors are shown in Table 6.

Table 6: *Assessment of disease consequences*

Rating	Descriptor
Insignificant (1)	Impact not detectable or minimal
Minor (2)	Impact on farm productivity limited to some production units or short term only
Moderate (3)	Widespread impact on farm productivity due to increased mortality or decreased performance
Major (4)	Considerable impact on farm production resulting in serious supply constraints and financial impact
Catastrophic (5)	Complete depopulation of the farm and possibly barriers to resumption of production

Risk estimation

The total risk of a particular hazard is estimated from the product of likelihood and consequence assessments, resulting in a risk rating of 1-25 (Figure 6 below). The risk of an identified hazard is highest when both the likelihood and consequences are high. However, the risk may be low even if the consequence is 'catastrophic,' as the likelihood may be 'remote' for that particular circumstance; similarly, even if the likelihood is 'certain', the consequence may be 'insignificant'. Risk ratings can be determined by applying estimates of likelihood (where 1 is remote and 5 is certain) and consequence (where 1 is insignificant and 5 is catastrophic) to the risk matrix provided below in (Figure 19).



Risk level	Explanation and management response
1-2 Negligible	Acceptable level of risk. No immediate action required.
3-5 Low	Acceptable level of risk. On-going monitoring may be required.
6-10 Medium	Unacceptable level of risk. Active management is required to reduce the level of risk.
12-15 High	Unacceptable level of risk. Intervention is required to mitigate the level of risk.
16-25 Extreme	Unacceptable level of risk. Urgent intervention is required to mitigate the level of risk.

Figure 19: Risk estimation matrix and risk assessment of disease consequences

Potential Hazard identification

Combined list of *Schedule 1 Pests and Diseases required to be notified* of the Biosecurity Regulation, 2017 and prohibited matter under Schedule 2 of the Biosecurity Act 2015 No. 24 and known endemic aquatic pathogens

Disease	Type	Exotic to Australia	Susceptibility of **Murray cod**	Susceptibility of Silver and Golden perch
Red sea bream iridoviral disease (RSBIV)	Virus	Yes	Likely (confirmed with related MCV-ISKNV)	Likely
Betanodavirus (Viral encephalopathy and retinopathy (VER))	Virus	No	Possible	Possible
Aeromonas salmonicida - atypical strain (goldfish ulcer disease)	Bacteria	No	Possible	Likely
Enteric septicaemia of catfish (*Edwardsiella ictaluri*)	Bacteria	No	Possible	Possible
Epizootic ulcerative syndrome of fish (infection with *Aphanomyces invadans* (EUS))	Fungus	No	Likely	Likely
Infectious spleen and kidney necrosis virus – like (ISKNV-like) viruses	Virus	Yes	Likely	Likely
Bacterial kidney disease (*Renibacterium salmoninarum*) (BKD)	Bacteria	Yes	Possible	Possible
Enteric redmouth disease (*Yersinia ruckeri* – Hagerman strain)	Bacteria	Yes	Possible	Possible

Epizootic haematopoietic necrosis of fish – EHN virus	Virus	No	Possible	Possible
European catfish virus / European sheatfish virus (ECV)	Virus	Yes	Possible	Possible
Furunculosis (*Aeromonas salmonicida* subsp. *salmonicida*)	Bacteria	Yes	Possible	Possible
Grouper iridoviral disease (GI)	Virus	Yes	Possible	Possible
Infectious haematopoietic necrosis (IHN)	Virus	Yes	Possible	Possible
Infectious pancreatic necrosis (IPN)	Virus	Yes	Possible	Possible
Spring viraemia of carp (SVC)	Virus	Yes	Possible	Possible
Viral haemorrhagic septicaemia (VHS)	Virus	Yes	Possible	Possible
Channel catfish virus disease (CCCV)	Virus	Yes	Unlikely	Unlikely
Gyrodactylosis (*Gyrodactylus salaris*)	Parasite	Yes	Unlikely	Unlikely
Infection with HPR-deleted or HPR0 infectious salmon anaemia virus (ISA)	Virus	Yes	Possible	Possible
Infection with salmonid alphavirus	Virus	Yes	Unlikely	Unlikely
Koi herpesvirus disease (KHV)	Virus	Yes	Unlikely	Unlikely
Piscirickettsiosis (*Piscirickettsia salmonis*)	Bacteria	Yes	Unlikely	Unlikely
Whirling disease (*Myxobolus cerebralis*)	Parasite	Yes	Unlikely	Unlikely
Chilodonella sp	Parasite	No	Likely	Likely
Trichodina sp	Parasite	No	Likely	Likely
Ichthyophthirius multifiliis	Parasite	No	Likely	Likely
Ichthyobodo sp.	Parasite	No	Likely	Likely
Disease	Type	Exotic to Australia	Susceptibility of **Yabby** *(Cherax destructor)*	
Crayfish plague (*Aphanomyces astaci*)	Fungi	Yes	Possible	
Thelohaniosis of crustaceans	Parasite	No	Likely	
White spot disease of crustaceans (WSSV)	Virus	Yes	Likely	
White tail disease of crustaceans	Parasite	No	Unlikely	
Yellowhead disease/ Yellowhead virus	Virus	Yes	Unlikely	

Candidatus *Hepatobacter penaei*	Bacteria	Yes	Unlikely
Enterocytozoon hepatopenaei	Parasite	Yes	Unlikely
Acute hepatopancreatic necrosis disease (AHPND) of crustaceans	Bacterial toxin	Yes*	Unlikely
Infectious hypodermal and haematopoietic necrosis of crustaceans	Virus	No	Unlikely
Infectious myonecrosis of crustaceans	Virus	Yes	Unlikely
Monodon slow growth syndrome	Virus	Yes	Unlikely
Necrotising Hepatopancreatitis of crustaceans	Bacteria	Yes	Unlikely
Taura syndrome of crustaceans	Virus	Yes	Unlikely
Gill-associated virus disease	Virus	No	Unlikely

Likelihood and consequence assessment

Disease	Likelihood of entry	Consequence of entry	Risk estimate
Red sea bream iridoviral disease (RSBIV)	1	5	5
Betanodavirus (Viral encephalopathy and retinopathy (VER))	1	2	2
Aeromonas salmonicida - atypical strain (goldfish ulcer disease)	2	2	4
Enteric septicaemia of catfish (*Edwardsiella ictaluri*)	1	3	3
Epizootic ulcerative syndrome of fish (infection with *Aphanomyces invadans* (EUS))	3	2	6
Infectious spleen and kidney necrosis virus – like (ISKNV-like) viruses	1	5	5
Bacterial kidney disease (*Renibacterium salmoninarum*) (BKD)	1	5	5
Enteric redmouth disease (*Yersinia ruckeri* – Hagerman strain)	1	3	3
Epizootic haematopoietic necrosis of fish – EHN virus	4	2	8
European catfish virus / European sheatfish virus (ECV)	1	5	5

Furunculosis (*Aeromonas salmonicida* subsp. *salmonicida*)	1	5	5
Grouper iridoviral disease (GI)	1	5	5
Infectious haematopoietic necrosis (IHN)	1	5	5
Infectious pancreatic necrosis (IPN)	1	5	5
Spring viraemia of carp (SVC)	1	5	5
Viral haemorrhagic septicaemia (VHS)	1	5	5
Infection with HPR-deleted or HPR0 infectious salmon anaemia virus (ISA)	1	5	5
Chilodonella sp	4	4	16
Trichodina sp	4	2	8
Ichthyophthirius multifiliis	4	4	16
Ichthyobodo sp.	4	3	12
Lernea sp.	3	3	9
Disease	Likelihood of entry	Consequence of entry	Risk estimate
Crayfish plague (*Aphanomyces astaci*)	1	5	5
Thelohaniosis of crustaceans	4	1	4
White spot Syndrome virus (WSSV) of crustaceans	1	5	5

Risk management measures

Disease	Proposed risk mitigation measure
Epizootic ulcerative syndrome of fish (infection with *Aphanomyces invadans* (EUS))	Do not introduce water from sources other than catchment dams onsite. Quarantine any incoming broodstock for surveillance as per protocol. Maintain visual surveillance for red skin lesions on fish during sampling. Affected cohorts of larvae/fingerlings should not be translocated off the farm until infection has completely resolved. Noting that the pathogen is endemic in the farm catchment and target market destinations. EUS is reported to be within the MDB already.
Epizootic haematopoietic necrosis of fish – EHN virus	Maintain surveillance for clinical signs of sickness; exophthalmia (pop-eye), blood shot eyes.

	Undertake investigation including submission of samples to the laboratory (use sample submission form in Appendix 7) upon detection of suspicions signs of disease. Do not translocate affected fish, until diagnostic testing has cleared the population of active disease. Noting that the pathogen is endemic in the farm catchment and target market destinations. EHNV is reported to be within the MDB already.
Chilodonella sp	Undertake routine examination of larvae every 3 days for the presence of protozoa. Treat with APVMA approved medication (formalin, sodium percarbonate) when observed within 24 hours. Seek veterinary guidance where required. Screen all populations prior to translocation according to hatchery release protocol. Undertake prophylactic treatment of resident broodstock every ~ 4 months outside of spawning season. If broodstock become sick, then undertake diagnostic investigation and provide appropriate treatment based on diagnosis. Screen broodstock when opportunistically handled by skin and gill mucous scrapes, using compound microscope. Quarantine all incoming broodstock for 4 weeks, following the farm import quarantine protocol. Noting that the pathogen is endemic in the farm catchment and target market destinations. Chilodonella is reported to be within the MDB already..
Trichodina sp	Undertake routine examination of larvae every 3 days for the presence of protozoa. Treat with APVMA approved medication (formalin, sodium percarbonate) when observed within 24 hours. Screen all populations prior to translocation according to hatchery protocol. Undertake prophylactic treatment of resident broodstock every ~ 4 months outside of spawning season. If broodstock become sick, then undertake

	diagnostic investigation and provide appropriate treatment. Screen broodstock when handled by skin and gill mucous scrapes. Quarantine all incoming broodstock for 4 weeks, following the farm import protocol. Noting that the pathogen is endemic in the farm catchment and target market destinations. Trichodina is reported to be within the MDB already.
Ichthyophthirius multifiliis	Undertake routine examination of larvae every 3 days for the presence of protozoa. Treat with approved medication (formalin, sodium percarbonate) when observed within 24 hours. Screen all populations prior to translocation according to hatchery protocol. Undertake prophylactic treatment of resident broodstock every ~ 4 months outside of spawning season. If broodstock become sick, then undertake diagnostic investigation and provide appropriate treatment. Screen broodstock when handled by skin and gill mucous scrapes. Quarantine all incoming broodstock for 4 weeks, following the farm import protocol. Noting that the pathogen is endemic in the farm catchment and target market destinations. Ichthyophthirius is reported to be within the MDB already.
Ichthyobodo sp.	Undertake routine examination of larvae every 3 days for the presence of protozoa. Treat with approved medication (formalin, sodium percarbonate) when observed within 24 hours. Screen all populations prior to translocation according to hatchery protocol. Undertake prophylactic treatment of resident broodstock every ~ 4 months outside of spawning season. If broodstock become sick, then undertake

	diagnostic investigation and provide appropriate treatment. Screen broodstock when handled by skin and gill mucous scrapes. Quarantine all incoming broodstock for 4 weeks, following the farm import protocol. Noting that the pathogen is endemic in the farm catchment and target market destinations. Ichthyobodo is reported to be within the MDB already.
Lernea sp.	Undertake routine examination of larvae every 3 days for the presence of protozoa. Treat with approved medication (formalin, sodium percarbonate) when observed within 24 hours. Screen all populations prior to translocation according to hatchery protocol. Undertake prophylactic treatment of resident broodstock every ~ 4 months outside of spawning season. If broodstock become sick, then undertake diagnostic investigation and provide appropriate treatment. Screen broodstock when handled by skin and gill mucous scrapes. Quarantine all incoming broodstock for 4 weeks, following the farm import protocol. Noting that the pathogen is endemic in the farm catchment and target market destinations. Currently, effluent water passes through settlement wetland pond that will reduce discharge of pathogens. Lernea sp. is reported to be within the MDB already.

Reassessment risk once mitigation implemented

Disease	Original risk estimate	Reassessed risk estimate once proposed mitigation implemented
Epizootic ulcerative syndrome of fish (infection with *Aphanomyces invadans* (EUS))	6	3

Epizootic haematopoietic necrosis of fish – EHN virus	8	4
Chilodonella sp	16	4
Trichodina sp	8	4
Ichthyophthirius multifiliis	16	4
Ichthyobodo sp.	12	4
Lernea sp.	9	3

Disease symptoms

Figure 20: Pop-eye - exophthalmos - potential systemic infection by a virus of bacteria

Figure 21: Deep skin ulceration-Red Spot- Epizootic ulcerative syndrome (EUS)

Figure 22: Superficial skin fungal infection - Winter kill- Saprolegniosis

Figure 23: Fin tip loss of colour, from acute stress eg poor handling or low dissolved oxygen, often a pre-cursor to fin rot.

Figure 24: Weight loss-emaciation: many possible causes including gut parasites and feed deficiencies

Figure 25: Bloated abdomen- possible abdominal/systemic infection or reproductive maturity

Figure 26: Deformity of spine or jaw

Figure 27: Changes in normal skin colouration – can indicate internal parasitism or lightning strike- requires pathology examination

Other changes which the farm manager looks out for include:

-abnormal swimming behaviour such as circling, spiral swimming or gulping at the surface

-slow growth rate

-excessive feed consumption

-low fertility

-low hatch rates

-low larval survival

A guide to exotic diseases can be downloaded to your mobile phone using the following links:

http://www.agriculture.gov.au/animal/aquatic/guidelines-and-resources/aquatic_animal_diseases_significant_to_australia_identification_field_guide
This guide is also available as a free App that can be downloaded from the App Store (Apple devices), Google Play (Android devices) and Microsoft Store (Windows devices).

Farm Biosecurity- Entry risks

Public access

Access is tightly restricted to minimise biosecurity risks. The public are not encouraged to visit the farm and have no access to the hatchery. A locked gate is present at the entrance to the site.

Any visitors to the farm are accompanied by farm staff and do not enter the ponds, hatchery or contact the culture water. Visitors to complete the Visitor Biosecurity Declaration, and if they pose a

risk entry will be refused. Visitors entering are required to fill in the Visitor Log and comply with Farm Entry Conditions (see examples in Appendix 1, 2, 3).

Staff

The hatchery is planned initially to operate as a family venture. Should staff be employed they will be required to attend work in clean laundered clothes and must not have attended other farms, or recreational fishing areas immediately prior. They will also need to complete the biosecurity declaration - see Appendix 4.

Farm workers will not enter the hatchery building, if they have been capturing wild broodstock or working on other aquaculture ventures, without first showering, changing into clean laundered clothes and using footbath to sanitise footwear prior to entry.

Larval and Fingerling Feed

Extensively reared murray cod fingerlings in the earthen pond will consume a natural diet of algae and zooplankton, until weaning onto formulated aquaculture diets if required.

Hatched artemia cysts, which have passed biosecurity protocols for entry to Australia, will at times be used to provide a start for first feeding murray cod larvae, in addition to harvested plankton from the site's ponds. Commercial extruded dust/microdiets and small pellet sizes are used for fingerling weaning. As these diets are all heat treated during manufacture they represent negligible risk for pathogen entry. Volumes will be very low (<20kg/year), as some fingerlings are planned to be sold as soon as harvested from ponds, and some as soon as weaned. Grow-out of fish will not be practiced at the hatchery.

Yabbies are maintained on vegetarian diets that pose no risk for disease introduction.

Wildlife Interactions

The farm boundaries are fenced to control livestock movement around the hatchery. Once operating it is envisaged that staff will be onsite to ensure birds do not enter the ponds or hatchery.

Populations of wild fish exist in the waterways, which are across paddocks from the elevated hatchery site. These local fish are considered to have equivalent disease status to the hatchery.

The egg incubation and larval rearing system in the proposed hatchery will operate on screened flow through water, that is pumped from the storage reservoir to the header. Screens will prevent entry of any fish/larvae.

Water

The water source is from a small, ephemeral controlled catchment, and spring fed dam. Water storages are noted in Figure 1. Water may also be re-used after passing through the water treatment-settlement-filtration area, and returned to the broodstock covered pond. Common freshwater parasite fauna is likely to be present or to emerge.

The absence of other aquaculture ventures above the farm catchment and relatively remote nature of the site minimizes the risk of entry of noxious fish species and potential exotic pathogens via predatory bird carriage also.

Flow through water will be used in incubation and fingerling systems. Intermittent use of APVMA permitted chemicals maybe applied as required to control ectoparasites and fungal pathogens.

Dissolved oxygen levels will be tested daily with a hand-held YSI Optical DO probe which is to be purchased.

Levels of dissolved oxygen below 40% saturation trigger the following management responses:

1) increase flow rate and water exchange to the affected tank/system
2) If this fails to rapidly correct the low oxygen level, then increased numbers of air stones driven by a blower can be added to the affected water body.

Fish mortality management

Carcasses are disposed of appropriately in a burial pit which is covered in lime. The farm has access to tractors to construct the burial pit and uses the same technique for livestock mortalities which have occurred in the past. The maximum biomass that could require burial is quite small < 50kg of fingerlings at ~ 1g average bodyweight. So the burial pit design, if required is likely to be ~0.5m wide (width of backhoe bucket), 3m deep, 2-3m long, excavated with a backhoe or equivalent. The pit design aligns with advice in AQUAVETPLAN Disposal Manual.

https://www.agriculture.gov.au/sites/default/files/sitecollectiondocuments/animal-plant/aquatic/aquavetplan/disposal-manual.pdf

Should broodstock cod need to be sourced under a NSW DPI broodstock collection permit, then the closest practicable source of broodstock will be pursued, to minimise travel times and reduce the risk of movement of a pathogen which may be exotic to the Old Gold Fisheries Site.

The broodstock entry protocol (Appendix 9) at the quarantine system will be employed to minimise, already low risks, for the entry of pathogens. Equipment used for broodstock capture and transport will be disinfected prior to entry to the main part of the farm/hatchery.

Farm Biosecurity -spread risks within and outside the farm

Public access

Public visitors are not routinely encouraged. Those visitors which attend and pass the biosecurity entry protocol are escorted by staff when on the farm.

Visitors are not permitted to bring any equipment onto the farm to handle fish.

Visitors who are taking fish off the farm, must use the farm's equipment to harvest stock.

Staff

Staff will undertake daily surveillance of all stock for signs of sickness or elevated mortality which provides early detection for disease expression. Sick and dead fish are removed from ponds daily, or more frequently should there be elevated mortality and disposed of at the mortality burial pit, which is remote from the waterways and other farm stock, and covered with lime.

Staff start each day in the hatchery (when operating), so they move from the cleanest area of the farm, to those of lower levels of sanitation.

Old Gold Fisheries has a copy of FFVS preparation of fish for histopathology sampling pdf, which is used to guide the procedure to send fish to the laboratory. Should such a circumstance arise, the farm would be guided directly by advice from the farm veterinarian, Future Fisheries Veterinary Service Pty Ltd.

Emergency disease response plan is detailed in Appendix 5.

Decontamination Protocol is detailed in Appendix 10.

Decontamination Chemicals can be readily accessed from the local produce store in Gundagai, so larger quantities can be rapidly accessed if required.

In the event of a major disease outbreak, staff ensure that water and equipment do not pass from the affected pond, into other ponds without decontamination prior. Staff must decontaminant their footwear or waders prior to entering other ponds. And ensure that stock movement off the property is ceased.

Feed

As discussed in feed entry section above.

Wildlife

Birds and other wildlife are excluded from the ponds with staff active on the farm through the day.

Livestock and pets are excluded from the pond area.

Water

Water can carry disease agents such as bacteria and parasites around the farm. Should a pond be detected to have a significant disease outbreak it will be isolated. Water from that pond will not be permitted to run into any other culture ponds to reduce the likelihood of spread. Prompt treatment will be initiated.

Dissolved oxygen is measured daily in larval rearing system and in highly stocked races or tanks as required to establish the necessary flow rates.

Unionised ammonia will be measured in tank systems. Where unionized ammonia levels increase to greater than 0.05mg/L rapid water exchange should be practiced, or the use of an ammonia binder, and cessation of feed administration. Remove of excess organic matter from the tank or race, or reduction in biomass may assist in medium term management.

Detection of low oxygen levels result in a cessation of feeding and other management actions to rectify as soon as possible, including checking flow rate to pond, supplemental aeration to pond.

Blower driven aeration are available on site to maintain water quality in optimal ranges using conservative stocking densities.

Adequate water storage ensures water exchange is always available to remediate pond water quality issues.

In the extreme event of an exotic disease outbreak, the control measure to minimise risk to the environment would be to control bird access and ensure no effluent flow from larval rearing ponds, or tanks prior to decontamination.

Fish

Movement of fish is to be carried out for murray cod when water temperatures are above 16^{o}C. Yabbies can be handled year round. Diseased populations are never moved into contact with undiseased stocks.

Sick and dead stock are removed once daily, or more frequently as required from larval rearing or broodstock ponds.

Fish mortality trigger levels for investigation escalation

Unexplained mortality of above 0.1% of the fish population per day of fingerlings (>2 grams) (cod or other species) for more than 3 days is considered a trigger for further investigation. If no obvious causes are identified on the farm, such as water quality or ectoparasite burdens, then the farm veterinarian and NSW DPI should be contacted to seek guidance on further laboratory submissions.

In murray cod larvae if more than 5% of population die in a day, without an obvious explanation then the farm veterinarian and NSW DPI should be contacted to seek guidance on further laboratory submissions.

Should an unusual elevation in mortality be detected, 5 live typically affected fish and 5 fresh killed typically affected sick fish on ice within individual zip lock bags samples are driven directly to the Elizabeth Macarthur Agricultural Institute for analysis, with a completed specimen advice form (Appendix 7).

Disease controls to prevent spread

Dead fish are transported to mortality pit and covered with lime

Water quality, feed, water flow and stocking density are all managed to prevent disease outbreaks.

Screens on outlets will be maintained to ensure no stock escape.

Disease surveillance

Should larvae/fingerlings appear with clinical signs, and significant sickness and/or mortality in the population, similar to those described in the section above, an investigation should be commenced in addition to the routine surveillance activities described below.

Should an unusual elevation in mortality be detected, 5 live typically affected fish and 5 fresh killed typically affected sick fish on ice within individual zip lock bags samples are driven directly to the Elizabeth Macarthur Agricultural Institute for analysis, with a completed specimen advice form (Appendix 7).

During murray cod larval rearing, a sub-sample of 3-5 larvae will be examined every 3 days from the larval rearing pond or tanks. These will be examined under light microscopy for the presence of protozoan ectoparasites and to ensure they are eating and growing normally.

During murray cod fingerling production, stock will be sampled weekly for protozoan ectoparasite surveillance.

Record keeping

Presently records are not kept for stock; water quality and mortality. As the farm progresses to produce murray cod records will be kept of water quality monitoring; mortality counts; parasite examination results; stock sales; stock movements and otherwise outlined in this biosecurity plan.

The farm also has the contacts for FFVS field veterinarians (Mobile: 0437 492 863; 0438 302 048) to provide assistance in collection of appropriate samples.

The farm will contact the State Government Aquatic Biosecurity Veterinary Officer (details in the emergency plan Appendix 5) if an emergency/exotic disease is suspected.

References

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Rowland, S. (1992). Diet and feeding of Murray cod (Macculoochella peeli) larvae. *Proceedings of the Linnean Society of New South Wales, 113*, 193-201.

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Appendix 1. Visitor Biosecurity Declaration

1. Are you entering production areas of the hatchery or farm?

Yes □ (Go to question 2) No □ (Go to signature section)

2. Have you been in contact with any aquaculture or the aquatic environment in the previous 24 hours, this includes: recreational fishing; seafood processors; water sports/activities

Yes □ (Go to question 3) No □ (go to question 4)

3. Have you had a head to toe shower and changed into clean clothes and shoes?

Yes □ (Go to signature section) **No** □ (Postpone non-essential visit) (or manager to assess risk prior to farm entry being permitted.)

4. Are you bringing any equipment, untreated seafood, dive gear, fishing gear onto the farm?

Yes □ (Go to question 5) No □ (go to signature section)

5. Has equipment or other items been sanitised to eliminate crustacean pathogens?

Yes □ (Go to signature section) No □ (Stop equipment entry onto farm) (or manager to assess risk prior to farm entry)

I, …… agree to abide by the entry conditions for visitors

Signature:…… Date: ……..

Appendix 2. Visitor log template

Date	Name	Company	Contact Number	Visitor Biosecurity Declaration completed	Responsible staff member	Time-In	Time-Out
25/10/17	*John Doe*	*Plumbing Service*	*0888 888 888*	*Yes*	*Jane Doe*	*9:00*	*14:00*

Appendix 3 Farm Entry Conditions for Visitors

Entry to this farm is subject to the following conditions:

- Entering Visitors **MUST NOT** have been in contact with any other aquaculture, seafood processors, ornamental aquatic animals or the aquatic environment on the same day prior to entry.
- Visitors **MUST** complete a visitor biosecurity declaration.
- Visitors **MUST** complete the visitor's log.
- Visitors **MUST** clean and sanitise hands and boots at wash stations prior to entering production areas of the farm

Appendix 4. Pre-Employment Biosecurity Declaration

I, ……. hereby agree to abide by (INSERT FARM NAME) biosecurity plan and will follow SOPs provided.

I understand the following applies at all times and I will:

1. Attend work in clean, laundered clothes
2. Only enter the areas of the farm which I am approved to access
3. Follow the flow of work from the highest biosecurity zone (e.g. hatchery) to the lowest biosecurity zone (production grow-out), and never in reverse.
4. Immediately report any biosecurity breaches to management
5. Immediately report any suspicion of disease emergence to management.

I must not:

1. Visit other aquaculture sites or seafood processes for 24 hours prior to entry to the farm, unless I have had a full head to toe shower and changed into clean laundered clothes and sanitised footwear.
2. Wear, or take boots which are worn in a specific production area outside the production area to which they are designated.
3. Move any equipment which is designated to stay within a zone of the farm, outside of that zone.

Signature: …….. Date: ……..

Appendix 5. Emergency Response Plan

This document outlines the actions and responsibilities that are to be undertaken in the event that an emergency fish disease is suspected in the farm.

A. Define the Trigger to execute the plan

Licence conditions commonly use terminology such as, "*unusually high, unexplained mortality*". This needs to be defined for the individual farm area, as the trigger may differ according to fish size e.g. daily mortality rate, abnormal stock behaviour, or certain clinical signs such as pop eye, red skin lesions.

B. Important Contacts

Position	Name	Contact details
General Manager Biosecurity manager	Martin Crossley	Mobile: 0492 073 310 Email:oldgoldfisheries@outlook.com
Farm veterinarian	Matt Landos, James Fensham	Mobile: 0437 492 863 Mobile: 0438 302 048 Email: matty.landos@gmail.com Email: jamesffvs@gmail.com
State Govt Aquatic Biosecurity Officer	Jeffrey Go Melissa Walker Debra Doolan Graeme Bowley	Mobile: Jeffrey Go (0418 482 951); Melissa Walker (0439 312 095); Debra Doolan (0428 921 397) Emma Wilkie (02) 4916 3845 Email:jeffrey.go@dpi.nsw.gov.au Melissa.walker@dpi.nsw.gov.au Debra.doolan@dpi.nsw.gov.au Emma.wilkie@dpi.nsw.gov.au
Emergency Disease Watch Hotline	State hotline for pest and disease	1800 675 888
State Govt Laboratory-Elizabeth Macarthur Agriculture Institute (EMAI), Menangle, NSW	Request 'Duty Veterinarian'	Phone: (02) 4640 6327 Email: menagle.rvl@dpi.nsw.gov.au

C. Responsibilities to notify and actions

Action	Person responsible to execute	Signature	Date
1. Contact the Farm manager- Martin Crossley	*All staff should have capacity to elevate their concerns of a major disease outbreak*	_____	__/__/__
2. Contact farm veterinarian FFVS 0437 492 863; 0438 302 048	Martin Crossley		__/__/__
3. Contact the relevant Government authority-	Martin Crossley		__/__/__
4. Contact neighbouring farms (SMT), or farms who have received stock from the suspect affected farm	Martin Crossley		__/__/__
5. Document and follow instructions as directed by Government authority	Martin Crossley		__/__/__
6. Halt all movement of fish and water from the farm	Martin Crossley		__/__/__

	until disease status known and approval granted			
7.	Stop water movement out of the affected pond/raceway/tank through blocking inflow and where possible outflow	Martin Crossley		__/__/__
8.	Stop water movement out of the farm, in the event of material disease. Block pipe to wetland settlement pond and turn off all entry water to farm.	Martin Crossley		__/__/__
9.	Collect typically affected sick fish and immediately submit for laboratory diagnostics	Martin Crossley and farm veterinarian if on site.		__/__/__
10.	Isolate any suspected disease stock from other stock on farm	Martin Crossley		__/__/__
11.	Cease all non-essential visitor/contractor movements onto the farm	Martin Crossley		__/__/__
12.	Advise farm staff not to move any equipment from the suspect diseased area to other farm areas.	Martin Crossley		__/__/__
13.	Restrict all non-essential staff movement into the suspect disease area.	Martin Crossley		__/__/__
14.	Compile a list of all movements of stock, staff, equipment, feed, visitors and machinery in the previous 2 weeks	Martin Crossley		__/__/__

D. Sample Collection, Packaging and Dispatch

Samples are to be collected by trained farm staff, as advised by *the relevant authority*, using the sampling SOP.

Document which staff members have been trained in sample collection and packaging.

1. Sample collection

The following guidelines are to be followed when submitting fresh samples:

Seek advice from the state government Aquatic Biosecurity Officer for collection and submission of samples and the farm veterinarian.

- Do not sample already dead animals unless specifically requested to do so.
- Preferably, submit typically affected sick but still living stock.

- Where live samples cannot be readily moved to the laboratory, some samples should be preserved in 10% buffered formalin, some frozen in individual bags, and some freshly killed sick fish each an individual zip lock plastic bag, sent chilled on ice to the laboratory.
- Submit sick and healthy stock separately, in separate labelled pots.

2. Sample labelling

- Legible and permanent labelling of samples is required.
- A key list of samples should be sent to identify each sample in the package being sent to the laboratory
- Include the following information on a specimen advice form:
    - Site address
    - Contact details
    - Date
    - History of the event: when, where, which stock were affected

3. Packaging samples

- Samples must be carefully packed to avoid breakage, leakage or contamination. Multiple layers of sealed packaging must be used.
- Pack samples in an appropriate container (e.g. a disposable poly box or foam esky) together with sufficient paper or absorbent material to soak up any leakage. Secure the lid with tape and pack into a cardboard box.
- Use IATA 650 packing instruction. https://www.iata.org/whatwedo/cargo/dgr/Documents/packing-instruction-650-DGR56-en.pdf

4. Sample submission

Samples must be submitted as soon as possible following collection (particularly any fresh material on ice). Decomposed samples are of limited diagnostic value. Ring the laboratory to advise the shipment of samples is coming to them. Provide courier details, if possible, to allow tracking.

Submission details should include:

Elizabeth Macarthur Agriculture Institute (EMAI), Menangle, NSW

Address samples are to be submitted to:

Specimen receival

Elizabeth Macarthur Agricultural Institute

PMB 8, CAMDEN, NSW 2570

Phone: (02) 4640 6327

Name and contact number of courier - transport may be arranged directly through the relevant authority or laboratory

E. Disposal Protocols

Before implementing any disposal or quarantine protocols, instruction from NSW DPI must be obtained to ensure compliance with General Biosecurity Obligations under the Biosecurity Act.

Should this emergency plan be triggered mortalities will be rapidly collected using double-lined seafood bins (or other alternate). They will be transported to the approved onsite burial site, avoiding leakage enroute. No dead stock will be returned to the environment or accessible to scavengers. Mortalities will be covered in lime and dirt to ensure no access to scavengers.

Disposal options may need consideration in this plan as to the volume of stock, based on farm size, which may be required to be disposed of. See AQUAVETPLAN – Operational procedures manual – Disposal www.agriculture.gov.au/SiteCollectionDocuments/animal-plant/aquatic/aquavetplan/disposal-manual.pdf *for further information.*

F. Key Response Plans

If a disease listed in Appendix 6 is identified, the farm will refer to relevant AQUAVETPLAN Disease Strategy manuals where available, as directed by the farm veterinarian.

https://www.agriculture.gov.au/animal/aquatic/aquavetplan

- Directions from NSW DPI Aquatic Biosecurity and NSW CVO.

Appendix 6- Australia's National Reportable Disease List- Finfish

Disease	Listed in the OIE Aquatic Animal Health Code (2018)	Listed regionally (OIE/NACA) (2018)	Exotic to Australia
1. Epizootic haematopoietic necrosis – EHN virus	Yes	Yes	
2. European catfish virus / European sheatfish virus			Yes
3. Infectious haematopoietic necrosis	Yes	Yes	Yes
4. Spring viraemia of carp	Yes	Yes	Yes
5. Viral haemorrhagic septicaemia	Yes	Yes	Yes
6. Channel catfish virus disease			Yes
7. Viral encephalopathy and retinopathy		Yes	
8. Infectious pancreatic necrosis			Yes
9. Infection with HPR-deleted or HPR0 infectious salmon anaemia virus	Yes		Yes
10. Infection with *Aphanomyces invadans* (epizootic ulcerative syndrome)	Yes	Yes	
11. Bacterial kidney disease (*Renibacterium salmoninarum*)			Yes
12. Enteric septicaemia of catfish (*Edwardsiella ictaluri*)		Yes	
13. Piscirickettsiosis (*Piscirickettsia salmonis*)			Yes
14. Gyrodactylosis (*Gyrodactylus salaris*)	Yes		Yes
15. Red sea bream iridoviral disease	Yes	Yes	Yes
16. Furunculosis (*Aeromonas salmonicida* subsp. *salmonicida*)			Yes
17. *Aeromonas salmonicida* - atypical strains			
18. Whirling disease (*Myxobolus cerebralis*)			Yes
19. Enteric redmouth disease (*Yersinia ruckeri* – Hagerman strain)			Yes
20. Koi herpesvirus disease	Yes	Yes	Yes

21. Grouper iridoviral disease		Yes	Yes
22. Infectious spleen and kidney necrosis virus – like (ISKNV-like) viruses[1]			Yes
23. Infection with salmonid alphavirus	Yes		Yes
24. Tilapia lake virus (TiLV) disease		Yes	Yes

Appendix 7: Laboratory specimen advice form

NSW DEPARTMENT OF PRIMARY INDUSTRIES

Diagnostic and Analytical Services

Veterinary Laboratory Specimen Advice

Number
Date
Officer
Laboratory Use Only

OWNER ..... Property Address .....

Locality ..... RLPB .....

RLPB Property ID ☐☐☐☐☐☐☐☐ or PIC ☐☐☐☐☐☐☐

SUBMITTER ..... Address .....

..... Phone ..... Fax .....

Date sampled ..... Date submitted .....

DISEASES SUSPECTED 1. ..... 2. ..... 3. .....

NUMBER AND TYPE OF SPECIMENS	TESTS REQUESTED	Laboratory Use

✓ ☐ Diagnosis ☐ Monitoring ☐ MAP ☐ Show ☐ Research (WBS.....) ☐ Exotic/Notifiable
☐ Eradication ☐ Accreditation ☐ AI Centre ☐ Sale ☐ Shipment to..... ☐ Other.....

SPECIES ..... Breed ..... Age ..... Sex .....

NUMBER OF ANIMALS At risk ..... Sick ..... Dead .....

HISTORY (husbandry, nutrition, treatment, clinical signs, lesions) **Previous Lab Report No. (or date specimens sent)**

Signature Date

Test results and findings may be provided to authorised staff and used for statistical, surveillance, extension, certification and regulatory purposes in accordance with Departmental policies. The information assists disease and residue control programs and underpins market access for agricultural products. The source of the information will remain confidential unless otherwise required by law or regulatory policies.

NSW DEPARTMENT OF
PRIMARY INDUSTRIES

Veterinary Laboratories

MENANGLE

Regional Veterinary Laboratory
Elizabeth Macarthur Agricultural Institute
PMB 8
CAMDEN NSW 2570

Delivery: Woodbridge Road
MENANGLE NSW 2568

Telephone Enquiries: (02) 4640 6327
Facsimile: (02) 4640 6400
Email: menangle.rvl@agric.nsw.gov.au

Appendix 8: Quarantine fish entry protocol

Purpose: for the reduction of risk of entry of important pathogens on fish entering Old Gold Fisheries.

Broodstock source:

Preferably source broodstock from populations closest to the farm. Never bring fish which are exhibited significant signs of sickness into the farm, nor collect fish from sites experiencing disease outbreaks.

Broodstock transportation:

Use legal anaesthetic agents (benzocaine, AQUI-S with off-label veterinary prescription) to anaesthetise broodstock prior to handling to limit damage to fish. Use slings to carry fish to support their bodyweight and avoid splitting fins on nets.

Transport fish in low concentration of salt 2-3g/L. Ensure oxygenation remains at 90-110% saturation, through use of supplemental oxygen and Fresh Flo propeller driven aerators. Keep carbon dioxide levels under 25mg/L through sufficient degassing. Use of ammonia binder is recommended. Ensure transport water has similar temperature, pH and alkalinity parameters to the source water at loading. It should however start free from total ammonia nitrogen, algae and suspended sediment.

Slight cooling of the transport water may be desirable to lower fish metabolism. Do not allow transport water to heat up above the water temperatures of the source water body.

Upon arrival at Old Gold Fisheries quarantine system, the water quality in transporter should be measured: pH, temperature, total ammonia nitrogen, dissolved oxygen and recorded on the transport sheets.

The quarantine system should be started 3 weeks prior to arrival of broodstock, to allow maturation of the biofilter. Ensure the system has <0.1mg/L total ammonia nitrogen. Ensure system has 2-3 g/L salt. Footbath and hand sanitisers should be in place at the door and in mandatory use.

Broodstock unloading procedure

If the transport water pH is >1.0 lower than the pH of the quarantine tanks, then white vinegar should be used to lower the quarantine tank, until it is within 0.5 of the transport tank pH.

The fish should be anaesthetised in the transport tank, and removed with a sling, to move into the quarantine tanks. When anaesthetised fish should be examined for external signs of parasites and disease, with skin and gill mucous scrapes collected and immediately examined under the compound light microscope. Broodstock should be microchipped at this time. Results of examinations are to be recorded on fish health observation sheets, stored in the quarantine lab folders.

Further guidance from the farm veterinarian should be sought if unusual lesions or parasites are detected.

Transport truck decontamination

The transport tank water should be disinfected with chlorine at 50ppm for one hour, prior to neutralising with sodium thiosulfate and irrigating onto the paddock. It should not be discharged into the waterway or effluent channels of the farm.

The truck should be washed down with truckwash detergent.

Broodstock quarantine surveillance

Broodstock are to be held in the quarantine system for 4 weeks. During this time daily observation of the fish is to occur, with signs of sickness to be promptly investigated at the farm, and laboratory if necessary.

System water quality must be maintained in the optimal range:

pH 6.7-7.8; DO-90-110% saturation; TAN < 0.3mg/L; Nitrite <0.2mg/L; Nitrate <100mg/L; temperature 12-28°C (with less than 1°C change per day).

A prophylactic treatment of 25mg/L of formalin is recommended after 2 weeks in quarantine, and repeated after one more week.

Stock should only be released from quarantine if they are not exhibiting any abnormal signs of disease.

Appendix 9: Decontamination protocol

STANDARD OPERATING PROCEDURE					
Task/activity (including specify particular equipment, substance) Decontamination procedures to prevent entry and spread of fish diseases with disinfectant (BKC, sodium hypochlorite, Virkon, Iodophors, etc) Equipment: permitted disinfectant, tubs, containers, buckets, spray bottles, wipe cloth, rinse water.				**Date prepared:** 06/01/2020	
Prepared by					
Name	FFVS	**Position**	Consultant Veterinarian	**Signature**	

DETAILS

CAUTION

Corrosive, oxidative agents with biocidal properties.

Preparation:

Ensure that chemicals are stored and prepared in a well-ventilated area and are within their expiry date. Storage conditions should comply to Worksafe regulation. They should be out of direct sunlight.

Remember that effective cleaning, is responsible for 90% of the efficacy of the disinfection procedure.

Do NOT mix chlorine compounds with acids, or other chemical compounds.

Chlorine disinfection baths must be made up fresh daily. The disinfection properties are rapidly lost.

Definitions:

BKC – Benzalkonium chloride

Personal Protective Equipment (PPE)

Appropriate PPE (coveralls, gloves, face mask, safety goggles boots, etc) – comply with the SDS guidance of the product in use.

If the chemical contacts the eyes, immediately irrigate the eyes with eyewash solutions and refer the person to hospital.

2.0. The Preparation:

Order chemicals and safety equipment. Contact FFVS (Matt Landos; 0437 492 863 matty.landos@gmail.com**)**

3.0. The Procedure:

Wash down infected or potentially contaminated items thoroughly by pressure spray (vehicles) or by dipping/washing and physical scrubbing with non-corrosive detergent prior to disinfection.

Rinse with clean water.

Immersion treatment with liquid chlorine (sodium hypochlorite) using commercially registered products that contain <15% free chlorine:

1. 200 mg/L available chlorine. Always add the concentrate to the water. Do NOT add water to the concentrate.
2. Allow time to completely saturate the material of the item, plus a further 2 minutes (minimum).
3. Rinse items in copious amounts of fresh water and/or neutralise with sodium thiosulfate.

On completion of work:
Disinfectant solutions should be disposed of in an appropriate manner.

A 1% solution of thiosulfate may be used to inactivate both compounds. The required volume of 1% thiosulfate (in mL) can be calculated as follows:

Chlorine

28.5 × (litres of disinfecting solution × concentration in mg/L)/100

Iodine

7.8 × (litres of disinfecting solution × concentration in mg/L)/100

Be aware of:

Relevant chemical MSDS.

Accident:

Refer to the relevant chemical MSDS.

Note: Review this Standard Operating Procedure:

a) after any accident, incident or near miss;

b) when training new staff;

c) if adopted by new work group;

d) if equipment, substances or processes change; or

e) within 5 years of date of issue.

Appendix 10: Permitted aquaculture chemicals

Note all chemicals can strictly only be used for the specific purpose stated on the Minor Use Permit, or the registered label. No other uses are permitted. Only the species listed on the permit can be have the product applied to them. Only the specific brand of product (unless otherwise specified) on the permit is permitted. Only the identified user group on the permit, are eligible to use the chemical on a minor use permit.

All permits are available on the Australian Pesticides and Veterinary Medicines Authority (APVMA) website www.apvma.gov.au

Benzocaine- fish anaesthetic. Minor Use Permit: 14638

Benzylkonium chloride (BKC)- equipment disinfection only: Minor Use Permit 84975

Buffodeine – egg disinfectant: Minor Use Permit 86878

Chorulon – HcG – spawning induction agent: registered. Only available under veterinary prescription and supply.

Copper sulfate – ectoparasite and fungal treatment for static ponds only: Minor Use Permit 14748 –

Formalin – ectoparasiticide and fungal treatment: Minor Use Permit 87759-

Hydrogen peroxide (50% and 60%): ectoparasiticide and fungal control: Minor Use Permit 88576 –

LHRHa: spawning induction agent – Minor Use Permit 13069

Ovaprim: spawning induction agent- Minor Use Permit 13800

Potassium permanganate: ectoparasiticide – Minor Use Permit 14749

Sodium percarbonate – ectoparasiticide- Minor Use Permit 89449

Liquid chlorine with < 15% active chlorine is permitted for use.