INFRASTRUCTURE

RISK MANAGEMENT PLAN

Stormwater

2020

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1. INTRODUCTION

1.1 Purpose

The purpose of this infrastructure risk management plan is to document the results and recommendations resulting from regular identification, assessment and treatment of risks associated with providing services to the organization from infrastructure, using the fundamentals of International Standard ISO 31000:2018 *Risk management – Guidelines*.

Risk Management is defined in ISO 31000:2018 as: "coordinated activities to direct and control an organisation with regard to risk" [1].

1.2 Objectives

The objectives of the risk management plan are:

- to identify risks to the Berrigan Shire Council that may impact the delivery of services from infrastructure
- to select credible risks for detailed analysis,
- to analyse and evaluate risks in accordance with ISO 31000:2018,
- to prioritise risks,
- to identify risks requiring treatment by management action,
- to develop risk treatment plans identifying the tasks required to manage the risks, the person responsible for each task, the resources required and the due completion date.

1.3 Infrastructure Risk Management Plan

This infrastructure risk management plan has been designed to be read as a supporting document to the infrastructure asset management plan. It has been prepared using the fundamentals of International Standard ISO 31000:2018 Risk management – Guidelines.

Organisations aiming at effectively managing risk should comply with the following principles.

- Risk management is an integral part of all organizational activities.
- A structured and comprehensive approach to risk management contributes to consistent and comparable results.
- The risk management framework and process are customized and proportionate to the organization's external and internal context related to its objectives.
- Appropriate and timely involvement of stakeholders enables their knowledge, views and perceptions to be considered. This results in improved awareness and informed risk management.

[1] ISO 31000:2018, p 1.

- Risks can emerge, change or disappear as an organization's external and internal context changes. Risk management anticipates, detects, acknowledges and responds to those changes and events in an appropriate and timely manner.

- The inputs to risk management are based on historical and current information, as well as on future expectations. Risk management explicitly takes into account any limitations and uncertainties associated with such information and expectations. Information should be timely, clear and available to relevant stakeholders.[i2]

1.4 Scope

This plan considers risks associated with delivery of services from infrastructure.

1.5 The Risk Management Context

Organisations implement management practices and procedures to identify and manage risks associated with providing services from infrastructure assets. These include:

- operating a reactive maintenance service for all assets and services;
- operating a planned maintenance system for key assets;
- monitoring condition and remaining service life of assets nearing the end of their service life;
- renewing and upgrading assets to maintain service delivery;
- closing and disposing of assets not providing the required service level; and
- acquiring or constructing new assets to provide new and improved services.

The Berrigan Shire Council's planning is underpinned by the Integrated Planning and Reporting Framework for NSW Local Government and the Integrated Planning and Reporting principles described by the Local Government Act 1993. The adjacent Figure illustrates the outcome, input, output, action and review logic and operational integration of Berrigan Shire 2027 (a Community Strategic Plan) with the Council's suite of Integrated Plans.

The Council's Delivery Program 2017 – 2021 includes the activities undertaken by the Council and is integrated with Berrigan Shire 2027 strategic outcomes. Describing the Council's commitments for the next four years and the resources it can draw on: resources identified in the Council's Resourcing Strategy 2017 - 2027. The Council's 4-year Delivery Program developed from the Shire Council's 10-year Resourcing Strategy includes the Shire's Asset Management Plans, Workforce Development Plan 2017 – 2021 and Long Term Financial Plan 2017 – 2027. Asset Management Plans describe and estimate the resources needed by Council to achieve service levels and community expectations and are the basis of the Shire's 4-year Capital Works Program an element of the Shire's Long Term Financial Management Plan. The Shire's Long Term Financial Plan and the costings included in the forward projections of its Capital Works Program are subject to ongoing monitoring and review by Council. This ensures Council's Delivery Program and cost estimates do not compromise the Council's Financial Strategy 2016 objectives of:

[2] ISO 3100:2009, Sec 4, p 3

1. Financial sustainability;

2. Cost effective maintenance of infrastructure service levels; and

3. Financial capacity and freedom.

Themed according to the outcomes we want to achieve the Delivery Program 2017- 2021 describes:

- The full range of Council services and activities – operations
- High level responsibility for Council services and operations; and
- The monitoring measures we use to determine the efficiency and effectiveness of Council's Delivery Program and its contribution to Berrigan Shire 2027 Strategic Outcomes.

Berrigan Shire Council has assigned responsibilities for managing risks associated with stormwater assets and associated service delivery to the following departments and positions.

Technical Services Department

Enterprise Risk Manager

1.6 Risk Management Process

The risk management process used is shown in Figure 1.6 below.

It is an analysis and problem-solving technique designed to provide a logical process for the selection of treatment plans and management actions to protect the community against unacceptable risks.

The process is based on the fundamentals of International Standard ISO 31000:2018

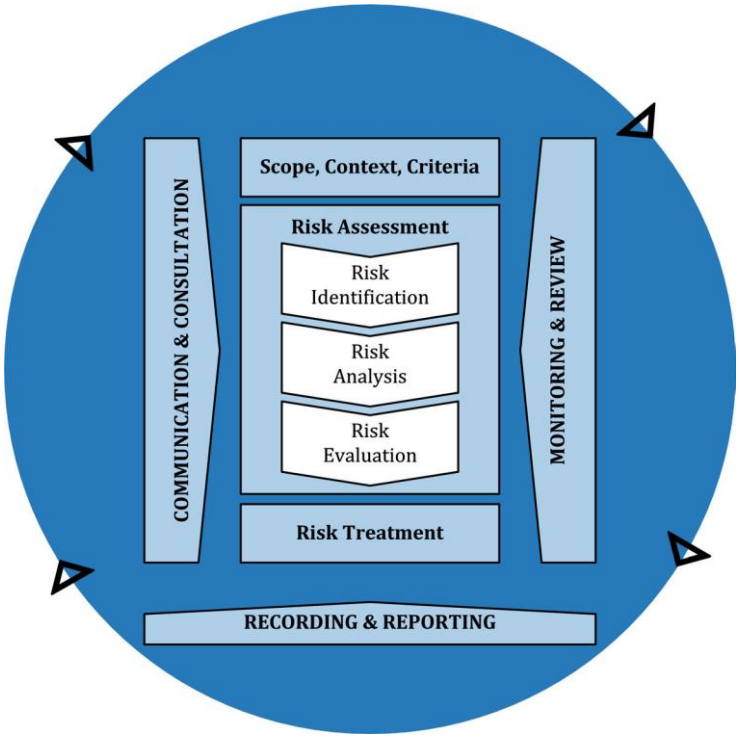


Fig 1.6. Risk Management Process – Abridged
Source: ISO 31000:2018, Figure 1, p9

An abridged version of the process from the previous ISO 21000:2009 (now withdrawn) describes and expands the process

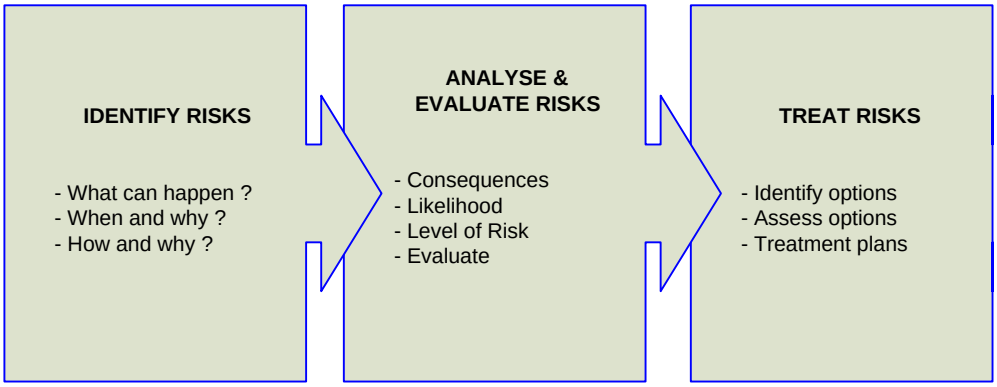


Fig 1.7. Risk Management Process – Abridged
Source: ISO 31000:2009 (now withdrawn)

2. COMMUNICATION AND CONSULTATION

Risk communication and consultation is to "assist relevant stakeholders in understanding risk, the basis on which decisions are made and the reasons why particular actions are required"[3].

Appropriate communication and consultation seeks to:

- 'bring different areas of expertise together for each step of the risk management process;
- ensure that different views are appropriately considered when defining risk criteria and when evaluating risks;
- provide sufficient information to facilitate risk oversight and decision-making;
- build a sense of inclusiveness and ownership among those affected by risk.' [4]

The development of this infrastructure risk management plan was undertaken using a consultative team approach to:

- Identify stakeholders and specialist advisors who need to be involved in the risk management process;
- Discuss and consider the views of stakeholder and specialist advisors
- Communicate the results of the risk management process to ensure that all stakeholders are aware of and understand their and roles and responsibilities in risk treatment plans.
- Create "ownership"

The results from the risk management planning process will frequently identify areas requiring expenditure. This might be in the form of additional operations and maintenance activities, asset renewals, or the creation of upgraded / new assets. It is essential that this forecast work be prioritised and included for funding consideration in the related Asset Management Plans.

Risks that are rated as 'high' or 'very high' and needing near term activities to manage are summarized and included in the related asset management Plan. These 'high' and 'very high' risks are also summarized in Appendix 1

Members of the team responsible for preparation of this risk management plan are:

- Matthew Clarke – Director Technical Services
- Fred Exton – Engineering Services Manager
- Gary George – Assets and Operations Manager
- Michelle Koopman – Enterprise Risk Manager
- Darron Fruend – Technical Support Officer
- Paul Glanville – Technical Officer Asset Management

[3] ISO 31000:2018, p 9
[4] ISO 31000:2018, p 9-10

- Dean Loats – Roads Overseer
- Andrew Frazer – Maintenance Overseer

3. RISK IDENTIFICATION

3.1 General

Risk identification seeks to identify the risks that need to be managed. A well-structured systematic process is crucial, because a potential risk not identified at this stage is excluded from further analysis. All risks should be identified, whether or not they are under the control of the organisation.

The risks are identified in three stages:

- What can happen? The aim is to generate a comprehensive list of events which might affect each element of the organisation's service delivery.
- How and why it can happen? It is necessary to consider possible causes and scenarios. There are many ways and event can be initiated. It is important that no significant causes are omitted.
- Are risks credible? An assessment of credibility of all risk is undertaken to ensure that credible risks receive proper and due consideration.

Potential risks associated with providing services from infrastructure were identified at meetings of the council's infrastructure risk management team.

Team members were asked to identify "what can happen, where and when" to the various council services, at the network level and for critical assets at the asset level, then to identify possible "why and how can it happen" as causes for each potential event together with any existing risk management controls.

Each risk was then tested for credibility to ensure that available resources were applied to those risks that the team considered were necessary to proceed with detailed risk analysis

The assets at risk, what can happen, when, possible cause(s), existing controls and credibility are shown in Appendix 2.1 – Risk Identification.

Credible risks are subjected to risk analysis in Section 4.4.5. Risks assessed as non-credible were not considered further and will be managed by routine procedures.

4. RISK ANALYSIS

4.1 General

Once risks have been identified it is necessary to analyse the risk in terms of the **likelihood** and **consequences** of an event occurring. These two parameters can be used to produce a level of risk which will help set treatment priorities and options.

In general Berrigan Shire Council will use a qualitative process to measure risks. This process uses descriptive information about the nature of the consequences and likelihood rather than a strict numerical analysis.

In analysing risks the most pertinent information sources should be used and any assumptions made in the analysis of risks should be recorded. Some relevant sources of information could include:

- Past records
- Practice and relevant experience
- Relevant published literature
- Specialist and expert judgements

4.2 Likelihood

Likelihood is a qualitative description of chance of an event occurring. The process of determining likelihood involves combining information about estimated or calculated probability, history or experience. Where possible it is based on past records, relevant experience, industry practice and experience, published literature or expert judgement.

4.3 Consequences

Consequences are a qualitative description of the outcome of an event affecting objectives. The process of determining consequences involved combining information about estimated or calculated effects, history and experience.

4.4 Method

The risk analysis method uses the risk rating chart shown in Section 4.4.3. This process uses a qualitative assessment of likelihood/probability and history/experience compared against a qualitative assessment of severity of consequences to derive a risk rating.

The qualitative descriptors for each assessment are shown below.

4.4.1 Likelihood

Level	Likelihood	Descriptor	Probability of occurrence (in relation to assets)
E	Rare	May occur only in exceptional circumstances	More than 20 years
D	Unlikely	Could occur at some time	Within 10-20 years
C	Possible	Might occur at some time	Within 3-5 years
B	Likely	Will probably occur in most circumstances	Within 2 years
A	Almost certain	Expected to occur in most circumstances	Within 1 year

4.4.2 Consequences

Consequence	Injury	Service Interruption	Environment	Finance	Reputation
1	Nil	< 4 hrs	Nil	< $20k	Nil
2	First Aid	Up to 1 day	Minor short term	$20k - $100k	Minor media
3	Medical treatment	1 day – 1 week	Wide short term	$100k - $500k	Moderate media
4	Disability	1 week – 1 month	Wide long term	$500k - $1M	High media
5	Fatality	More than 1 month	Irreversible long term	> $1M	Censure/ Inquiry

4.4.3 Risk Assessment

The risk assessment process compares the likelihood of a risk event occurring against the consequences of the event occurring. In the risk rating table below, a risk event with a likelihood of 'Possible' and a consequence of '3' has a risk rating of 'High'. This rating is used to develop a typical risk treatment in Section 5.3.

	Consequence				
Likelihood	**1**	**2**	**3**	**4**	**5**
A	Medium (11)	High (16)	High (20)	Very High (23)	Very High (25)
B	Medium (7)	Medium (12)	High (17)	High (21)	Very High (24)
C	Low (4)	Medium (8)	High (14)	High (18)	High (22)
D	Low (2)	Low (5)	Medium (9)	Medium (13)	High (19)
E	Low (1)	Low (3)	Medium (6)	Medium (10)	High (15)

4.4.4 Indicator of Risk Treatment

The risk rating is used to determine the required timing and type of risk treatments. Risk treatments can range from immediate corrective action (such as stop work or prevent use of the asset) for 'Very High' risks to being managed by routine procedures for 'Low' risks.

An event with a 'High' risk rating will require 'Prioritised action'. This may include actions such as reducing the likelihood of the event occurring by physical methods (limiting usage to within the asset's capacity, increasing monitoring and maintenance practices, etc), reducing consequences (limiting speed of use, preparing response plans, etc) and/or sharing the risk with others (insuring the organisation against the risk).

	Response	Action
Very High	Senior management attention required. Action plan required.	Immediate response Specify management responsibility
High	Senior management attention Action plan required	Response required within 7 working days Specify management responsibility

Medium	Implement specific monitoring or response procedures	Strategic action required Specify management responsibility
Low	Manage by routine procedures. Unlikely to require a specific application of resources	Business as usual Response may not be necessary

Immediate corrective action may include combinations of stopping work, making the area safe, preventing use of the asset and/or scheduling replacement as soon as possible. Prioritised action may include making the areas safe and implementing a short term work program to reduce the risk through improved maintenance or replacement of the asset. Planned action may include shifting the asset from a reactive maintenance to a planned maintenance management regime and/or scheduling component/asset replacement in the current or next budget. Manage by routine procedures involves managing the risk through existing operations and maintenance procedures.

4.4.5 Analysis of Risk

The team conducted an analysis of credible risks identified in section 3.1 using the method described above to determine a risk rating for each credible risk.

The credible risks and risk ratings are shown in Appendix 2.2 – Risk Analysis

4.5 Risk Evaluation

The risk management team evaluated the need for risk treatment plans using an overall assessment of the following evaluation criteria to answer the question "is the risk acceptable?"

Criterion	Risk Evaluation Notes
Operational	Risks that have the potential to reduce services for a period of time unacceptable to the community and/or adversely affect the council's public image.
Technical	Risks that cannot be treated by council's existing and/or readily available technical resources.
Financial	Risks that cannot be treated within council's normal maintenance budgets or by reallocation of an annual capital works program.
Legal	Risks that have the potential to generate unacceptable exposure to litigation.
Social	Risks that have the potential to: - cause personal injury or death and/or - cause significant social/political disruption in the community.
Environmental	Risks that have the potential to cause environmental harm.

The evaluation criteria are to provide guidance to evaluate whether the risks are acceptable to the council and its stakeholders in providing services to the community. Risks that do not meet the evaluation criteria above are deemed to be unacceptable and risk treatment plans are required to be developed and documented in this Infrastructure Risk Management Plan, for consideration by council.

"Decisions on managing risk should take account of the wider context of the risk and include consideration of the tolerance of the risks borne by parties, other than the organisation that benefits from the risk. Decisions should be made in accordance with legal, regulatory and other requirements.

In some circumstances, the risk evaluation can lead to a decision to undertake further analysis. The risk evaluation can also lead to a decision not to treat the risk in any way other than maintaining existing controls. This decision will be influenced by Berrigan Shire Council's risk attitudes and the risk criteria than have been established."[5]

[5] ISO 3100:2009, Sec 5.4.4, p 18.

5. RISK TREATMENT PLANS

5.1 General

The treatment of risk involves identifying the range of options for treating risk, evaluating those options, preparing risk treatment plans and implementing those plans. This includes reviewing existing guides for treating that particular risk, such as legislation and regulations, International Standards and Best Practice Guides.

Developing risk treatment options starts with understanding how risks arise, understanding the immediate causes and the underlying factors that influence whether the proposed treatment will be effective.

Options for managing risk are shown below. The optimum solution may involve a combination of options.

- **Avoid the risk** by deciding not to proceed with the activity that would incur the risk, or choose an alternative course of action that achieves the same outcome,

- **Reduce the level of risk** by reducing the likelihood of occurrence or the consequences, or both;
  - the likelihood may be reduced through management controls, organisational or other arrangements which reduce the frequency of, or opportunity for errors, such as alternative procedures, quality assurance, testing, training, supervision, review, documented policy and procedures, research and development.
  - the consequences may be reduced by ensuring that management or other controls, or physical barriers, are in place to minimise any adverse consequences, such as contingency planning, contract conditions or other arrangements,

- **Transfer the risk** by shifting the responsibility to another party (such as an insurer), who ultimately bears the consequences if the event occurs. Risks should be allocated to the party which can exercise the most effective control over those risks.

- **Accept and retain the risks** within the organisation where they cannot be avoided, reduced or reduced or transferred, or where the cost to avoid or transfer the risk is not justified, usually because the risk is acceptable or low. Risks can be retained by default, ie. Where there is a failure to identify and/or appropriately transfer or otherwise manage risks

The cost of managing risks needs to be less than with the benefits obtained, the significance of the event and the risks involved.

5.2 Risk Treatment Options

Council will use the ALARP (*"As Low as Reasonably Practicable")* technique in determining which risks will be treated through an evaluation of "tolerable risk". ALARP enlists the concept of what is "reasonably practicable" by evaluating if something can be done

against the costs and benefits of action or inaction. These two aspects need to be balanced carefully if the risk being treated is related to an expressed or implied duty of care.

ALARP divides risks into three bands:

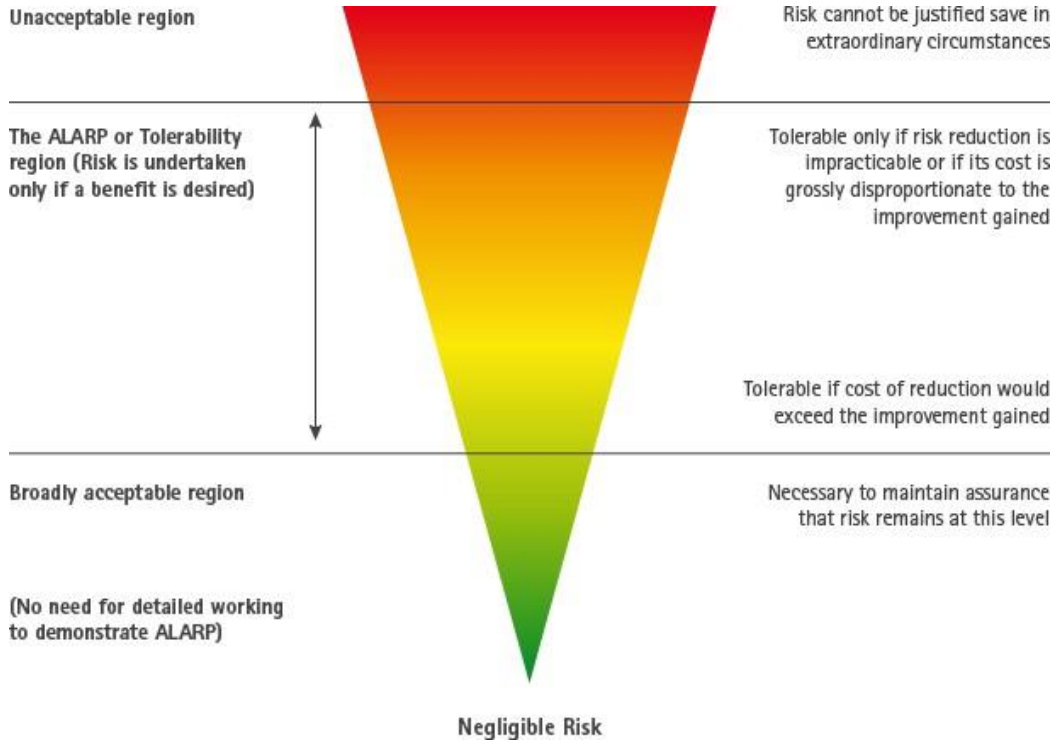
1. An upper band where adverse risks are **intolerable (red area)** whatever benefits the activity may bring, and risk reduction measures are essential whatever their cost.

2. A middle band, or **orange/yellow area**, where costs and benefits are taken into account and opportunities balanced against potential adverse consequences.

3. A lower band where positive or negative risks are **negligible (green area)**, or so small that no risk treatment measures are needed.

In applying this principle it is expected that, when the risk is close to the intolerable level, the risk will be reduced unless the cost of reducing the risk is grossly disproportionate to the benefits gained. Similarly when the risks are close to the negligible level the action may only be undertaken to reduce the risk where the benefits exceed the costs of reduction.

The ALARP Principle



5.3 Risk Treatments

The risk treatments identified for non-acceptable risks are detailed in Appendix 2.3 – Risk Treatment.

5.4 Risk Treatment Plans

From each of the risk treatments identified in Appendix A – Risk Register, risk treatment plans were developed.

The risk treatment plans identify for each non-acceptable risk: -

1. Proposed action
2. Responsibility
3. Resource requirement/budget
4. Timing
5. Reporting and monitoring required

The risk treatment plan is shown in Appendix 2.4 A – Risk Treatment Plan.

6. MONITORING AND REVIEW

Monitoring and review is an essential and integral step in the process of managing risk. It is necessary to monitor risks, the effectiveness of any plans, strategies and management systems that have been established to control implementation of risk management actions.

The plan will be monitored and reviewed as follows.

Activity	Review Process
Review of new risks and changes to existing risks	Annual review by team with stakeholders and report to council
Review of Risk Management Plan	4 yearly review and re-write by team and report to council
Performance review of Risk Treatment Plan	Action plan tasks incorporated in council staff performance criteria with 6 monthly performance reviews. Action plan tasks for other organisations reviewed at annual team review meeting

7. REFERENCES

IPWEA, 2011, *International Infrastructure Management Manual*, 2011, Institute of Public Works Engineering Australasia, Sydney

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ISO, 2009, *ISO 31000:2009, Risk management – Principles and guidelines*, Standards Australia, Sydney.(now withdrawn)

ISO, 2018, *ISO 31000:2018, Risk management – Guidelines*

Standards Australia, 2004, *AS/NZS 4360:2004, Australian/New Zealand Standard, Risk Management*, Sydney (superseded by ISO 3100:2009).

Standards Australia, 2004, *HB 436:2004, Risk Management Guidelines, Companion to AS/NZS 4360:2004*, Sydney.

Berrigan Shire Council Risk Management Policy and Framework, adopted 15/03/2017.

INSERT OTHER APPLICABLE REFERENCES IN ALPHABETICAL ORDER

Appendix 1 - Risk Register Summary for inclusion in Asset Management Plans

Critical Risks and Treatment Plans					
Service or Asset at Risk	***What can Happen***	***Risk Rating (VH, H)***	***Risk Treatment Plan***	***Residual Risk ****	***Treatment Costs $,000***
Levee Bank	Flood when Levee Bank Overtopped due to inadequate height	***High***	***Update flood study of leveed area to identify all low areas of levees and implement works program to upgrade them***	***Nil***	***$1,050***
Levee Bank	Flood when Levee undermined due to sand underlying foundations	***High***	***Provide cut-off wall to prevent levee being undermined***	***Low***	***$200***
Pipe discharge terminal	Child could enter pipe and become trapped or drowned	***High***	***Fit guards to discharge terminals of pipes larger than 375mm diameter***	***Low***	***$20***

Note * The residual risk is the risk remaining after the selected risk treatment plan is implemented.

Appendix 2 - Risk Register

[i]RISK IDENTIFICATION							RISK ANALYSIS					RISK TREATMENT			RISK TREATMENT PLAN				
Risk No.	Asset at Risk	What can happen?	When can it occur?	Possible cause	Existing controls	Is risk credible?	Likelihood	Consequences	Risk rating	Action required	Is risk acceptable?	Treatment option(s)	Residual risk	Risk treatment plan	Actions	Responsibility	Resources	Budget	Date due
1	Pit	Flood	Anytime now	Pit Blockage	Inspections, Customer Request / Suggestion Form and Maintenance	Yes	Possible	Minor	Medium	Planned action required	Yes								
2	Pipe	Flood	Anytime now	Pipe Blockage or Collapse	Inspections, Customer Request / Suggestion Form and Maintenance	Yes	Possible	Minor	Medium	Planned action required	Yes								
3	Pipe	Road or Path collapse	Anytime now	Pipe Collapse under Road	Inspections, Customer Request / Suggestion Form and Maintenance	Yes	Unlikely	Major	Medium	Planned action required	Yes								
4	Pump Station	Flood	Anytime now	Pump Failure	Standard Operation Procedures implemented / Inspections and Maintenance	Yes	Possible	Minor	Medium	Planned action required	Yes								
5	Levee Bank	Flood	Anytime now	Levee Bank Collapse	Levee Owner's Manual prepared including Standard Operating Procedures / Inspections and Maintenance	Yes	Rare	Catastrophic	High	Prioritised action required	Yes								

6	Levee Bank	Flood	Anytime now	Levee Bank Overtopped due to inadequate height	Low areas identified and emergency procedures developed	Yes	Rare	Catastrophic	High	Prioritised action required	No	Increase height of low sections of levees to provide 1% protection	Nil	Update flood study of leveed area to identify all low areas of levees and implement works program to upgrade them	Update Flood study	DTS/DOPIE	Staff Time/ Consultants	$50,000	Jun-21
															Implement works program to upgrade levees	DTS	Staff Time/ Consultants/ Contractors	$1,000,000	Jun-22
7	Levee Bank	Flood	Anytime now	Levee undermined due to sand underlying foundations	Suspect areas identified and emergency procedures developed	Yes	Rare	Catastrophic	High	Prioritised action required	No	Provide cut-off wall to prevent levee being undermined	low	Provide cut-off wall to prevent levee being undermined	Design Cut-off Wall Construct Cut-off Wall	DTS	Staff Time/ Consultants/ Contractors	$200,000	Jun-21
8	Flood control structures/ gates	Flood	Anytime now	Flooding behind Levee due to failure or incorrect operation of flood gates / flaps	Levee Owner's Manual prepared including Standard Operating Procedures / Inspections and Maintenance	Yes	Possible	Major	High	Prioritised action required	Yes								
9	Retention Basin	Public Drowning	Anytime now	Public gaining access to Retention Basin	Signage and Fencing	Yes	Rare	Catastrophic	High	Prioritised action required	Yes								
10	Retention Basin	Staff Bitten by Snake	Anytime now	Snake Habitat	SWMS, Safety boots and long pants	Yes	Rare	Catastrophic	High	Prioritised action required	Yes								
11	Gross Pollutant Trap	Flood	Anytime now	Block or failure to work	Inspections and Maintenance	Yes	Unlikely	Minor	Low	Manage by routine procedures	Yes								
12	Gross Pollutant Trap	Contaminate Water Downstream	Anytime now	Block or failure to work	Inspections and Maintenance	Yes	Rare	Moderate	Medium	Planned action required	Yes								

13	Pipe discharge terminal	Child could enter pipe and become trapped or drowned	Anytime now	Unguarded entry into pipes large enough for children to enter	Some pipes fitted with guards	Yes	Rare	Catastrophic	High	Prioritised action required	No	Fit guards to discharge terminals of pipes larger than 375mm diameter	low	Fit guards to discharge terminals of pipes larger than 375mm diameter	Fit guards to discharge terminals of pipes larger than 375mm diameter	AOM	Staff Time/ Contractors	$20,000	Jun-21