REPORT 2
(1215/52/IM)

REDUCING OVERFLOWS OF WASTEWATER INTO THE ENVIRONMENT: A PROPOSED ACTION PLAN

1. Purpose of Report

This report seeks the Committee's approval for an "Action Plan to Reduce Overflows of Wastewater into the Environment". Approval is also sought to include additional funding in the LTP to implement Phase One of the action plan.

2. Executive Summary

In high-intensity rainfall events, the wastewater network can be overwhelmed because of inflow and infiltration (I/I) of non-wastewater (e.g. stormwater run-off) into the network. This is a recognised problem around the world.

I/I is mostly from: groundwater flowing in through holes in the pipes; stormwater getting in from cross connections; defective pipe systems; and from low gully traps. Wastewater systems are designed so that, should the capacity of the network be exceeded, overflows can occur at controlled points to relieve pressure on the system and protect properties. Wellington has constructed overflows, but it is desirable to utilise these as little as possible because the higher the number of overflow incidents, the higher the risk to the public health and the receiving environment. The Council is also obliged to address overflow incidents as a condition of resource consents to discharge wastewater and stormwater.

Assessments made on I/I in Wellington have identified that private drainage pipes are a significant part of the problem. As the Council does not own this infrastructure it is often not maintained and faults go undetected for long periods of time.

Successfully reducing overflows will require actions in both public and private infrastructure.

An Action Plan has been developed to address I/I and reduce the frequency and severity of overflows. The Action Plan is in two phases; Phase One is to trial reduction strategies, implement a selection of operational improvements, implement an education programme and to gain data assessing the effectiveness of these strategies.

Phase Two will use the information collected in Phase One to provide a detailed forward works programme combining reduction and management strategies to get the best value and I/I reduction for the money spent.

There are additional costs that need to be approved associated with the Action Plan. These are as follows;

Year	12/13	13/14	14/15	15/16	16/17	17/18	18/19	19/20	20/21	21/22
Budget ($,000)	$970	$960	$885	$340	$345	$315	$295	$285	$285	$115

Table 1: Action Plan Phase One Funding Requirements

It is recommended that the Council includes this additional funding in the 2012-22 draft LTP process.

3. Recommendations

Officers recommend that the Strategy and Policy Committee:

1. *Receive the information.*

2. *Agree that the "Action Plan to Reduce Overflows of Wastewater into the Environment", as attached in* ***Appendix 1*** *to this report, be included in the proposed 2012-22 Long-term Plan (LTP);*

3. *Agree that additional funding to implement Phase One of the Action Plan also be included in the proposed LTP;*

4. *Agree that officers report back to the Committee in early 2014/2015 with the findings and results from Phase One of the Action Plan, and recommendations for any further phase of the Plan.*

4. Background

The "upper private drainage" referred to in this report is also known as the "upper lateral". This is the length of private pipe from a building to the road boundary. The "lower private drainage" is also know as the "lower lateral" and is the length of private pipe from the road boundary to the Council's public main.

The term "lateral" has caused some confusion and is being replaced by "private drainage". However, until the "Lateral Policy" is reviewed, this terminology will remain.

Work on managing overflows from the wastewater system has been ongoing for a number of years.

This report is a follow up to the paper presented to the Strategy and Policy Committee (SPC) on 11 March 2010[1]. After considering the paper, SPC:

- *instructed officers to explore the range of options to mitigate overflows from the wastewater system as outlined in section 6 of* [that] *report.*
- *noted that officers will bring to the Committee a number of options for consideration to mitigate wastewater overflows before the 2011/2012 draft Annual Plan considerations.*

The report back to the Committee was delayed a year; however a proposed Action Plan can now be included in the 2012-22 LTP process.

5. Discussion

5.1 Why manage overflows and I/I?

The March 2010 paper identified a number of public health, environmental, cultural and legal reasons why the Council needs to manage wastewater overflow and I/I. These reasons are still valid.

Since then Council has been granted global stormwater consents. These consents are for stormwater discharges into the harbour and south coast and replace eleven individual discharge consents. Under the new consents Council is required to report what management solutions or options are being used to reduce the occurrence of wastewater overflows and the effect of any remaining overflow points. There is a specific consent requirement to:

> *"identify the causes of wastewater inputs into the stormwater network in catchments discharging to Wellington Harbour via the Davis Street stormwater outfall (V32-022)[2], and management/treatment options for preventing and/or minimising further inputs".*

The global stormwater consents have been issued for 10 years. In this 10-year period Council will be required to provide options to reduce overflows. These options will assist Council in the next consent application process likely to start in 2019.

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[1] http://www.wellington.govt.nz/haveyoursay/meetings/committee/Strategy_and_Policy/2010/11Mar0915/pdf/2010_March_11_Report_3_Watewater_Overflow_Report.pdf

[2] This outfall is the overflow from the Murphy Street Interceptor.

5.2 Level and source of I/I

In late 2010 flow monitors and rain gauges were installed in strategic locations within the Wellington network to determine the wastewater flow through the pipes. The information gathered indicates that an estimated 75 percent of the wastewater flow during wet weather is from I/I.

Figure 1 shows the sources of I/I estimated for Wellington and illustrates that the public and private networks each contribute 50 percent of I/I into the network.

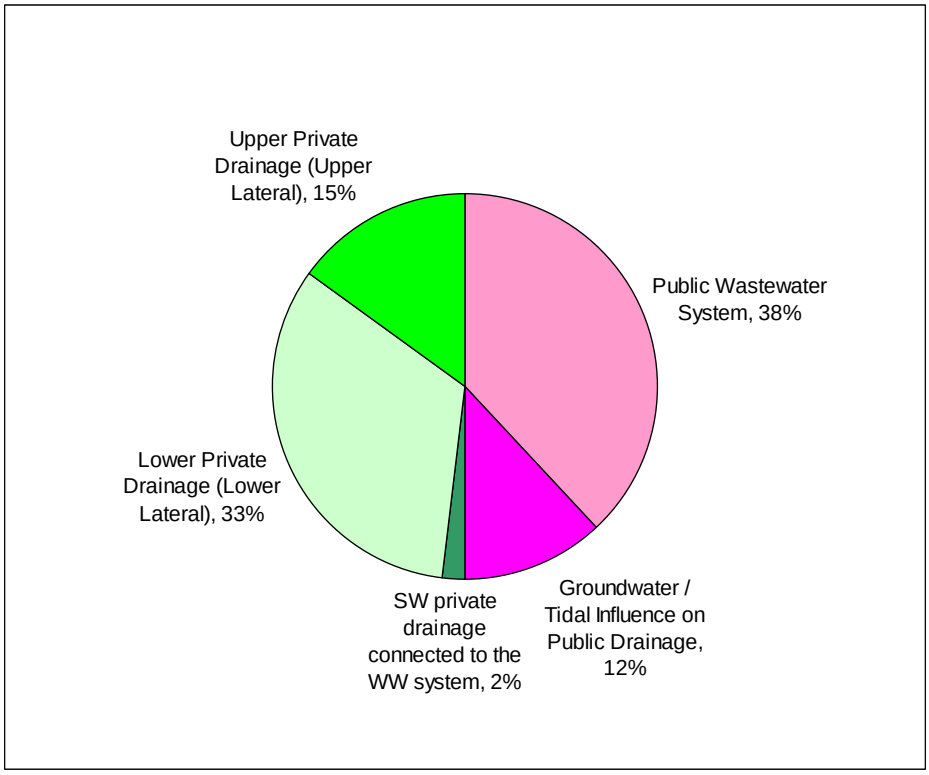

Figure 1: Estimated sources of Inflow and Infiltration for Wellington City Council

Figure 2 breaks down the proportion of total wastewater flow in a rainfall event by various sources.

This information illustrates that:

- during heavy rainfall an estimated 75 percent of wastewater flow is from I/I
- the large majority of I/I is from older suburbs

The information in figures 1 and 2 can help to prioritise I/I management to get the best value for money.

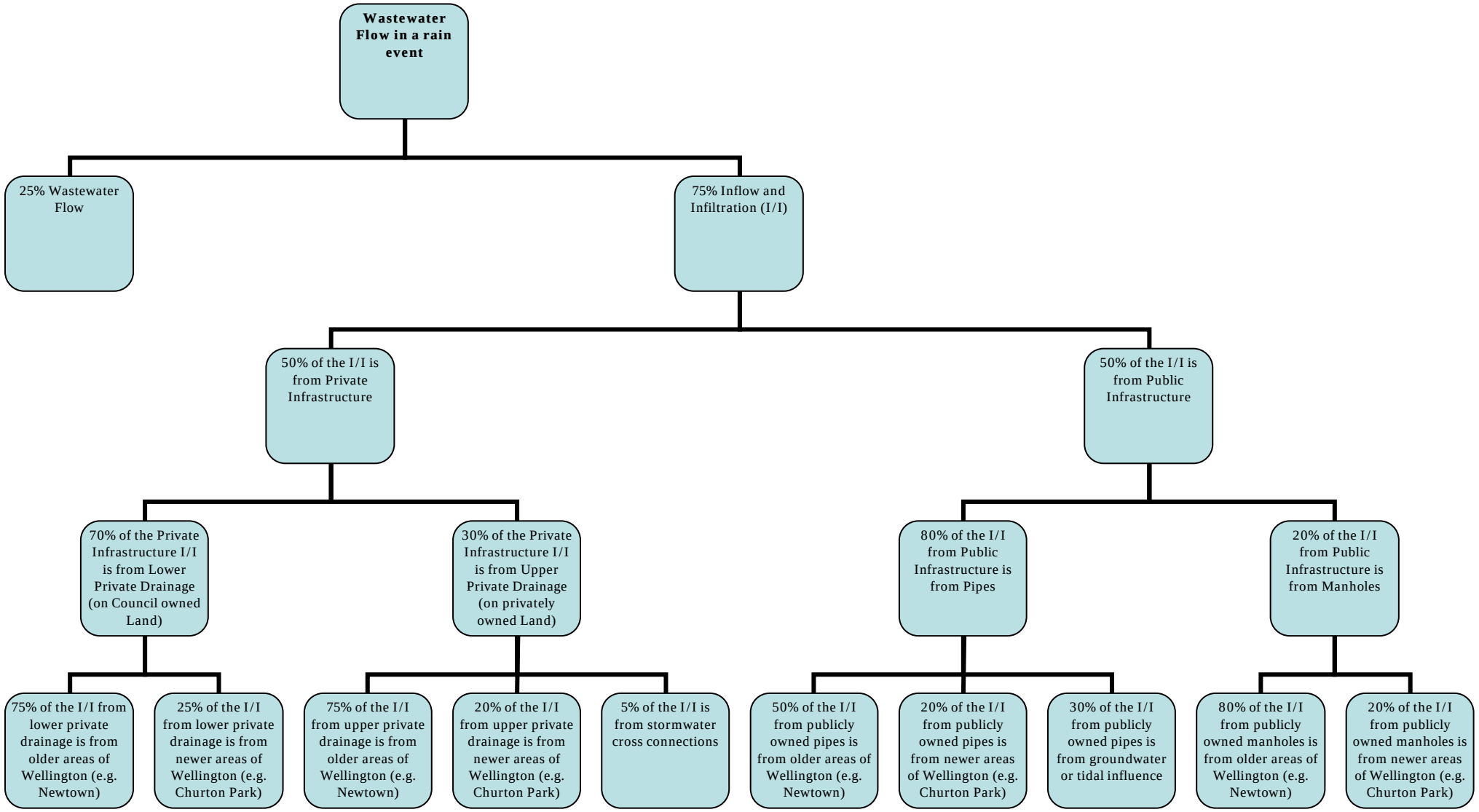

Figure 2: Wastewater Composition Estimate Diagram

5.3 Objectives for managing overflows

The key objectives for managing wastewater overflows are to:

- protect public health
- to promote sustainable management
- protect ecosystems
- meet the Council's legal obligations, including under its resource consents

Significant overflows can have public health effects, harm ecosystems, close beaches and prevent food harvesting. These outcomes are not consistent with a long term goal of Wellington being a Eco-city, that takes a leadership role as the capital of clean and green New Zealand (refer Wellington Towards 2040: Smart Capital).

It is not realistic to try and eliminate I/I or overflows completely. Rather I/I needs to be managed by fixing the pipe network in areas where the most benefit can be gained and, if necessary, implement other techniques to manage or reduce the effects of I/I in the wastewater system.

5.4 Council's actions so far

Council has already laid the ground work for an effective overflow reduction action plan. There have been projects completed that, although not primarily undertaken for overflow management, have had a positive effect. These were documented in the March 2010 paper.

Currently there are programmes and practices underway that will form part of the ongoing management of overflows, including; flow and overflow monitoring, a Miramar Overflow and I/I Investigation and analysis of I/I control options.

Also in the March 2010 paper several options for I/I management were suggested. Many of these ideas have now been investigated. **Appendix 2** summarises the options assessed and the reasons why they were either discounted or are considered feasible for inclusion in the proposed Action Plan.

As part of the investigation, information was gathered on what actions had been implemented by other Councils. This is summarised in **Appendix 3**.

The projects that have been identified and recommended in the proposed Action Plan have been divided into two strategic groups:

- **Reduction of I/I** – this is the reduction in I/I entering the wastewater system from both public and private infrastructure.

- **Management of I/I** - this is the management of I/I once it is in the wastewater system. This includes storage of additional flow or treatment of discharges.

Generally, the first priority should be the reduction of I/I entering the network. However, in some situations this may not be the most cost effective option, in which case management options need to be considered.

It is also important to establish the level of overflow that is acceptable from the network. As noted earlier in the paper it is not practical to develop a network that has no overflows. Therefore there is a decision to be made between cost and the level of environmental effect the community is willing to accept. It is proposed that, as part of the Action Plan, the Council develops "Overflow Management Standards", which essentially set the level of service for the key aspects of the wastewater network.

Each element included in the proposed Action Plan is discussed in a little more detail in the next section of this paper.

Figure 3 shows how the elements could fit together to create the overall Action Plan. Note that some of these actions require more analysis before final recommendations are made on them. Where this is the case, recommendations would be made as part of Phase Two of the Action Plan.

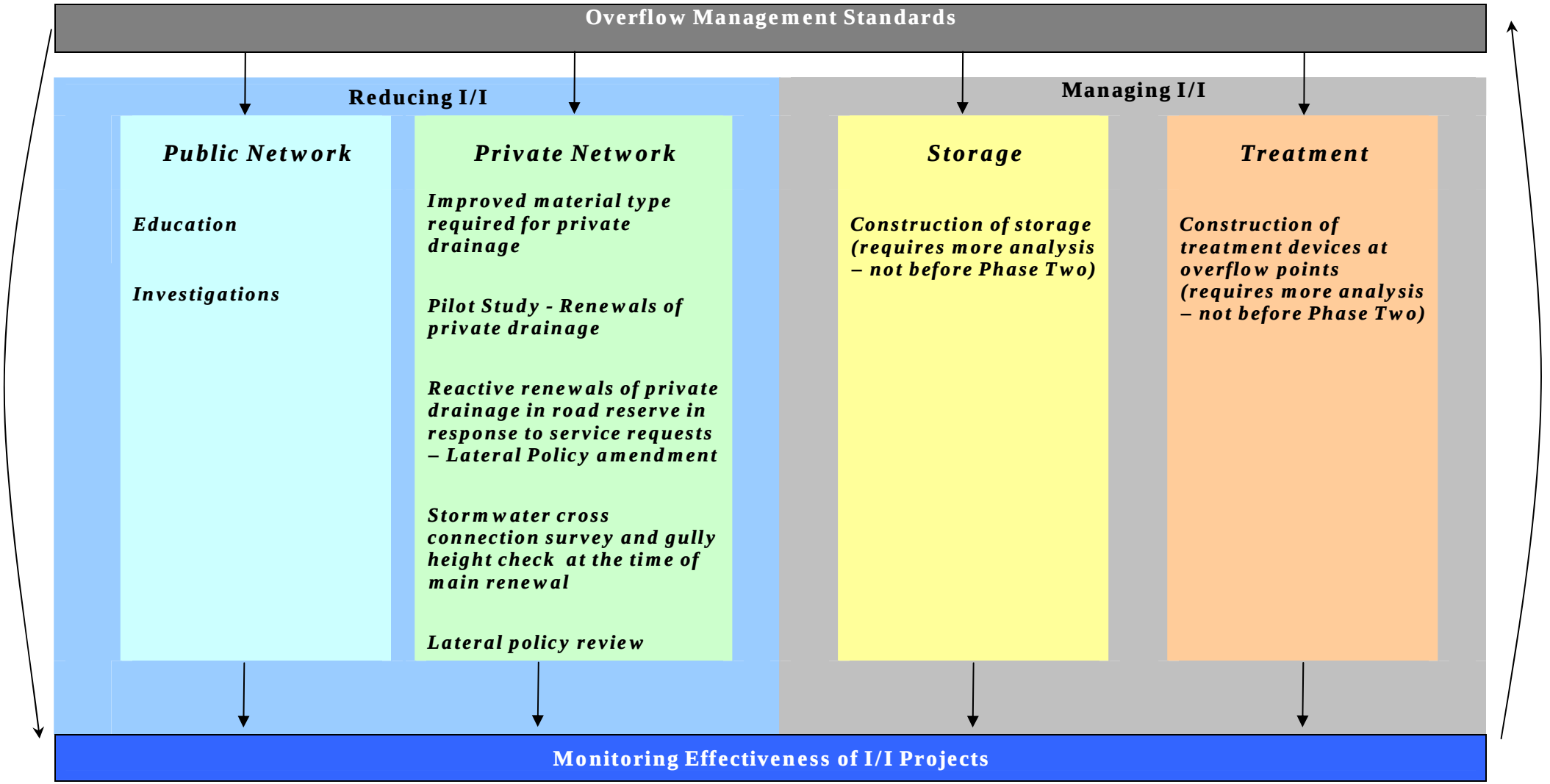

Figure 3: Proposed Action Plan to Reduce Overflow from the Wastewater System

5.5 Discussion on the Elements that make up the Proposed Action Plan

5.5.1 Development of Overflow Management Standards Options

Overflow management standards are an agreed level of service for overflows from the wastewater network and are an integral part of I/I control. These standards need to be determined and agreed upon to feed into other I/I projects.

An options report will provide information on the physical works required to achieve containment of wastewater under different scenarios e.g. one overflow every two years or one overflow every six months. These standards can cover the complete network or be site specific depending on the sensitivity of the discharge site and the costs involved. Whatever standard is chosen it would need to be related to a measurable event (e.g. one in one hundred year rainfall event).

It is important to acknowledge that it is not practical to eliminate overflows from a network. Networks are designed to a certain capacity and once the capacity is exceeded there needs to be a structured discharge point so properties are not affected. The effect of additional flow on the downstream infrastructure, particularly the wastewater treatment plants, also needs to be considered.

The table following summarises a selection of different containment standards used within Australasia.

Table 1: Various Australasian Containment Standards

Council	***Management Standard***
Hutt City	*Varies from 6 months to 5 years depending on the location*
Kapiti Coast DC	*2 years*
Watercare	*6 months*
Manukau Water	*1 year*
North Shore City (at the time of merger)	*6 months*
Christchurch City	*6 months (originally this standard was 2 years but was amended due to the costs that would have been involved in achieving the standard).*
Sydney Water	*Varies depending on location – the Northside Tunnel Project is 6 months*
Melbourne Water and Retail Companies	*5 years – but this has not been able to be achieved due to cost.*

5.5.2 Catchment I/I and Overflow Investigations

A catchment investigation in Miramar is already underway. To date this investigation has involved short term flow monitoring and the development of a wastewater hydraulic model to determine the areas of the catchment most affected by I/I. These areas were CCTV inspected to assess the condition of the pipes. The investigation so far has shown significant I/I in the area which has previously resulted in overflows from the Park Avenue constructed overflow. The next stage in this study is to pressure and smoke test a selection of pipes and to incorporate the leaky pipes into the renewals programme for replacement.

Once investigation work is complete in Miramar investigation work will start in Island Bay.

5.5.3 Pilot Study – Private Drainage Replacement

As 50% of the I/I is estimated to come from private drainage, a pilot study is being recommended to replace selected private drainage pipes to ascertain the level of I/I reduction that can be achieved. It is proposed to carry out this study as a follow on from the investigation in Miramar. This study will involve the replacement of approximately 200 private drains in conjunction with the public main replacement previously identified. Should this pilot study show that the replacement of private drainage pipes has sufficient benefit to warrant consideration, various funding options will be presented for Council decision.

5.5.4 Replacement of Lower Private Drainage (in Road Reserve) due to Tree Roots

Two to three service requests come into council per month regarding root intrusion into lower private drainage pipes on road reserve from Council trees. An additional sum of $60,000 per year is being sought to enable these works to be carried out under the council maintenance budget. This is recommended as a temporary solution until sufficient information is available to determine if the lateral policy should be reviewed. Until a review takes place the lateral policy would be amended reflecting this change.

5.5.5 Stormwater Cross Connection Survey

It is recommended that as part of the renewal programme investigation the private stormwater drainage in the proposed work area is checked to make sure it is not connected to the wastewater network. Gully trap heights will also be checked at the time. Property owners will be notified to rectify the faults.

5.5.6 Education Plan

- **Public Education**

Generally there is a lack of understanding by property owners as to what part of the drainage system they own and that the faults in the system can lead to I/I and overflows from the system. Educating the public will help them understand the need for work in this area and could enhance the willingness to participate in and fund an I/I programme.

- **Contractor/Plumber Education**

This education is aimed at emphasising the importance of using more resilient materials (e.g. Polyethylene) and the importance of water tight connections to the wastewater network.

- **Pipe Material**

Change the pipe material type specified for private drainage construction to provide a more robust material that has increased resilience to tree roots and is stronger to combat heavy loads on the pipe.

Currently lower classes of uPVC and ceramic pipes are allowed for private drainage. All private drainage in future will be constructed from Polyethylene (PE) pipe due to its superior water tightness.

5.6 Council's Policy on Laterals

The Council's lateral policy currently states that the private drainage connection from a building to the Council main is the responsibility of the property owner.

A table in appendix four documents the policies of a selection of councils in New Zealand regarding their private drainage pipe maintenance. The majority of these Councils maintain the lower private drainage – this is the section of pipe from the boundary of the property to the council main.

Depending on the results of the pilot study this policy may require review as part of Phase Two.

5.7 Financial Considerations

The Action Plan in Appendix 1 provides more detail on the costs of each specific project. A summary of the annual costs is shown below. Note these are only costs involved in Phase One of the action plan.

Year	12/13	13/14	14/15	15/16	16/17	17/18	18/19	19/20	20/21	21/22
Budget ($,000)	$970	$960	$885	$340	$345	$315	$295	$285	$285	$115

Table 2: Action Plan Phase One Funding Requirements

5.8 Climate Change Impacts and Considerations

Climate change has the potential to make an impact on the management of I/I. With an expected increase in higher intensity rainfall events there it is likely that more stormwater will enter the wastewater system. This in turn increases the likelihood and volume of overflows. Sea level rise is another possible effect of climate change; this increases the potential for seawater to enter the wastewater system.

Both of these effects will be mitigated with the suggested I/I management practices.

5.9 Long-Term Council Community Plan Considerations

The content of this report will progress into the LTP process.

6. Conclusion

Investigation into the sources of I/I reveal that public and private infrastructure contribute equally to wastewater overflow incidents. A successful I/I reduction programme requires work on both public and private infrastructure. This report recommends work on both public and private infrastructure to reduce I/I and consequently the number of overflows into the environment.

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Supporting Information

1)Strategic Fit / Strategic Outcome

The policy supports Council's overall vision of reducing it is environmental impact and contributing to achieving the community outcomes of promoting sustainable management of the environment, protecting natural landforms and indigenous ecosystems and the protection of environmental health with well planned and well maintained infrastructure.

2) LTCCP/Annual Plan reference and long term financial impact

The projects will require additional budget in some infrastructure budgets – these increases will be added to the 2012/2022 LTP.

3) Treaty of Waitangi considerations

Incidents of wastewater overflow are not considered acceptable by mana whenua.

4) Decision-Making

This is not a significant decision.

5) Consultation

a)General Consultation

No consultation has been undertaken

b) Consultation with Maori

No consultation has been undertaken

6) Legal Implications

A legal opinion is recommended if the lateral policy is reviewed

7) Consistency with existing policy

This report recommends certain measures which are inconsistent with some existing Lateral policy, such as replacing private drainage with public funds. These measures are recommended despite this inconsistency because of the community wide benefit that will result

Appendix 1: Proposed Action Plan to Reduce Overflows of Wastewater into the Environment

Phase One:

No	Action Plan	Comments	2012/2013	2013/2014	2014/2015
1	Development of overflow management standard options	The project is to develop the overflow management standards options for consideration by Council in conjunction with Phase 2 works being considered.	$75,000	$75,000	
2	Investigations	Investigation is required to narrow down areas most affected by I/I to ensure effective private and public network renewal	$300,000	$320,000	$320,000
3	Pilot study – private drainage replacement	This project will involve replacing lower private drainage in one area and both upper and lower private drainage in another to assess the benefits of private drainage renewal. A total of 200 private drainage renewals are expected to be carried out over three years. This will give a statistically relevant result.	$460,000	$460,000	$460,000
4	Lower private drainage replacement due to Council owned trees	Currently there are 2 – 3 service requests per month due to root intrusion in lower private drainage (located on road reserve). This funding would allow for the renewal of those sections of private drain affected by Council owned trees until sufficient information is available for a full lateral policy review.	$60,000	$60,000	$60,000
5	Stormwater cross connection and gully trap checks	This project will check stormwater connections to make sure they are not connected to the stormwater system at the time the public main is replaced. Gully trap heights will also be investigated.	$30,000	$30,000	$30,000
6	Education programme	This programme is to educate the public and contractors on the effects of I/I and incorrect connections.	$45,000	$15,000	$15,000
	Total additional budget requirements		**$970,000**	**$960,000**	**$885,000**

Phase Two:

No	Action Plan	2015/2016	2016/2017	2017/2018	2018/2019	2019/2020	2020/2021	2021/2022
7	Continuation of phase one work; investigations, stormwater cross connection and gully trap checks, education programme (Action Plan No's 2, 4, 5, 6)	$340,000	$345,000	$265,000	$245,000	$235,000	$235,000	$115,000
8	Determination of overflow management standards after the review of the options report	Options will be identified and analysed for Council consideration at the end of Phase One						
9	Full review of the lateral policy – the extent of this review will depend on the results from trials	Will be carried out at the end of Phase One						
10	Funding strategy	Options will be identified and analysed for Council consideration at the end of Phase One						
	Total Additional Budget Requirements	**$340,000**	**$345,000**	**$265,000**	**$245,000**	**$235,000**	**$235,000**	**$115,000**

Appendix 2: Summary of Management Options

The table below lists all the different management and options considered. Some projects documented below are business as usual and some are new.

Management Tool	Management Strategy	Area of Influence	Business as Usual or New Project	Comments	Action Recommended
Renewals Programme – public mains	Reducing I/I	Public Infrastructure	BAU	Currently Business as Usual	yes
Investigations	Reducing I/I	Public Infrastructure	NP	Project is required to provide a renewals programme specifically related to overflow reduction.	yes
Critical Drains CCTV Inspection	Reducing I/I	Public Infrastructure	BAU	Tool to assist in I/I reduction	yes
Flow Monitoring	Reducing I/I	Public Infrastructure	BAU	Used to assess the level of I/I and to quantify improvements (average cost of $185,000 per year but can vary slightly)	yes
Fast Track Renewals Programme	Reducing I/I	Public Infrastructure	NP		no
Renewal of Pipes within the Tidal Zone	Reducing I/I	Public Infrastructure	NP		maybe
Additional CCTV Inspection	Reducing I/I	Public Infrastructure	NP	This project is needed to assist in the development of capital works projects	maybe

Management Tool	Management Strategy	Area of Influence	Business as Usual or New Project	Comments	Action Recommended
Model Development and Maintenance - Wastewater	Reducing I/I	Public Infrastructure	NP	This project is needed to assist in the development of capital works projects and forms part of other projects	yes
Material Pipe Types for Private Drainage	Reducing I/I	Private Infrastructure	NP	Resilient materials will provide for better quality private drainage.	yes
Renew Private Drainage (Lower only or both upper and lower)	Reducing I/I	Private Infrastructure	NP	Could be implemented in varying ways including partially or completely rates funded.	yes
Property Warrant of Fitness	Reducing I/I	Private Infrastructure	NP	Not recommended as it will be labour intensive and could have an impact on the ability of property owners to sell their properties.	no
Building Inspection Process Modification	Reducing I/I	Private Infrastructure	NP		yes
Lateral Policy Change	Reducing I/I	Private Infrastructure	NP	A policy change could be required regarding the maintenance of private drainage - changing maintenance responsibility would increase I/I reduction	yes
Council taking over ownership of private drainage.	Reducing I/I	Private Infrastructure	NP	Additional depreciation would need to be funded annually	no
Education - Public, Contractor and Staff	Reducing I/I	Private Infrastructure	NP	$45K initially then $15 per annum to maintain	yes

Management Tool	Management Strategy	Area of Influence	Business as Usual or New Project	Comments	Action Recommended
Government Grants for Private Drainage Repair	Reducing I/I	Private Infrastructure		Not a possibility	no
S127 Changes to Resource Consent Conditions	Controlling I/I	Treatment	NP	Not recommended as it goes against community outcomes	no
Treatment at the end of the overflow points	Controlling I/I	Treatment	NP	Costly - each overflow needs to be considered individually	maybe
Code of Practice changed (sizing of wastewater pipe)	Controlling I/I	Storage	NP	Will result in more wastewater entering the treatment plants	no
Review pump station emergency overflow mitigation measures	Controlling I/I	Storage	NP	Would not decrease I/I but could reduce low frequency events	maybe
Removal of constructed overflows from the network	Controlling I/I	Storage	NP	Each overflow would need to be considered on a case by case basis	maybe in the longer term
Development of Overflow Management Standards	Controlling I/I	Storage	NP	This project is needed to assist in the development of capital works projects - 2 year project	yes
Construction of on line storage	Controlling I/I	Storage	NP	Is likely to form part of Phase Two in combination with other options	yes

Appendix 3: I/I Management Options Employed by other local authorities

Council	Management Solution	Effectiveness
Upper Hutt City Council / Hutt City Council (Combined Wastewater Treatment)	**Storage** - Installation of a 10,000 m3 diluted wastewater storage tank for storage and treatment of excess wet weather flows. **Private Drainage Renewal** - Undertaken in Waiwhetu where the wastewater system is subject to high wet weather loadings. HCC meets the cost of testing laterals and the cost of replacing the private drainage in road reserve that is found to be defective. Owners are required to meet the cost of replacement of the private drainage in their properties that does not pass the specified test.	Since the tank has been in operation the amount of wastewater discharged to the Hutt River has substantially reduced and the Hutt River water quality has improved. The implementation of this project has reduced wastewater overflows to the Waiwhetu Stream
North Shore City Council	**Storage** – a long term capital works project is under way to install storage within the network. **Private Drainage Renewal** – Owners were required to repair private drainage as defects were found.	Information from North Shore City Council has shown that both rehabilitation of private and public drainage is required in older networks to show significant reduction in I/I. The installation of storage and the renewal of private drainage has reduced the number of overflows.
Waitakere City Council	**Public main renewal** - An inflow and infiltration control programme is in place to minimise stormwater entering the wastewater network either as direct inflow or infiltration.	Previous pilot study showed significant reduction of I/I following rehabilitation.
New Plymouth District Council	**Private Drainage Repair** - New Plymouth District Council undertook a one-off community project to fund and repair defective private sewers. This was completed instead of the more expensive option of upgrading the wastewater treatment plant.	The upgrade of the wastewater treatment plant was deferred due to the reduction in influent flow.

Appendix 4: Council Policies for Lateral Maintenance

Territorial Authority	Maintenance of Private Drainage from the Boundary to the Council main	Maintenance of private drainage from the building to the Council main	Comments
Christchurch CC	✔		When the lower private drain is replaced Council takes ownership of that pipe.
Far North DC	✔		
Gisborne DC	✔		
Hamilton CC	✔		When the lower private pipe is replaced Council takes ownership of that pipe.
Hutt CC	✔		
Kaipara DC	✔		
Kapiti Coast DC	✔		
Nelson CC		✔	
New Plymouth CC	✔		
Palmerston North CC	✔		
Southland DC	✔		
Taupo DC	✔		
Tauranga CC	✔		
Upper Hutt CC	✔		When the lower private pipe is replaced Council takes ownership of that pipe.
Wanganui DC	✔		
Watercare		✔	Watercare has instances where it maintains the private drainage that is located in road reserve.
Wellington CC		✔	
Western Bay of Plenty DC	✔		
Whangarei DC	✔		