Environmental Response Protocol - October 2017

Salty Lagoon Monitoring: Post Closure of Artificial Channel

PO Box 119
Lennox Head NSW 2478
T 02 6687 7666

PO Box 1446
Coffs Harbour NSW 2450
T 02 6651 7666

PO Box 1267
Armidale NSW 2350
T 02 6772 0454

PO Box 229
Lismore NSW 2480
T 02 6621 6677

info@geolink.net.au

Prepared for: Richmond Valley Council

UPR	Description	Date Issued	Issued By
1731-1281	First issue	13/10/2017	David Andrighetto
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1. Introduction

1.1 Aim

The principal aim of this protocol is to document the procedures resulting in, and followed during, a response to a potential environmental incident in the Salty Lagoon system. The most relevant environmental incident that may require a response is an episode of poor water quality in Salty Lagoon with the potential to cause a fish kill. The key water quality variable in Salty Lagoon with the potential to cause a fish kill is a critically low dissolved oxygen concentration.

1.2 Background

Since 2008 water quality and other environmental variables have been monitored in Salty Lagoon, first as part of the Salty Lagoon Ecosystem Recovery Monitoring Program (ERMP) and subsequently as part of the Salty Lagoon Monitoring Pre/ Post Channel Closure (MPPC) program. Following on from this monitoring, an additional five-year Post Closure Monitoring Program (PCMP) has been implemented. The ERMP was implemented to monitor the response of the system to an upgrade of the Evans Head Sewage Treatment Plant (STP) and the MPPC was implemented to monitor the response of the system to closure of the artificial channel connecting Salty Lagoon and Salty Creek.

The additional five-year PCMP has been implemented with three main objectives:

1. Monitoring the health of Salty Lagoon and confirming that Evans Head STP discharge is not adversely impacting water quality and ecology at Salty Lagoon.
2. Monitoring water quality and attributes of the previous MPPC program where predicted trends have not been confirmed and risks to the ecosystem health still remain.
3. Observing medium to long term changes in the Salty Lagoon system in response to channel closure.

The primary outcome of this revised monitoring program is to inform decision makers in the future of the effect, if any, of continued long-term discharges of the Evans Head STP effluent into the Salty Lagoon system. One of the main variations in monitoring is associated with the removal of automated alarms from the system, given the reduction in alarms and adaptive management trips following the closure of the artificial channel.

Historically, the risk of a fish kill occurring in the Salty Lagoon system led to the introduction of a risk monitoring and event response protocol (Hydrosphere 2009) during the ERMP. Whilst not preventing fish kills, the protocol was valuable in the sense that information gathered during the event responses gave a detailed picture of the major risk factors occurring prior to a fish kill and the processes leading to a fish kill. For this reason, the key elements of the risk monitoring and event response protocol were maintained when the MPPC began.

The key factors that contributed to fish kills observed in Salty Lagoon following implementation of the event response protocol were:

- sustained periods of high salinity and high water levels;
- low dissolved oxygen concentrations;
- high temperatures; and
- rapid draining of the water from Salty Lagoon.

1.3 Current Context

The artificial channel connecting Salty Creek and Salty Lagoon was filled in by works that occurred from May to July 2012. Since the infill of the artificial channel the risk of some of the factors listed above has been reduced markedly. Although there is still some risk of seawater penetration into the Salty Lagoon system, the risk of it leading to very high concentrations of salt has been greatly reduced by the increased capacity for storage of fresh water and the subsequent likelihood of dilution. The risk of high temperatures has also been reduced because of the increased storage capacity and reduced light penetration to the bottom of the water column. The risk of rapid draining of the water from Salty Lagoon has been removed entirely. It is noted that an eroding head cut progressing between the creek and the lagoon, without suitable monitoring and management, may reinstate the connection between the two water bodies, hence returning the site to pre channel fill state. Generally speaking, the triggers that were developed during the ERMP are no longer relevant.

There are some new risks associated with the infill of the artificial channel and the changes to the Salty Lagoon ecosystem. These are:

- Potential deoxygenation of the water column resulting from:
    - a rapid increase in nutrient concentrations and biological processing of nutrients (primarily sourced from the decomposition of plant matter); and
    - the changeover period between a degraded brackish system with fluctuating water levels to a freshwater system with stable water levels (primarily relating to the decomposition of plant matter).
- Potential for salinity increases resulting from saltwater intrusion via Salty Creek.
- Risks associated with high temperatures (although the possibility is low).

In addition to the above information, continued monitoring of the data collected from Salty Lagoon and application of the adaptive management response protocol since the closure of the artificial channel have indicated that most of the time the DO concentrations at the bottom of the water column, where the permanently installed loggers are located, are low to very low (**Figure 1.1**). However, the percentage of low dissolved oxygen concentrations has reduced in the years since the channel was closed and the dissolved oxygen concentrations at the surface (and the majority of the water column) have been shown to be relatively stable and adequate for supporting biota in the main body of Salty Lagoon.

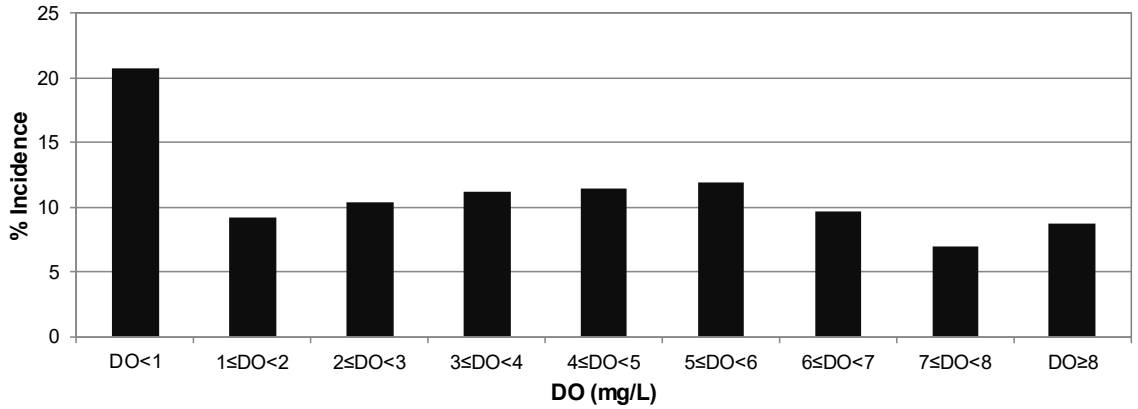

Figure 1.1 Percentage incidences of DO concentration brackets at the bottom of the water column since July 2012

With respect to DO concentrations, since closure of the artificial channel the water column in the main body of Salty Lagoon is sometimes stratified into a moderately well oxygenated surface layer (**Figure 1.2**) and an anoxic, occasionally hypoxic bottom layer. There are several factors that contribute to low DO concentrations at the bottom of the water column, including:

- Decomposing plant material resulting from the changeover from a degraded brackish to a freshwater system.
- Low background DO concentrations.
- Low benthic productivity due to poor light penetration.
- High DO consumption among benthic sediments resulting from elevated nutrient and organic matter processing.

It is uncertain how long these conditions will persist.

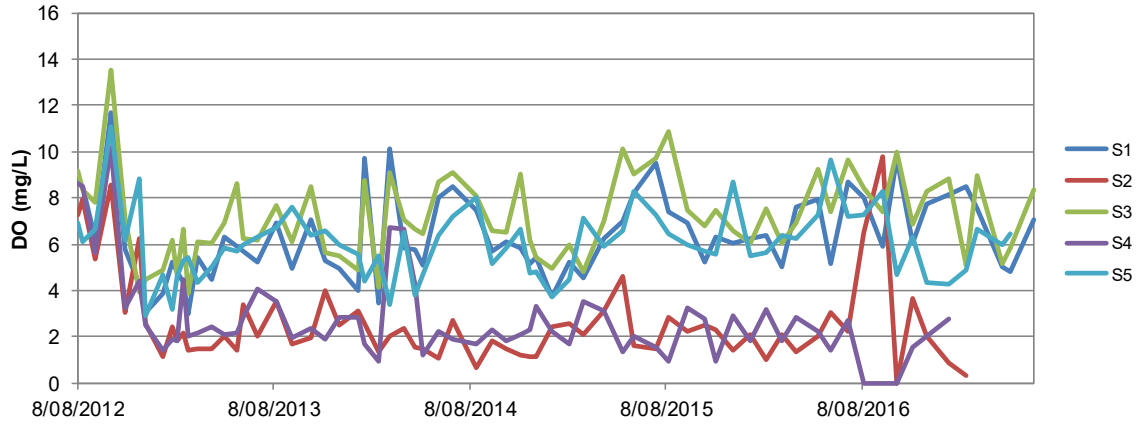

Figure 1.2 Surface DO concentrations at all sites since August 2012

In summary, the key factors that influence overall DO concentrations in Salty Lagoon can include:

- Diffusion of air into the surface waters, leading to higher surface water DO concentrations.
- Concentration of Microalgae, with photosynthesis (day) and respiration (night) producing and consuming oxygen respectively.
- Light availability influencing photosyntehese of microalgae (Turbidity).
- Wind and flow driven mixing, with more mixing leading to a well oxygenated water column.
- Water Level, with an effect on the impact of wind driven mixing and light availability to the entire water column.
- Salinity which can result in severe deoxygenation of the water column.

2. Event Response

2.1 Risk Monitoring

2.1.1 Monitoring Pre/ Post Channel Closure

Permanent water quality monitoring stations (PWQMS) were installed in Salty Lagoon and Salty Creek in May 2008. The PWQMS recorded and transmitted water quality and water level data at 15 minute intervals. This information formed the basis of ongoing risk monitoring. The data from the PWQMS was monitored on at least a weekly basis with email alerts sent to GeoLINK staff under particular circumstances. The triggers for email alerts have been revised over the course of the MPPC.

Triggers were revised and set at levels that reflected some environmental risk and intended to strike a balance between too many alerts and facilitating a rapid response when an event occurs (Hydrosphere 2009):

- Dissolved oxygen concentration < 1 mg/L – average over one hour.
- Dissolved oxygen concentration < 1 mg/L – average over three hours.
- Water temperature > 30˚C.
- Water level change (up or down) > 0.05 m in one hour.
- Water level change (up or down) > 0.4 m in 24 hrs.

Given that a variety of environmental scenarios have been observed (e.g. heavy rainfall, extended dry conditions, saline water ingress, etc.) over the course of the monitoring program, revised parameters were developed in 2013. The subsequently revised trigger levels for the Salty Lagoon PWQMS were as follows:

- Dissolved oxygen concentration < 1 mg/L – average over 12 hours.
- Conductivity > 3 mS/cm.
- Water temperature > 30˚C.

Typical responses to the receipt of alarms were based upon an assessment of risk that was dependent upon other supporting information and the understanding of the state of the system. Since the beginning of the MPPC a large number of alarms resulted in further response, i.e. a site inspection. This was particularly true in the early phase immediately following the closure of the artificial channel.

The changes to the alert triggers were based on the likelihood of differing scenarios following the closure of the artificial channel. The modified dissolved oxygen trigger was an acknowledgement of the increased likelihood of low dissolved oxygen at the base of the water column resulting from the greater water depths experienced in Salty Lagoon following the closure of the artificial channel. The introduction of a conductivity trigger was in response to the risk of saltwater penetration from Salty Creek. Although this is a natural feature of the system, it was still considered important to have immediate knowledge of such an occurrence via an alarm. The removal of the alarm for a change in water level was an acknowledgement that water level change was no longer related to a specific environmental risk in Salty Lagoon.

In moving beyond the MPPC, it has been acknowledged that the PWQMS have surpassed their useful life, and as such have been replaced with new water quality sondes and probes. Since the channel closure in 2012, there has been a clear reduction over time in alerts and subsequent adaptive management field trips with the risk of instantaneous events leading to fish kills reduced with the stabilisation of the Salty Lagoon ecosystem. Given this, the newly deployed water quality monitoring infrastructure will not be telemetered for alarm purposes however will still provide important water quality data at bimonthly intervals used to monitor ecosystem health.

2.2 Alarm Response

2.2.1 Previous Application

Since the beginning of the MPPC, upon receipt of an alarm, the current responses were either Level 1 or Level 2 (Hydrosphere 2010). A Level 1 response resulted in an increased frequency of checking data on the Richmond Valley Council (RVC) server. A Level 2 response resulted in a site inspection and extra round of water quality sampling. The site inspection was based upon a check of the banks of Salty Creek and Salty Lagoon for any sign of ecosystem disturbance such as a fish kill, algal bloom or impacts upon aquatic vegetation. Water quality sampling undertaken as part of an event response replicated the routine monthly discrete water quality sampling. Details of the previous alarm triggers and their allocated response level follow:

- DO < 1 mg/L – average over one hour – **Level 1 response**.
- DO < 1 mg/L – average over three hours – **Level 2 response**.
- Temp > 30°C – **Level 1 response**.
- Water level change (up or down) > 0.05 m in one hour – **Level 1 response**.
- Water level change (up or down) > 0.4 m in 24 hours – **Level 1 response**.

2.2.2 Revised Response

The revised response adopted in 2013 was based upon **Figure 2.1**.

2.2.3 Further Monitoring and Response

As addressed above, there were 13 adaptive management visits based upon alarms prior to channel closure and 10 adaptive management visits in the first 30 months following channel closure. There have been no adaptive management visits based on alarms since November 2014. Given the reduction in alerts and subsequent adaptive management field trips, the newly deployed water quality monitoring infrastructure will not be telemetered for alarm purposes. This results in a new pathway in regards to incident response and management. Because the risk of instantaneous events leading to fish kills has reduced with the stabilisation of the Salty Lagoon ecosystem, it is expected that the bimonthly monitoring will enable the determination of potential negative trends over the course of the program. Evans Head STP discharge data would continue to be assessed, with the notification provided for any Environmental Protection Licence (EPL) discharge exceedances.

Adaptive management will be undertaken in conjunction between Aquatic Science and management, GeoLINK and RVC, as part of the ongoing management of Salty Lagoon. The experience gained amongst the Project team will enable them to monitor external conditions which have led to previous adaptive management trips. The revised response will be based upon **Figure 2.2**.

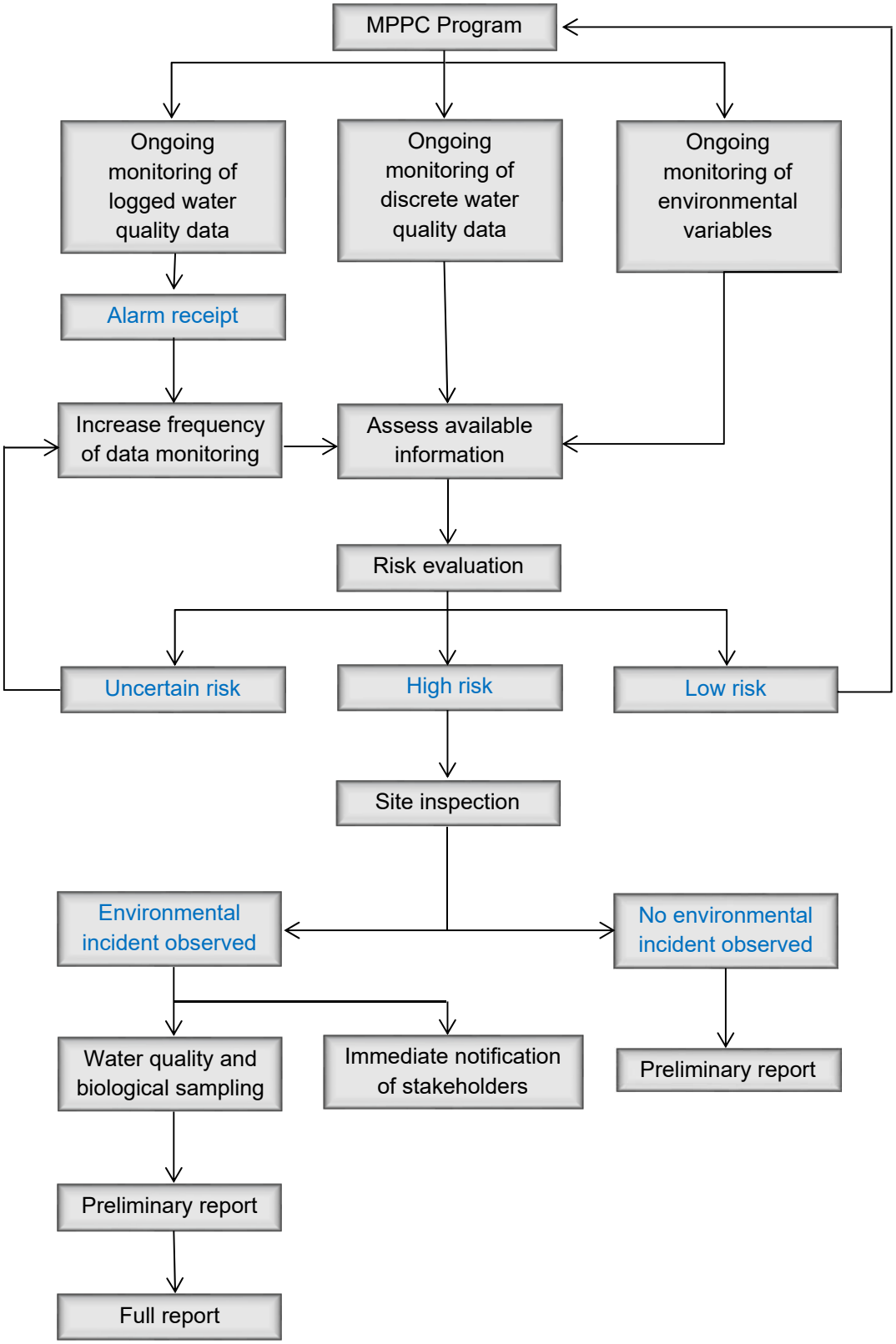

Figure 2.1 Salty Lagoon Response Protocol (adopted 2013)

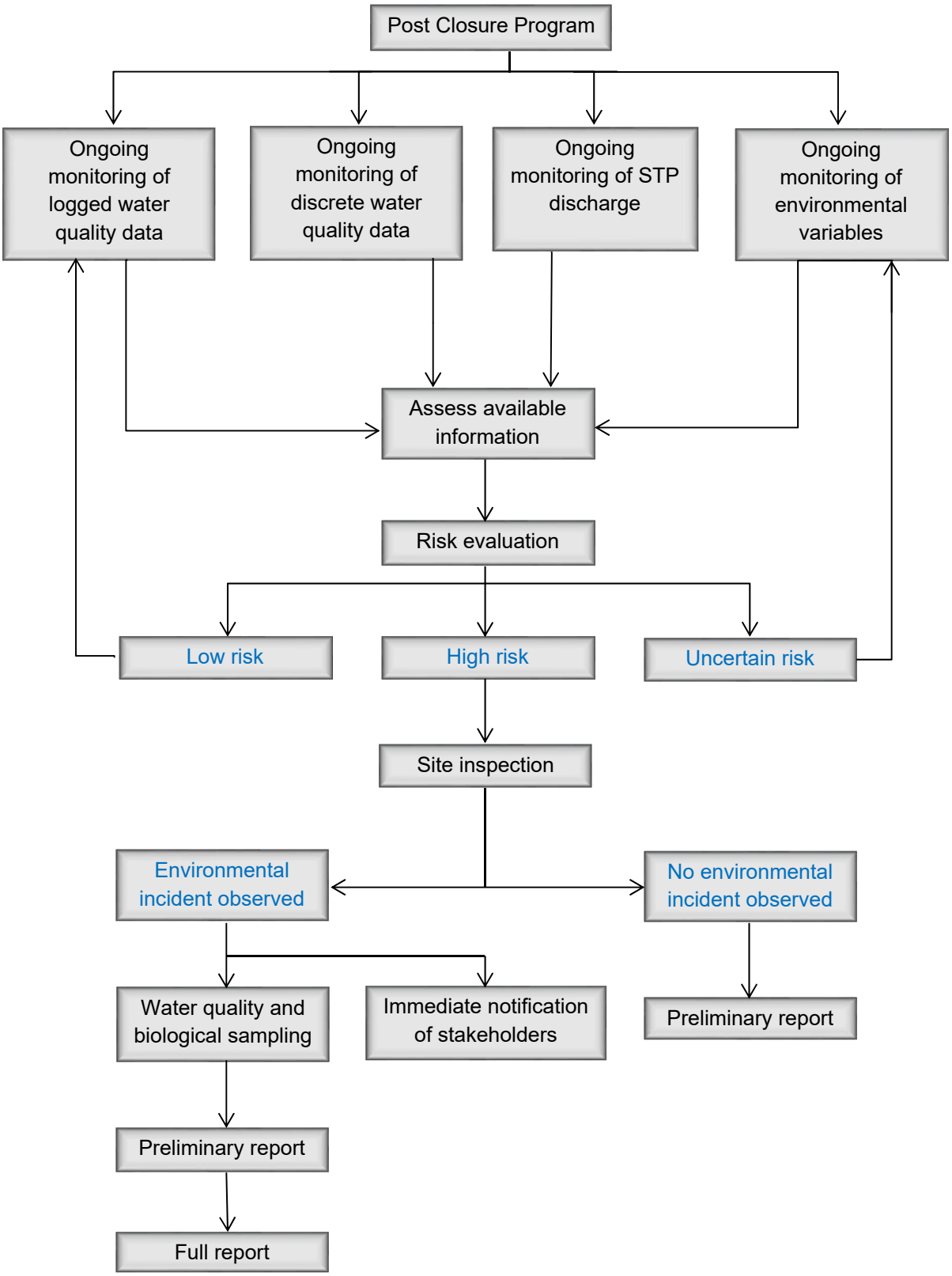

Figure 2.2 Salty Lagoon Revised Response Protocol (2017)

2.2.4 Detailed Response Protocol

The details of the environmental incident response protocol are displayed in **Table 2.1**.

Table 2.1 Details of Steps in the Revised Environmental Incident Protocol for Salty Lagoon

Task	*Description*	*Responsibility*
Post closure program ongoing monitoring of water quality data and environmental variables	Ongoing monitoring involves bimonthly checking of the logged water quality data, bimonthly measurements of surface water quality including physico-chemical, chemical and biological measurements, and surveys of aquatic weeds.	GeoLINK, Aquatic Science and Management
Ongoing monitoring of Evans Head STP discharge	Ongoing fortnightly monitoring of Evans Head STP discharge, including discharge quality and faecal coliform, Total Nitrogen (TN) and Total Phosphorus (TP) concentrations. The data collected from the Evans Head STP is used to contextualise results collected during ongoing monitoring and inform any pollution incidents that may occur.	Richmond Valley Council
Risk evaluation	Use all available data to evaluate the risk of the circumstances leading to environmental incidents. The key data include all recent water quality data and recent observations of environmental variables such as vegetation decay, tidal information potentially affecting the status of the entrance to Salty Creek and data from the Evans Head STP. Risk is classified as either **high**, **low** or **uncertain**. Risk remains as **uncertain** until classified as **high** or **low.** Classification of **low** risk is by consensus among representatives of RVC, GeoLINK and Aquatic Science and Management. If the perceived risk is thought to be **high** by a representative of RVC, GeoLINK or Aquatic Science and Management, a site inspection is required and all other parties are to be notified immediately by phone and email. In the case that the conditions resulting in a risk evaluation persist, risk will be re-evaluated on a weekly basis.	Richmond Valley Council, GeoLINK, Aquatic Science and Management
Site inspection	A site inspection will be conducted within 24 hours of a high risk classification. A site inspection involves: ■ Physico-chemical water quality measurements at least five sites using a hand held probe. ■ Checking the open water, banks and surrounding vegetation for evidence of fish kill or other loss of fauna. ■ Checking for signs of abnormal vegetation	GeoLINK, Aquatic Science and Management

Task	Description	Responsibility
	or algal growth or death.	
Water quality and biological sampling	In the case that an abnormal environmental incident is noted during the site inspection water quality and biological sampling will proceed. Water quality monitoring will replicate the routine bimonthly water quality sampling in addition to any other samples/ analyses deemed necessary. RVC will be notified of any variation to the normal monthly monitoring prior to laboratory analysis. Biological sampling may include sampling fish, plant material or algal material dependent upon the nature of the incident.	GeoLINK, Aquatic Science and Management
Immediate notification of stakeholders	In the case of an environmental incident, representatives of DPI (Fisheries), OEH (EPA) and NPWS will be notified immediately by phone. In the case of a fish kill, the protocol for reporting a fish kill will be implemented.	Richmond Valley Council, GeoLINK, Aquatic Science and Management
Preliminary report	Within two working days of any site inspection a preliminary report will be delivered to RVC. The preliminary report will describe: ■ a summary of the conditions in the lead-up to the site inspection and the factors that resulted in a high risk classification; ■ the results of physico-chemical water quality monitoring; and ■ the results of the site inspection, i.e., environmental incident detected/ no environmental incident detected.	GeoLINK, Aquatic Science and Management
Full report	In the case that an abnormal environmental incident is detected during a site visit and water quality and biological sampling proceed, a full report will be delivered to RVC within seven days of receiving results of the analyses of water quality and biological samples. A full report will describe: ■ a summary of conditions leading up to the site inspection and the factors that resulted in a high risk classification; ■ the nature of the environmental incident detected; ■ charts of logged water quality data in the lead up to and immediately after the site inspection; ■ the results of physico-chemical water quality monitoring; ■ the results of water quality and biological sample analyses undertaken in response to the environmental incident; and ■ follow-up required.	GeoLINK, Aquatic Science and Management

References

Hydrosphere Consulting (2009). *Salty Lagoon Ecosystem Recovery Monitoring Program – Environmental Incident Response Protocol*. Report to Richmond Valley Council.

Hydrosphere Consulting (2010). *Salty Lagoon Monitoring Program Pre/Post Closure of the Artificial Channel*. Report to Richmond Valley Council.

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Appendix A

Responsibilities and Contact Details

Responsibility	Name/ Position	Role	Contact Details
Representative – Richmond Valley Council	Craig Connolly (Water and Sewer Support Engineer)	■ Management of ERMP ■ DECC and DPI notification ■ Event response as required	craig.connolly@richmondvalley.nsw.gov.au Phone: 6660 0247 Mobile: 0457 505 625
	Johan Schoonwinkel (Water and Sewer Engineer)	■ Alternative RVC contact	johan.schoonwinkel@richmondvalley.nsw.gov.au Phone: 6660 0248 Mobile: 0414 395 706
Salty Lagoon Ecosystem Recovery Monitoring Program – GeoLINK Consulting	David Andrighetto (Project Manager / Ecologist) Duncan Thomson (Environmental Engineer/ Director) Mathew Birch (Aquatic Ecologist)	■ Data collection and monitoring ■ Risk Assessment ■ Alarm evaluation ■ RVC, NPWS, DPI notification as required ■ On-site assessment ■ Reporting	dandrighetto@geolink.net.au Phone: 6687 7666 Mobile: 0468 997 449 dthomson@geolink.net.au Phone: 6687 7666 Mobile: 0419 237 075 matbirch@iinet.net.au Phone: 6655 2140 Mobile: 0410 470 204
Representative – Broadwater National Park National Parks and Wildlife Service (NPWS)	Brian McLachlan (Ranger Richmond River Area)	■ Event response as required	brian.mclachlan@environment.nsw.gov.au Phone: 6627 0203
	Mark Pittavino (Area Manager, Richmond River Area)	■ Alternative NPWS contact	mark.pittavino@environment.nsw.gov.au Phone: 6627 0220
Representative – Fisheries Department of Primary Industries	Patrick Plunkett (District Fisheries Officer)	■ Event response as required in accordance with DPI Protocol for Investigating and Reporting Fish Kills (Appendix A)	patrick.plunkett@dpi.nsw.gov.au Phone: 6618 1800 Mobile: 0417 692 608
	Pat Dwyer (Fisheries Conservation Manager North)	■ Alternative DPI contact	patrick.dwyer@dpi.nsw.gov.au Phone: 6626 1397
Representative – Office of Environment and Heritage (OEH) – Environmental Protection Agency (EPA) branch	EPA Environment Hotline	■ Reporting of environmental incidents (24-hour)	Phone: 131 555
	Janelle Bancroft (Senior Operations Officer - North Coast)	■ Event response as required	Janelle.bancroft@epa.nsw.gov.au Phone: 6640 2513 Mobile: 0447 139 638

Appendix B

DPI Protocol for Reporting and Investigating Fish Kills

PROTOCOL FOR REPORTING AND INVESTIGATING FISH KILLS

Information on fish kills is available at: www.dpi.nsw.gov.au/fisheries/habitat/threats/fish-kills

Notification

When a report of a fish kill is received all information is to be recorded on the ***Fish Kill Notification & Investigation Report [Part A]***. Officers of the Department of Primary Industries (DPI) who receive this information must notify the Environmental Protection Agency (EPA) on 131 555 office and vice versa. Local offices of the Local Land Service and the relevant local council should also be notified.

Email the completed Part A form to ahp.central@dpi.nsw.gov.au and the relevant Regional Offices of DPI and EPA (see contact list) for their information. Each agency is responsible for information exchange within their respective departments.

Initial assessment

The officer receiving notification of the fish kill will decide whether a field investigation is warranted. This decision will be made following discussions with other staff (e.g. DPI and EPA) on the basis of: size of kill, sensitivity of waterway, potential cause (including likelihood of a disease agent), species affected, potential public interest, etc. If a field investigation is warranted, and DPI or EPA officers are not available, the department with primary responsibility for the investigation (see below) will endeavour to arrange an inspection by the local council or another government authority, whichever is most appropriate.

Field investigation

Generally, DPI officers will investigate fish kills in non-metropolitan areas while EPA officers will investigate fish kills in Sydney, Newcastle and Wollongong metropolitan areas. In many cases a joint inspection will be appropriate. Regardless of the location, EPA officers will be responsible for detailed investigation of kills which appear to be related to pollution events, hazardous chemical incidents or discharges from commercial or industrial premises.

Please note that all DPI Fisheries Officers in NSW have fish kill response kits available with required fish and water sampling and water quality testing equipment.

Investigating officers will inspect the site and complete the ***Notification & Investigation Report [Part B]***.
If officers from a local council or a department other than EPA or DPI investigate a fish kill, the investigating officer should discuss the fish kill with their regional DPI Aquatic Ecosystem Fisheries Manager at the earliest opportunity (see contact list). The completed Part B form and other information such as photos or information about local media articles should be emailed to ahp.central@dpi.nsw.gov.au .

Media contact

Fish kills can generate significant media interest. All media requests for comment should be directed to the **DPI Media Unit** on **(02) 6391 3686**. Prior to any response to the media, a common view should be established between EPA and DPI officers, including any other relevant parties. The Program Leader - Aquatic Ecosystems is the DPI co-ordinator for media contact (phone 6626 1370 or 0419 253 819). Alternatively, DPI Senior Fisheries Managers can provide a regional response (see contact list). Any EPA related media queries should be directed to the relevant EPA regional office (refer to Contacts below).

Collection and analysis of samples

Water quality - on-site water quality measurements should be undertaken where possible. Regional DPI Aquatic Ecosystem - Fisheries Managers, EPA officers and local councils generally have digital meters available to undertake such assessments (see list of contacts). Water samples should be taken if a pollutant, algae or disease is possible, particularly during or immediately following an event where fish are still dying or recently dead. Water samples should be taken from the affected area and if possible from a nearby unaffected area for comparison. Water samples should be kept cold, but not frozen. Specialist advice should be sought regarding relevant water sampling procedures if a disease is suspected please call Program Leader - Aquatic Biosecurity and Risk Management (ph 4916 3911) or EPA officers for pollutants or algae (see list of contacts for specialist advice). Water samples will need to be logged with an appropriate NATA laboratory for testing as soon as possible, and again, advice from the appropriate specialists should be sought.

Fish samples for a possible disease - a disease agent may be possible when only a single species has been affected or the fish have visible lesions, fungus, and/or sick fish are visible and continue to die over a period, rather than in a sudden incident. Fish samples should be obtained but only after consultation with the Program Leader - Aquatic Biosecurity and Risk Management (ph 4916 3911). All fish samples are to be lodged with the DPI Elizabeth Macarthur Agriculture Institute laboratory for analysis. All appropriate information is to be included, including time, date, and exact location. Transport of live fish is ideal, but if not feasible, approximately six, dying (not yet dead) individuals of each species affected should be placed in separate plastic bags and placed on ice, **NOT FROZEN**. Dead fish should not be submitted for disease diagnosis as any deterioration in the condition of the fish post death will confound the results. The final report on the samples will be received and reviewed by the Aquatic Biosecurity and Risk Management before being forwarded to the reporting officer to assist with interpretation of results and advice on appropriate course of action to take if results for disease are positive. Results will generally be provided within two weeks of submission.

Fish samples where another agent, other than disease is possible – another set of fish samples should also be obtained where poor water quality, pollution, algal bloom or other agent is possible. Approximately six recently dead or dying individuals of each species affected should be placed in separate plastic bags and placed on ice. If immediate delivery is not possible fish samples should be frozen. Fish samples should only be lodged with an EPA laboratory in consultation with the DPI Program Leader or regional Fisheries Managers in Aquatic Ecosystems (see contact list).

Reporting of laboratory analysis

The officer responsible for organising transportation and analysis of water and fish samples will be responsible for reporting results of the analysis to all organisations previously involved with the fish kill.

Database, lodging completed forms

All completed **Notification and Investigation Report** forms and results of analyses are to be forwarded to ahp.central@dpi.nsw.gov.au please make the email subject reads: 'FISH KILL: [state the location of kill]'. The NSW DPI Fish Kill Database Coordinator will include the details in the state-wide fish kill database. Information from the database is available on request (see contact details provided on the forms).

FISH KILL Form Part A: Notification Report

NAME OF WATERBODY: ……

CATCHMENT: ……
(e.g. Murray River, Sydney Harbour, Tuggerah Lakes)

PRECISE LOCATION WITHIN WATERBODY: ……

(Place a pin on a Google Earth map and email with the KMZ or KML file attached)

HABITAT DESCRIPTION: (circle/highlight as appropriate)

(A) Freshwater / estuarine / marine

(B) stream / river / anabranch / lake / billabong / swamp / drain / channel / impoundment / bay / lagoon / farm dam / beach / open ocean / other:……

REPORTED BY: ……
(Name, address, phone)

TIME / DATE REPORTED …… TIME / DATE KILL FIRST OBSERVED……

WEATHER CONDITIONS PRIOR TO OBSERVATION OF KILL: ……

……

TIDAL STATE/WATER LEVEL AT TIME OF KILL (if applicable):……

NUMBERS OF FISH AFFECTED (circle): less than 10 / 10 to 100 / 100s / 1000s / 10,000s / 100,000s / millions

CONDITION OF FISH (circle): dying / freshly dead / few hours old / few days old / decomposed

SIZE OF FISH (circle): all similar size (……cm) / range of size classes (…… to ……cm)

SPECIES OF FISH AFFECTED (circle): one species only / few species / many different species

Please list if known: ……

LOCATION OF FISH (circle): floating in water / on bottom / along waters edge / onshore

EXTENT OF KILL (area (ha) or length (m) of area affected): ……

(Create a polygon or line on a Google Earth map and email through the KMZ or KML file)

GENERAL OBSERVATIONS OF REPORTING PERSON: ……

……

……

OTHER FORMS OF WILDLIFE AFFECTED? (specify): ……

WHAT IS THE SUSPECTED CAUSE? ……

OTHER INDIVIDUALS & AUTHORITIES NOTIFIED

INDIVIDUAL	DEPARTMENT	LOCATION	COMMENTS

REPORTED TO : .....POSITION: .....LOCATION.....

ORGANISATION : ..... DATE: ..... PHONE……

REMINDER. Send copies of Parts A and B to:

NSW DPI Fish Kill Database Coordinator
1243 Bruxner Hwy WOLLONGBAR NSW 2477
ahp.central@dpi.nsw.gov.au

FISH KILL Form Part B: Investigation Report

TIME/DATE KILL INVESTIGATED: .....

HABITAT DESCRIPTION: (circle as appropriate)

(A) Freshwater / estuarine / marine

(B) stream / river / anabranch / lake / billabong / swamp / drain / channel / impoundment / bay / lagoon / farm dam / beach / open ocean / other:……

ADJACENT LAND USES (specify): ……

PHYSICAL EVIDENCE OF POLLUTION (OR ALGAL BLOOMS) OBSERVED:.....

ON-SITE WATER SAMPLING RESULTS WATER SAMPLES COLLECTED: Yes / No

Sample no.	**1**	**2**	**3**	**4**	**5**	**6**
Name of sampling site						
pH						
Temp. (^{o}C)						
Dissolved Oxygen						
Others (specify)						

Attach map/diagram showing total area of fish kill and sample sites. Colour photographs would also assist analysis and identification.

OTHER COMMENTS: (eg behaviour/appearance of fish) ……

……

AFFECTED FISH SPECIES (Full name)	**LENGTH RANGE (cm)**	**NUMBERS**	**SAMPLES COLLECTED**
			Yes / No
			Yes / No
			Yes / No
			Yes / No

SUSPECTED CAUSE OF FISH KILL: .....

.....

WATER SAMPLES DESPATCHED TO:……TO BE TESTED FOR: .....

FISH SAMPLES DESPATCHED TO:……TO BE TESTED FOR: .....

INVESTIGATED BY: …… POSITION: .....

ORGANISATION: …… DATE: .....

RECOMMENDATION(S) FOR FUTURE ACTION: .....

……

REMINDER. Send copies of Parts A and B to:

DPI Fisheries Fish Kill Database Coordinator
1243 Bruxner Hwy WOLLONGBAR NSW 2477
ahp.central@dpi.nsw.gov.au

Department of Primary Industries Fisheries NSW

Fishers Watch hotline (24 hr) 1800 043 536

District Offices

Albury	02 6042 4200
Ballina	02 6618 1800
Batemans Bay	02 4472 4032
Bathurst	02 6331 1428
Coffs Harbour	02 6652 3977
Deniliquin	03 5881 9928
Eden	02 6496 1377
Huskisson (Shoalhaven)	02 4428 3402
Illawarra	02 4295 1809
Inverell	02 6722 1129
Jindabyne	02 6451 3400
Maclean	02 6645 0504
Narooma	02 4476 2072
Narrandera	02 6959 9066
Nelson Bay (Port Stephens)	02 4982 3934
Port Macquarie	02 5524 0600
Swansea	02 4971 1201
Sydney Metro (Wollstonecraft)	02 8437 4903
Sydney South (Sans Souci)	02 9529 6021
Tamworth	02 6763 1132
Narara	02 4328 8618
Tumut	02 6947 9028
Tuncurry	02 6591 6300
Tweed Heads	07 5523 6900
Dareton (Lower Murray)	03 5019 8408

Advice on pathology testing, disease and sampling procedures:

DPI Aquatic Biosecurity	02 4916 3911

Media Contact Program Leader - Aquatic Ecosystems 6626 1370 or 0419 253 819

Aquatic Ecosystems – Fisheries Managers

Wollongbar	02 6626 1397
Tamworth	02 6763 1255
Port Stephens	02 4916 3931
Huskisson	02 4428 3401
Batemans Bay	02 4478 9103
Cronulla	02 9527 8522
Albury	02 6042 4213

Environment Protection Authority

Pollution Line (24 hr) 13 15 55

Regional Offices

Albury	02 6022 0600
Armidale	02 6773 7000
Bathurst	02 6332 7600
Grafton	02 6640 2500
Griffith	02 69690700
Newcastle	02 49086800
Queanbeyan	02 62297002
Sydney DIAC	0418 445 035
Wollongong	02 42244100

Specialist Advice

Water Science	02 9995 5539
Ecotoxicology	02 9514 4050
Env Forensics Group	0401 714 440
Inorganic Laboratory	02 6626 1103

COMPLETED FORMS emailed to:
ahp.central@dpi.nsw.gov.au