DRAINWISE

Fix pipes and drains.
Stop sewage overflows
in homes and rivers.

Wastewater Discharge Reduction Plan

Dec 2016 - Version 4

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Outcomes

Medium term: To reduce the risks to public health, cultural values and the environment of wastewater overflows into rivers and streams and onto private property
Longer term: A sustainable, efficient and cost-effective wastewater network

Target levels of service

- Reduction of wastewater releases into rivers and streams from four times per year (average) to once every two years (average) by 2026/27
- Reduction of wastewater discharged onto private property during heavy rain from four times per year (average) to once every two years (average) by 2026/27
- Greatly reduce the number of times households can't use their toilets and wastewater system during a heavy rain event by 2036/37, (10-20% probability of occurring annually)
- Reduce ponded water on private properties causing dampness in houses.

Network issues

- Flood waters flowing over and into gully traps
- Water getting into leaking gully traps
- Roof water being piped straight into gully traps or lateral wastewater pipes

- Private property lateral wastewater pipes leaking

- Council's pipes and access points leaking

Areas for action

- Ensure the stormwater piped network has enough capacity for a rainfall event that has a 10% probability of occurring annually (10% AEP)
- Reduce the amount of stormwater entering the wastewater network based on priority level (reducing high impact stormwater by 85%)
- Incentivise/subsidise property owners to alleviate ponding and dampness
- Enforce compliance requirements for wastewater and stormwater as per the building code with flexibility on compliance timeframes
- Council more involved in managing stormwater on private property
- Communicate issues, options and benefits to the community
- Implement a Ten Year Programme of modelling, investigations and remedial work

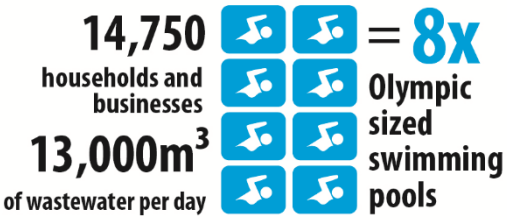
SECTION 1

PLAN FRAMEWORK

1.1 Background

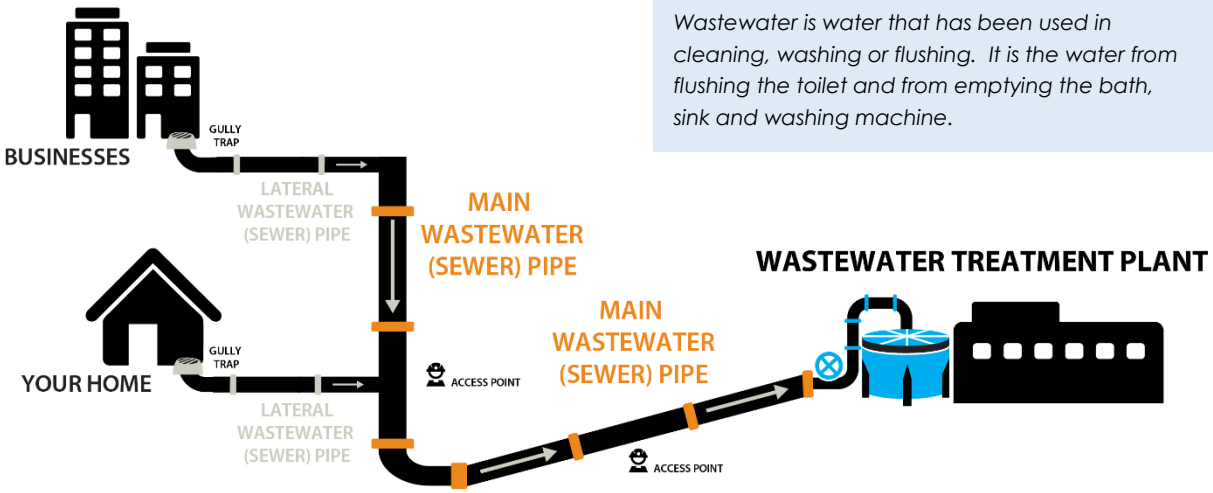
The Gisborne city wastewater network services about 14,750 houses and businesses.

An average of 13,000 cubic metres of wastewater per day goes through the network to the treatment plant. That is about the volume of water in eight Olympic pools.



The network is a big system of pipes and access points (manholes). The diagram below shows how wastewater moves from individual properties to the wastewater treatment plant.

Diagram 1



What is wastewater?

Wastewater is water that has been used in cleaning, washing or flushing. It is the water from flushing the toilet and from emptying the bath, sink and washing machine.

To operate effectively we need all the pipes, access points and gully traps in the network to be in good working order and to be designed to cope with the expected volume of water. When one part of the network breaks down it will impact on the rest of the network.

Council has developed a wastewater model and a stormwater model of Gisborne City. These new tools create maps of our network using information we have from sources such as service requests, water flow data, and land slope mapping (LiDAR). Council can use them to predict the impact of rainfall of varying intensity on the wastewater and stormwater networks. They highlight risk areas where stormwater could get into the wastewater network and where we might see wastewater overflows. They are the crucial evidence base for this Plan.

It is important to note that Council only owns and manages 50% of the wastewater network. The remaining 50% is owned and managed by individual landowners. This has significant implications for managing the wastewater network in an integrated way. The majority of focus to date has been on Councils 50%.

1.2 What's the problem?

The Gisborne City wastewater network has been designed and built to manage the wastewater needs of Gisborne households and businesses for growth over the next 30+ years. About four times a year during heavy rainfall, Council's network cannot cope with the amount of water going through it. This causes wastewater to overflow onto private property and for Council to release it into rivers and streams to reduce health risks to property owners from overflows.

The community have many concerns around the public health, environmental and cultural impacts of wastewater flowing into rivers and onto private property. Some individual landowners are not able to use toilets and showers during heavy rainfall and have increasing dampness under houses due to stormwater ponding. This is not acceptable to our community.

What causes the problem?

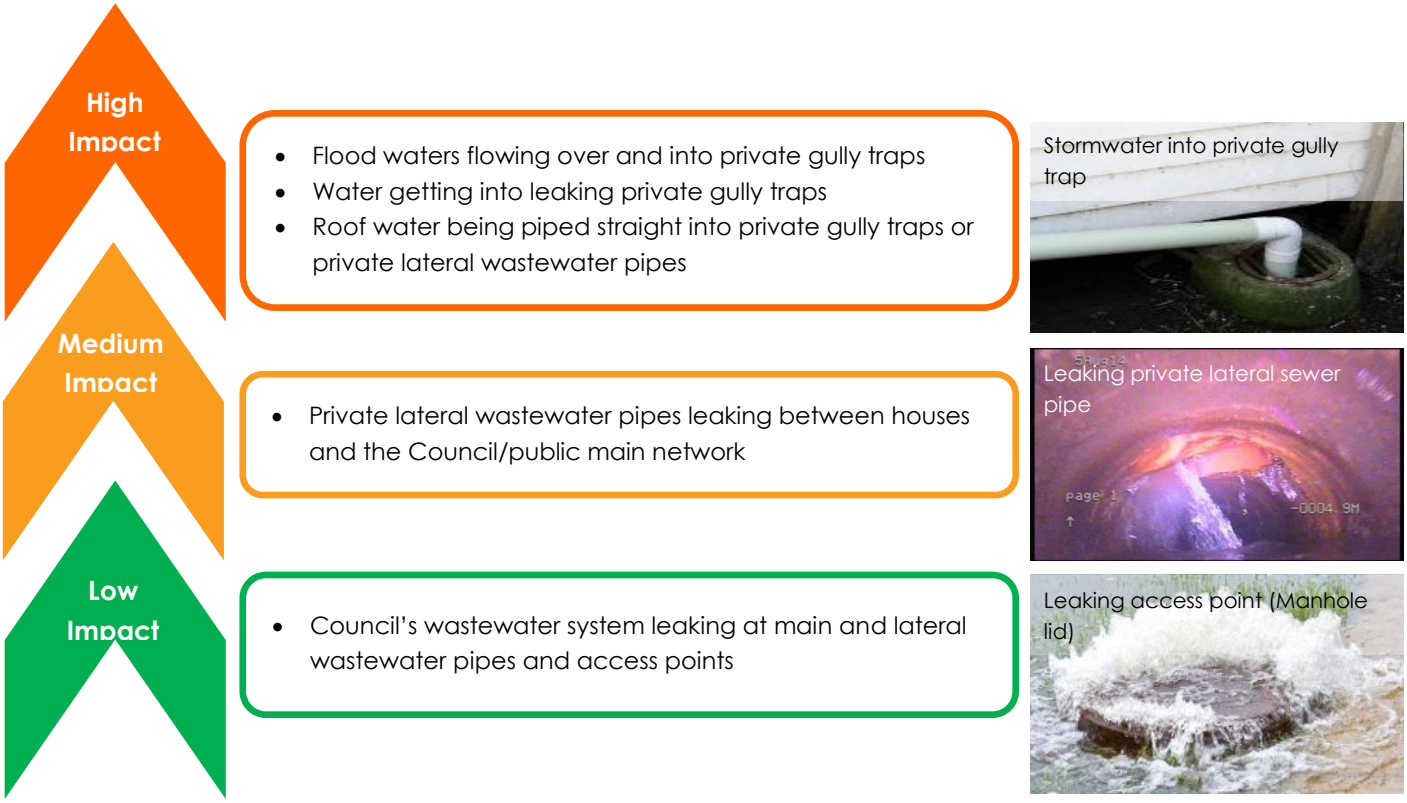
The overflow happens mainly because large volumes of stormwater get into the wastewater network. There are several entry points for stormwater to get into the wastewater network:

- Flood waters (even minor) flowing over and into gully traps
- Water getting into cracked and leaking gully traps
- Roof water being piped straight into the wastewater system through gully traps or lateral wastewater pipes
- Lateral wastewater pipes from houses to the main network leaking
- Council's wastewater system leaking at main wastewater pipes and access points.

What's the impact on the wastewater network?

The diagram below ranks these entry points in terms of the impact they have on the wastewater network.

Diagram 2



As per diagram there are Medium & High Impact issues happening on private land.

What have we done so far?

For several years, Council has focused on fixing our part of the wastewater network by:

- Increasing the size of Council's wastewater pipes where they are under capacity.
- Upgrading the stormwater network to manage larger flood events.
- Replacing Council's leaking wastewater pipes and access points.

Council has extensive asset management systems for the wastewater network. But this is only 50% of the network. The remaining 50% of the network is owned by private landowners with no coordinated asset management. As the diagram above suggests, the high impact issues are happening on private land.

Council has started to roll out a more intensive programme of private property inspections to:

- remove roof downpipes from gully traps
- check for leaking gully traps
- check if gully trap heights are too low
- check for illegal cross connections of stormwater to wastewater
- check for some leaking lateral sewer pipes.

Where issues have been identified, Council have asked landowners to fix them, although Council has yet to see the improvements we had expected.

1.3 What are we trying to achieve?

What outcomes are we seeking?

Council's Infrastructure Strategy 2015 identifies stormwater inflow and infiltration as a significant infrastructure issue facing Gisborne City over the next 30 years. Council has committed to improving the water quality that we discharge back into the environment for both stormwater and wastewater and to reduce the frequency that wastewater is discharged into rivers and streams and onto private property during wet weather events.

The outcomes we want from the Wastewater Reduction Plan are:

Medium term:	To reduce the risks to public health, cultural values and the environment of wastewater overflows into rivers and streams and onto private property
Long term:	A sustainable, efficient and cost-effective wastewater network

Target levels of service

Our aim is to meet the following levels of service:

- Reduction of wastewater releases into rivers and streams from four times per year (average) to once every two years (average) by 2026/27.
- Reduction of wastewater discharged onto private property during heavy rain from four times per year (average) to once every two years (average) by 2026/27.
- Greatly reduce the number of times households can't use their toilets and wastewater system during a heavy rain event by 2036/37 (10-20% probability of occurring annually).
- Reduce ponded water on private properties causing dampness in households.

How will we achieve the target levels of service?

The key areas of action to achieve target levels of service are:

1. Ensure there is enough capacity in the stormwater system to receive stormwater from private property for a rain event that has at least a 10% probability of occurring annually (similar large size rainfall event on the September 2016 flood that impacted on the Waimata River and Gisborne City).
    - Significant stormwater infrastructural improvements has occurred since the late 1990s. As a result the stormwater system generally has capacity to cater for a 10% (10 year storm event). This has also been supported by recent stormwater modelling work completed.
2. Ensure the wastewater network has enough capacity - approximately 14km of main wastewater pipes out of 220km require upsizing.
    - Outputs from wastewater modelling has highlighted where improvement work is required. This information will feed into the wastewater renewals forward works program/s over the next 10 years.
3. Reduce the amount of stormwater entering the wastewater network on a prioritised basis (reducing High Impact by 85%).
    - The wastewater model (calibrated with actual pipe flows during a rain event) shows that if 85% of gross (High inflows) was eliminated the network would then largely have capacity. Noted that some capacity improvements are still required.
4. Incentivise/subsidise property owners to assist them with property improvements to reduce the risk of stormwater entering the wastewater network and to reduce dampness.
    - Attract grant funding to fund or partially fund private stormwater improvement work.
5. Enforce compliance requirements for sewer and stormwater as set out in the building code but allow flexibility with timeframes to achieve compliance.
    - Ensure that gully traps are installed above flood levels, stormwater is discharged to an approved outlet and wastewater laterals are up to standard.
6. Council to have a greater involvement in the ongoing management of stormwater on existing private property and new developments due to the high risks this poses to achieving target levels of service.
7. Communicate with the community to raise awareness and ownership of the issues, how they can help and the collective benefits of doing so.
8. Implement a Ten Year Programme of modelling, investigations and remedial work starting with Kaiti, then Whataupoko and finally Elgin/CBD.

Council's wastewater model has confirmed that if we removed 85% of the stormwater getting into the wastewater network through gully traps on private properties we will achieve targets for wastewater reductions as shown in Appendix 3. Other improvements to fix leaking pipes and access points will improve the household levels of service over the long-term and remove wastewater overflows as shown in Appendix 4.

At present Council's efforts are focused 70% on the public parts of the network and 30% on private property. That is likely to reverse as the project progresses. We will continue to shift our

focus more to fixing issues on private property so that stormwater ends up where it belongs - in the stormwater network - not the wastewater network.

Guiding principles

In implementing the wastewater reduction plan we will follow these guiding principles that will help deal with uncertainty and risk and ensure our actions are effective:

- managing the wastewater network in an integrated way across Council and private landowner boundaries.
- managing wastewater and stormwater together to avoid transferring issues between the two networks.
- prioritising actions that address each of the entry points into the wastewater network based on the level of risk.
- programming work so that it is affordable for Council and landowners
- playing a more extensive role in coordinating work on private property to ensure it happens so we see improvements.
- managing risks by taking incremental steps and basing decisions on robust evidence.

1.4 Understanding rainfall terminology

The project is focusing on reducing stormwater entering the wastewater. This is linked to how large the rainfall event is and therefore important there is a clear understanding what level of service is being provided for the rainfall event.

Average Recurrence Interval (ARI): means the average intervall that that size rain event will be exceeded. A 2-year ARI means that a rain event of this size will occur on average every 2 years.

Annual Exceedance Probability (AEP): means the probability that a given rainfall total accumulated over a given duration will be exceeded in any one year. A 50% AEP means there is a 50% chance of this event occurring in a year, so once in every two years, is the same as a two-year ARI.

Table 1

Average Recurrence Interval (ARI)	Annual Exceedance Probability (AEP)
2 Year	50%
5 Year	20%
10 Year	10%
50 Year	2%
100 Year	1%

The building code uses AEP to define a rain event for design purposes.

1.5 What are the key issues?

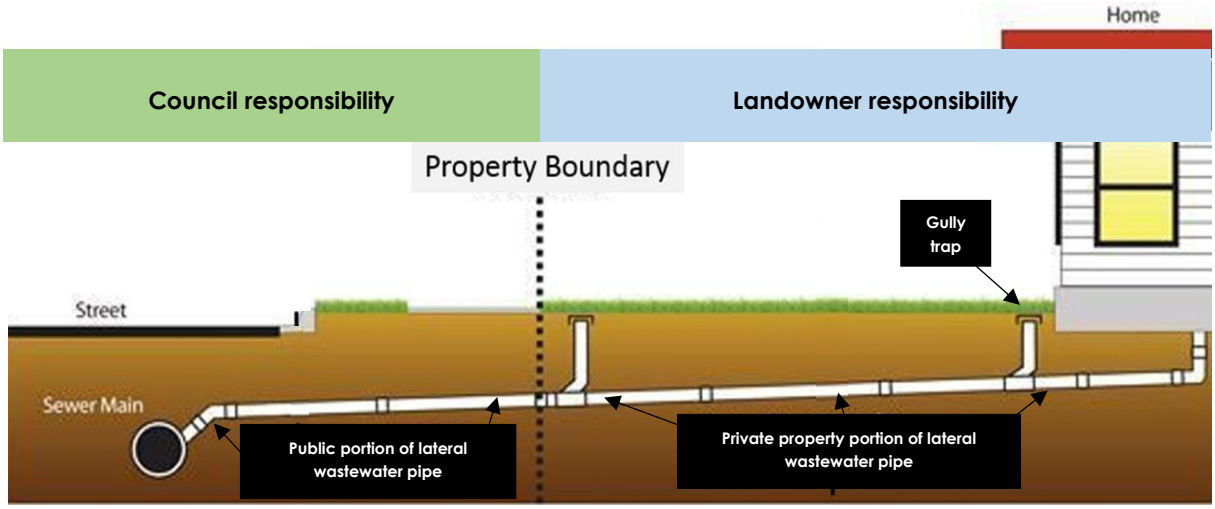
Cost burden

The diagram below shows where the responsibility for different parts of the wastewater network sit. Landowners are responsible for the management and maintenance of the wastewater system on their property, this includes gully traps and part of the lateral wastewater pipe. The High and Medium Impacts are:

- Flood waters flowing over and into private gully traps (High Impact),
- Water getting into leaking private gully traps (High Impact),
- Roof water being piped straight into private gully traps or private lateral wastewater pipes (High Impact),
- Private lateral wastewater pipes leaking between houses and the Council/public main network (Med Impact).

Council's responsibility kicks in at the property boundary. Those responsibilities extend to paying for remediation works that may need to be done to reduce stormwater infiltration.

Diagram 3



The exception to this is where Council needs to reduce stormwater flooding on properties. Flooding on one property may lead to wastewater overflows at other properties, usually low-lying neighbours. This is because the whole wastewater network is interconnected and water will always flow downhill. Sometimes the person responsible for the problem is not the one that bears the negative impacts.

So there is a community benefit to preventing flooding on private property. As such Council may manage and pay for improvements to reduce flooding where multiple properties are involved.

The table below outlines where the burden of cost falls for each type of remediation work.

Table 2

Remediation	GDC	Property Owner	Grant/ Subsidy
Drain property flooding to approved outlet	✓	✓	✓
Raise gully traps above 10-year flood level	✓	✓	
Divert roof water going to ground in flood area to approved outlet	✓		✓
Prevent flooding getting to properties	✓		
Fix leaking gully traps		✓	
Roof water going directly to gully traps or wastewater		✓	
Private property sewer laterals leaking		✓	
Councils sewer mains, access points and laterals leaking	✓		
Capacity upgrade of wastewater system	✓		
Capacity Upgrade of stormwater system	✓		
Ponded water under houses	✓	✓	✓

To reduce the cost burden on property owners, Council will attempt to spread private property work over a longer time period to spread the financial impact to the owner.

Council will also investigate funding options through external organisations to incentivise/ subsidise property owners to make improvements that will remove flooding from their properties or under houses. This system could run similar to local home insulation programmes as it has similar health and environmental benefits for our community.

Prioritising work

With so much work to be completed, it is important to prioritise the work. We will prioritise based on reducing flows where the greatest amount of stormwater could enter the wastewater network.

Council's wastewater and stormwater models will be used to identify these priority areas. Early model runs show that Kaiti has the highest percentage of stormwater entering the wastewater network followed by Whataupoko/ Mangapapa then Elgin/CBD.

Appendix 2 shows the most affected areas and potential wastewater overflow points.

Work programming

We do not have enough information to know how much work is needed on the private-owned parts of the wastewater network. We can only estimate until detailed investigations are done.

We are able to provide a reasonable idea of the amount of work needed in Kaiti based on early modelling done in the area. The table below shows the scale of the work needed to address flooding in Kaiti.

Table 3

Kaiti	Hectares	Houses Affected	Collective (# Drains)	Individual (# Drains)
Medium Risk	90 Ha	960	40	720
High Risk	10 Ha	120	15	30
TOTAL	**100 Ha**	**1080**	**55**	**750**

The table below outlines the key work areas and gives some general indications of the scale of the work where known.

Table 4

Work area	Comments
Property flooding	12 houses per hectare (approximately) likely to be affected by flooding in impounded areas.
Private property laterals	33% of property laterals need replacement in the next 20 years.
Council mains upgrades	14km of sewer main upgrades.
Stormwater upgrades	Yet to be determined from modelling work, $18M+ already completed.
Network renewals	Projected expenditure of $12.5m over the next 10 years and $21m over the next 30 years.

There are other non-remedial actions that also need to be factored into work programmes:

- Property inspections and monitoring of the stormwater network.
- Education and securing community buy-in will be critical to project success.
- Programme administration to manage inspection records, fault notices and remediation work progress.

The level of uncertainty around the scale of the amount of work could impact significantly on how quickly we can get the work done and how much it will cost.

It is likely that work will extend beyond the current 10-year timeframe. We expect the target levels of service to still be achieved.

1.6 Options / How much will it cost?

We are not certain of how much work is needed on the privately-owned parts of the wastewater and stormwater networks. So we can only estimate costs at present. As we complete more work we will be able to refine costs.

To deal with this uncertainty we have developed a budget with three options:

Option	Cost
1. High option	$80,097,400
2. Medium option	$49,997,400
3. Low option	$38,579,900

The High option (1) will have significantly less risk of not achieving the objectives. The Low option (3) should achieve the objectives but potentially greater risks. Given the costs that would fall on private property owners to undertake work at their own cost, the High option is unrealistic and unaffordable.

The Low option gives priority to high impact actions to reduce stormwater infiltration through gully traps and reduces the amount of private property drainage that Council will fund.

Table 5

Remediation Options	Overall (10 yrs)			Funding Source
	Range (Option)			
	High (1)	Medium (2)	Low (3)	
Total Budget (Proposed)	**80,097,400**	**49,997,400**	**38,579,900**	
Wastewater (WW)	**55,700,000**	**30,400,000**	**23,150,000**	
WW - Renewals (Retic)	38,000,000	15,000,000	11,000,000	Capex
WW - Renewals (Laterals)	5,300,000	4,000,000	3,000,000	Capex
WW - Upgrades (Retic)	5,500,000	5,500,000	4,250,000	Capex
WW - Upgrades (Pump Station Storage)	3,000,000	2,000,000	1,000,000	Capex
WW - Model	300,000	300,000	300,000	Opex (Special Projects)
WW - Private Property Investigations (Laterals)	2,250,000	2,250,000	2,250,000	Opex
WW – Inflow & Infiltration Coordination	1,350,000	1,350,000	1,350,000	Opex
Stormwater (SW)	**24,397,400**	**19,597,400**	**15,429,900**	
SW - Renewals (Retic)	3,208,200	3,208,200	3,208,200	Capex
SW - Upgrades (Retic)	4,250,000	4,250,000	4,250,000	Capex
SW - Upgrades (Drain Private Property)	13,200,000	8,400,000	5,400,000	Capex
SW - Upgrades (Driveway Culverts)	900,000	900,000	0	Opex
SW – Model	310,700	310,700	310,700	Opex (Special Projects)
SW - Private Property Inspections	2,250,000	2,250,000	2,250,000	Opex
SW - Secondary Flowpath	11,000	11,000	11,000	Opex (Special Projects)
SW - Private Property Investigations	267,500	267,500	0	Opex (Special Projects)

The community have signalled that they want a greater reduction of wastewater overflow events and are prepared to pay to achieve this as signalled through the Long Term Plan and the Freshwater Plan.

To give certainty to reducing discharges Council needs to participate and manage on-property flooding to a higher standard than what is required of the property owner under the building code. The standard a property is required to comply with under the building code is to raise the gully trap above the 10 year flood level (10% AEP).

Historically it has been very difficult for Council to accurately set gully trap heights in relation to a 10 year flood level. As a result the minimum default gully trap heights were applied (25mm

above paved or 100mm above unpaved surfaces). This default approach has not provided a long term or robust solution to reducing gully trap overtopping.

Due to detailed hydraulic modelling tools now becoming available, gully trap heights above a 10 year flood level can now be specified on all new building consents (when the wastewater system is affected). Where there are sustainable solutions to achieve greater certainty around reducing overflows, Council needs greater involvement to draining impounded stormwater.

Cost to individual property owners

For those properties that have private sewer system issues there will be no grant funding or subsidy available. Time (ranging from 2-10yrs) is the one thing where flexibility can be provided to the property owner as to when the minor repairs, partial replacement, or total renewal of the sewer system will need to be completed by. The cost to individual property owners could vary from a few hundred dollars to $5-6,000.

Providing that grant funding assistance is secured the cost burden imposed on private property owners for stormwater improvement work is expected to be minimal. Some properties will be fully funded while others may be incentivised (via a subsidy) to complete the work.

Some suburbs have been found to have about 20% of the dwellings roof-water being discharged to the ground (i.e. not to an approved outlet). It is also common for shed runoff to be discharged to the ground and the majority of houses tend not have sumps installed to drain surface runoff. The quality and quantity of drainage also varies depending on the age of the house or era of the subdivision.

When a properties stormwater runoff is not being managed appropriately, is causing a nuisance or is in a high risk area then system improvements will be required. The property may be addressed collectively by a new Council funded system to address multiple properties at once, or individually with localised improvements.

Where localised stormwater improvements are required rough order costs could be in the order of $10,000 per property when little private infrastructure is in place. This will vary depending on the nature of the site, distance from an approved outlet and concrete driveways/footpaths etc. It is expected that this work will be grant funded as wider betterment will exist for high risk and/or nuisance properties. This work will occur on a prioritised basis or 'risk based' approach.

SECTION 2

ACTIONS

2.1 Flood waters flowing over and into gully traps (High Impact)

Flood waters flowing over and into gully traps	• Drain property flooding to the Council system for 10 year flood level • Raise gully traps above the 10 year flood level • Divert roof water to Council system if required • Prevent flooding getting to the property

1. All on-property flooding that has the potential to impact on a house or the Wastewater Network must be drained to an approved stormwater outlet for a rain event that has a 10% probability of occurring annually (10% AEP). This is in order to prevent stormwater entering the gully trap/s or affecting the house. Council will fund and manage on property flooding including the use of grants/subsidies if available.
2. 10% AEP (Flood level) will be determined by the Rain on Ground Map produced by Council's stormwater model. This assumes the worst case – where no formal drainage exists other than natural flow paths.
3. All gully traps must be raised to 100mm above the 10% AEP (flood level) or if not in a flood area meet the requirements of the building code. This is a property owner's cost.
4. Gully traps to be raised once any on-property flooding is resolved.
5. If downpipes are discharging directly to ground in a flood area and are contributing to flooding the downpipes will be required to be connected to an approved outlet. Council will fund and manage.
6. Where Council construct a drain on private property it will generally be designated as a common shared private or private drain unless there is a need to maintain an interest in the drain(s) and will declare it to be a public drain. Criteria that will be used to assess a public drain will be:
    a. Where 3 or more properties are affected by flooding and the most practical option is one drain.
    b. Council needs to provide a public drain onto private property for efficient drainage of the network.
    c. Where Council does not provide an approved outlet nearby.

2.2 Water getting into leaking gully traps (High Impact)

Water getting into leaking gully traps	• Inspect and repair/replace broken and leaking gully traps

7. Inspect, repair or replace any leaking gully traps as determined by a water test.
8. If a major repair of the gully trap is required the condition of the sewer lateral will also be assessed to check if additional repairs are likely which may lead to reduced costs overall and less disruption.

2.3 Roof water being piped directly to gully traps or lateral wastewater pipes (High Impact)

Roof water piped into gully traps or lateral wastewater pipes	• Require downpipes to be connected directly to Council system

9. Where downpipes from roofs are directly discharging into gully traps the property owner is responsible for paying for its removal and piping to an approved outlet. Completion within 1-3 months.

2.4 Lateral wastewater pipes from houses to the main network leaking (Medium Impact)

Lateral wastewater pipes leaking	• Inspect, repair/replace, prioritise based on age and leakiness (range of timeframes to achieve compliance)

10. Sewer laterals will be inspected using CCTV based on risk of leakage. If faults are identified repairs/replacement will be required.

11. All private sewer lateral repairs/replacement will be funded by the property owner/s. There will be flexibility as to when the repairs/replacement will be required to be completed. From time of notification:

    a. High priority repairs/replacement will have 2 years to complete, and will have some or all of:
    - Lateral located in a ponding area
    - Identified faults
    - Pipe age older than 70 years
    - High leakage / infiltration
    - High groundwater level.

    b. Medium priority repairs/replacement will have 5 years to complete, and will have some or all of:
    - Lateral located in a ponding area
    - Identified faults
    - Medium Leakage/infiltration
    - Pipe age older than 50 years.

    c. Low priority repairs/replacement will have 10 years to complete, and lateral has identified faults.

2.5 Council's wastewater system leaking at main and lateral wastewater pipes and access points (Low Impact)

Council's pipes and access points leaking	• Continue annual renewal of mains, manhole and Council's portion of the sewer lateral

12. Council with maintain a renewal programme approved as part of the Long Term Plan process. Priority will be given to the most leaky pipes where possible.

SECTION 3
APPENDICES

Appendix 1 – Findings of Wastewater and Stormwater Review

Reducing overflows commenced with the Gisborne City Council in 1988 when a study was commissioned. Remediation work has been ongoing since and overflows were planned to be reduced in conjunction with the establishment of a wastewater treatment plant. The reality is the level of reduction that was expected did not occur. A review was undertaken to identify why this has not occurred and what, if anything, could be done differently. The results of this review are detailed below:

Key	High Impact	Medium Impact	Low Impact

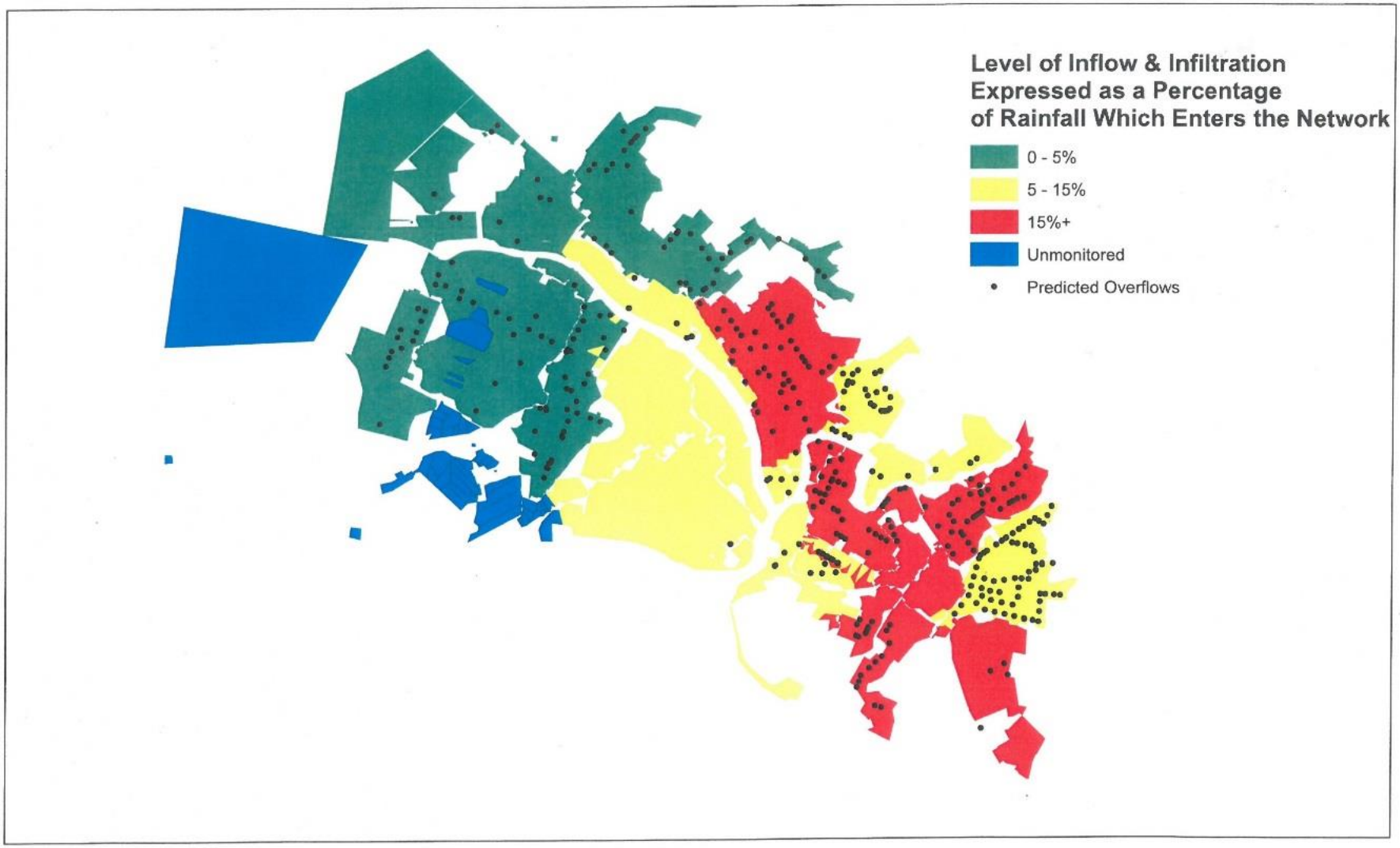
	Findings and issues	Options and recommendations
1	The Wastewater Network Model confirms there are some upgrades required as shown in Appendix C.	Appendix C identifies capacity constraints but further investigations will be undertaken to confirm the actual solution. **Recommendation:** Upgrades to be undertaken.
2	x21 Stormwater catchments have been investigated and upgrade work completed on Council's network, x3 Stormwater catchments have been investigated and are awaiting upgrade work. In some catchment studies gully traps were recommended to be raised on private property. These have not been raised to the recommended heights.	A stormwater model was commissioned initially in the Kaiti area and will be extended to the rest of the city. This will check previous catchment studies as to the adequacy given that some of these studies were commissioned in the late 1990's. Outputs from the Kaiti model suggest that there is adequate capacity to allow private property to be drained to Council's network. It is expected that there will be some additional improvement works. **Recommendation:** 1 Complete the stormwater network model across the whole city and use this to reconfirm outputs from previous catchment studies. 2 Complete improvement works from remaining 3 catchment studies. 3 Complete the raising of gully traps (refer 5).

	Findings and issues	Options and recommendations
3	While Council provided for properties to drain to the stormwater system mostly the property owners did not connect or only drained their roof water but largely did not drain any property flooding.	Through the use of high resolution aerial digital contour mapping undertaken recently, Council is now able to identify likely properties that will experience ponding/flooding on their property. Previously there was a high reliance on property questionnaires to identify at risk properties. Council needs to reduce private property flooding that gets into gully traps by a minimum of 85% to achieve objectives. Options: 1 Educate property owners and encourage them to discharge ponded water into Council's system. 2 Council develops a grant system (similar to warmer homes programme) to incentivise property owners to manage stormwater under houses and on property that causes a nuisance. 3 Council enforces the requirement to drain the ponded water to an approved outlet at owners cost. 4 Council funds and manages the reduction of on-property ponding/flooding where it is at risk of flowing into Council sewer network. **Recommendation:** Option 2. This can range from 100% funding where it gets into sewer network to a range of funding options depending on benefits. Council to manage all procurement to ensure benefits are realised.
4	Of the properties connected to Council's stormwater system approximately 70% of the properties have not maintained their pipes and they were found to be blocked. Therefore not discharging to Council's system.	A management system to ensure properties maintain their system. Options: 1 Educate property owners and provide regular reminders. 2 Council funds a cleaning cycle up to the property boundary to ensure efficient operation. 3 Do nothing - this has a Medium to High Impact. **Recommendation:** Council undertake an ongoing cleaning programme of stormwater laterals to the property boundary and operate an education and inspection programme for the on-property portion.

	Findings and issues	Options and recommendations
5	Most gully traps heights have been set to minimum heights required within the building code on the assumption they are not within a flood area. The building code requires gully traps to be raised above the 10% AEP.	It is only until recent times that technology can provide the level of detail to determine property flood levels relative to gully trap heights on individual properties. Flood level requirements have changed over the last 50 years. Raising gully traps without removing on-property flooding will not provide a permanent fix or sustainable outcome. Options: 1 Raise gully traps immediately to comply with the building code. 2 Raise gully traps to comply with the building code in conjunction with managing on-property flooding to ensure a sustainable solution.
		Recommendation: Option 2. It has been found that if only gully traps are raised people will still find a way to get stormwater into the sewer network to drain their property which can make it more difficult to identify and remove.
6	The repairs of leaking gully traps have been partially ineffectual and a portion are still leaking.	The reasons for this are multiple and may have even occurred due to earthquakes, but quite often gaps have not been sealed where a visual inspection is difficult. Water test should be used rather than just a visual inspection.
		Recommendation: All gully traps shall be water tested following any repairs.
7	It has been acceptable practice to allow roof water to discharge to ground and not to an approved outlet.	When roof water downpipes are discharging into gully traps the property owner has been required to remove them from the gully traps. Re-inspections are finding that they have been simply reconnected to gully traps or made less obvious making it harder to identify (not a permanent fix). Options: 1. All roof water to be discharged to an approved outlet and not directly to ground. 2. Only require roof water that is being discharged into gully traps to be redirected to an approved outlet not ground. 3. All roof water being discharged that could cause stormwater to enter into the sewer network be discharged to an approved outlet and not to ground.
		Recommendation: Option 1. The only long term solution that ensures the prevention of stormwater entering the sewer network.

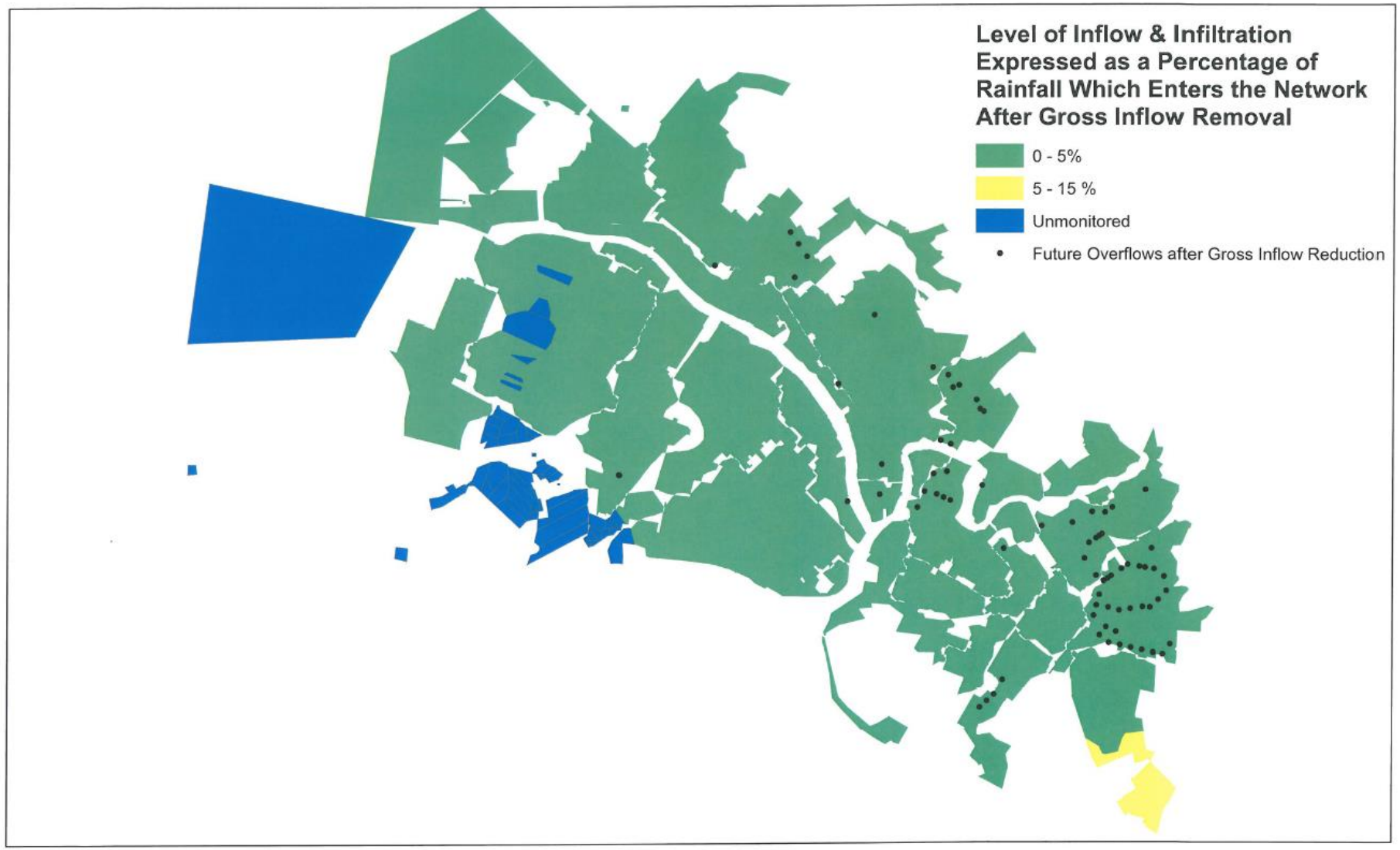
	Findings and issues	Options and recommendations
8	CCTV inspections of sewer lateral when faults are identified and remediation works required have not been supported by water testing which checks for overall leakage.	When private property sewer laterals are inspected using CCTV the owner is only required to fix major faults and fix areas where tree roots have entered the pipes. The sewer lateral has not been water tested to determine if the lateral should be fully replaced (not a permanent fix). Options: 1 Continue with visual lateral inspections (CCTV) and only require fixing of visual faults. 2 Continue with visual lateral inspections (CCTV). Once faults are fixed undertake a water test as required by the building code.
		Recommendation: Option 2.
9	The review identified that water traps (e.g. an 'S' bend) in the sewer near gully traps which are required to prevent odours escaping from the sewer are not being broken during inspections. Therefore it is possible that any illegal stormwater connections above the water trap will not be identified. It is also possible that water traps exist at the property boundary (e.g. Buchan traps) which will prevent any smoke entering the sewer lateral on private property.	Smoke is pumped into the sewer system and if smoke appears out of stormwater connections then there is a cross connection which is illegal. The water trap seal at the gully traps should be broken (via plunging) so that smoke comes out of the gully traps to confirm the seal is broken and there are no other water traps. The gully traps are then covered to prevent smoke coming out of them so that cross connections with the stormwater system can be checked.
		Recommendation: Smoke Inspection methodology be modified to ensure complete testing of the system is undertaken.
10	Downpipes from house roofs are not checked to see where they discharge to. It is assumed that if no smoke emits from the spouting there is no cross connection with the sewer.	It is possible that there is a blockage in the stormwater pipe or there is a water trap that prevents the smoke being emitted.
		Recommendation: All downpipe discharge points should be identified and where they connect to. This will provide greater certainty. Inspection methodology to be modified.
11	Council has a renewal programme of its sewer mains, manholes and Council portion of the property lateral. For a period of time Council has not been replacing the sewer lateral in conjunction with the main.	The rationale for this was to replace more mains that are in groundwater within an allocated budget. It is considered that laterals are more responsive to the amount of stormwater entering the network during a rain event than mains and therefore both should be renewed at the same time.
		Recommendation: Council's mains, manholes and laterals should be replaced at the same time to achieve the greatest reduction and network protection.

Appendix 2: Current overflows for a 50% AEP Rainfall



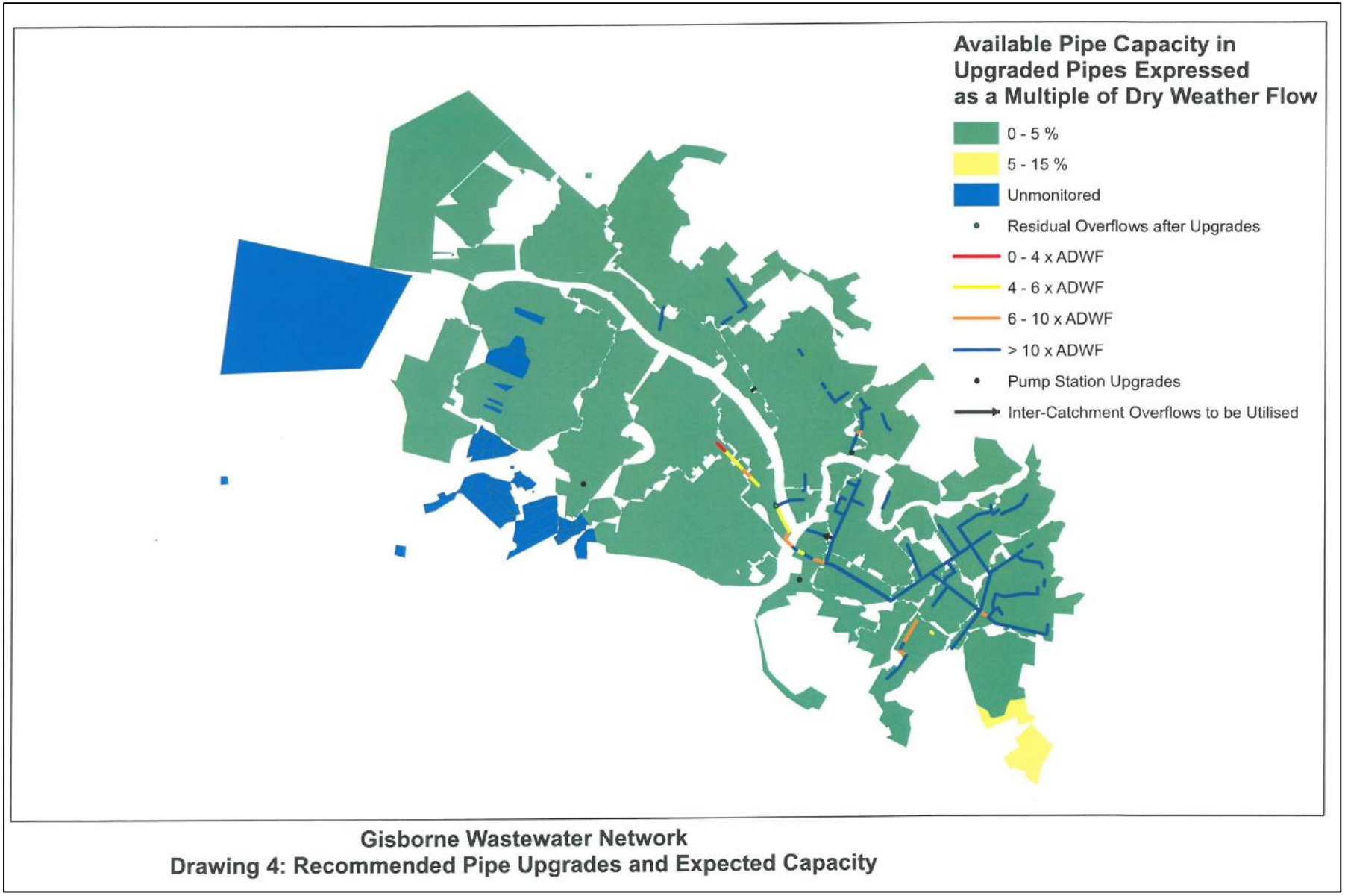
Gisborne Wastewater Network
Drawing 2: Predicted Level of Network Inflow and Infiltration
Expressed as a Percentage of Rainfall in a Two-Year Return Period Event

Appendix 3: Predicted overflows with 85% of High Impact stormwater Removed for a 50% AEP Rainfall



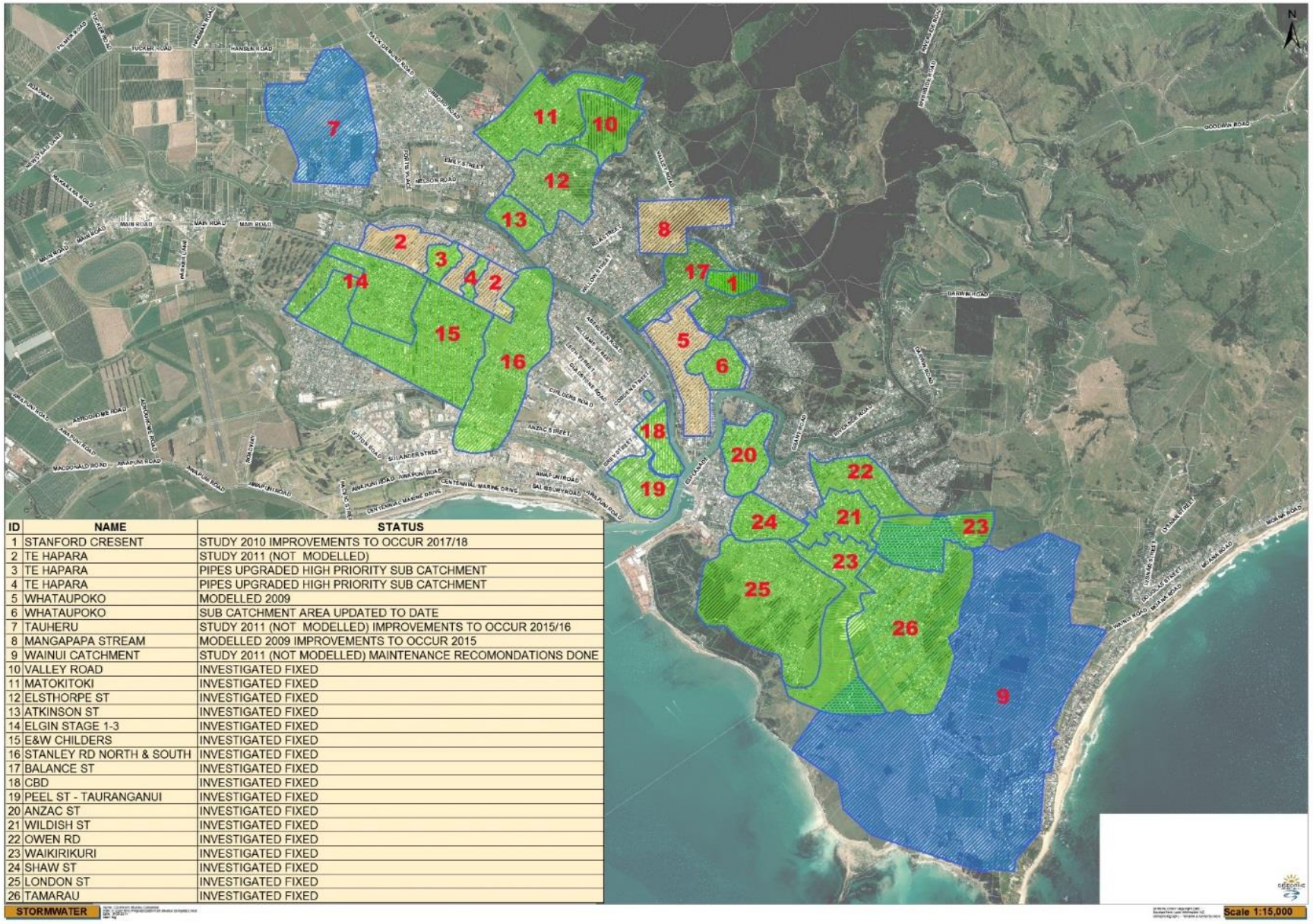
Gisborne Wastewater Network
Drawing 3: Predicted Level of Network Inflow and Infiltration Expressed as a Percentage of Rainfall in a Two-Year Return Period Event After Removal of Gross Inflows

Appendix 4: Predicted overflows with 85% of High Impact stormwater Removed for a 50% AEP Rainfall and sewer main upgrades completed



Gisborne Wastewater Network
Drawing 4: Recommended Pipe Upgrades and Expected Capacity

Appendix 5: Stormwater Catchment Investigations



ID	NAME	STATUS
1	STANFORD CRESENT	STUDY 2010 IMPROVEMENTS TO OCCUR 2017/18
2	TE HAPARA	STUDY 2011 (NOT MODELLED)
3	TE HAPARA	PIPES UPGRADED HIGH PRIORITY SUB CATCHMENT
4	TE HAPARA	PIPES UPGRADED HIGH PRIORITY SUB CATCHMENT
5	WHATAUPOKO	MODELLED 2009
6	WHATAUPOKO	SUB CATCHMENT AREA UPDATED TO DATE
7	TAUHERU	STUDY 2011 (NOT MODELLED) IMPROVEMENTS TO OCCUR 2015/16
8	MANGAPAPA STREAM	MODELLED 2009 IMPROVEMENTS TO OCCUR 2015
9	WAINUI CATCHMENT	STUDY 2011 (NOT MODELLED) MAINTENANCE RECOMONDATIONS DONE
10	VALLEY ROAD	INVESTIGATED FIXED
11	MATOKITOKI	INVESTIGATED FIXED
12	ELSTHORPE ST	INVESTIGATED FIXED
13	ATKINSON ST	INVESTIGATED FIXED
14	ELGIN STAGE 1-3	INVESTIGATED FIXED
15	E&W CHILDERS	INVESTIGATED FIXED
16	STANLEY RD NORTH & SOUTH	INVESTIGATED FIXED
17	BALANCE ST	INVESTIGATED FIXED
18	CBD	INVESTIGATED FIXED
19	PEEL ST - TAURANGANUI	INVESTIGATED FIXED
20	ANZAC ST	INVESTIGATED FIXED
21	WILDISH ST	INVESTIGATED FIXED
22	OWEN RD	INVESTIGATED FIXED
23	WAIKIRIKURI	INVESTIGATED FIXED
24	SHAW ST	INVESTIGATED FIXED
25	LONDON ST	INVESTIGATED FIXED
26	TAMARAU	INVESTIGATED FIXED