



CARTERTON
DISTRICT COUNCIL

STORMWATER ASSET MANAGEMENT PLAN

Te Mahere Wai Taonga Whakahaere

PART B

REVIEWED 2021

Contents

- 1 Executive summary 5**
- 2 Introduction 8**
 - 2.1 Linkages..... 8
- 3 Description of Activity 10**
 - 3.1 What is involved? 10
 - 3.2 Summary of Stormwater Assets 10
 - 3.3 Stormwater and Related Council Assets..... 11
 - 3.4 Why does CDC provide this Activity? 11
 - 3.5 Management of Activity. 12
 - 3.6 Significant negative effects and how they are mitigated. 13
 - 3.7 Significant changes to Activity. 13
 - 3.8 Goals and Objectives of Asset Ownership 13
 - 3.9 Community Outcomes 14
 - 3.10 Local Context..... 14
 - 3.11 Regional Context 15
- 4 Level of Service 15**
 - 4.1 Introduction 15
 - 4.2 Service statement 16
 - 4.3 Customers and Stakeholders 16
 - 4.4 Defining levels of service 16
 - 4.5 Customer Research and Expectations 17
 - 4.6 Service Levels and Performance Measures 18
 - 4.7 Potential changes in Levels of Service 19
 - 4.8 Levels of Service Improvements 20
- 5 Demand Management 21**
 - 5.1 Climate change..... 21
 - 5.2 Demand for improvement in the Level of Service..... 21
 - 5.3 Changes to Customer Expectations 22
 - 5.4 Natural resources plan..... 22
 - 5.5 Demand forecast and Response Strategy..... 23
- 6 Risks and Resilience 25**
 - 6.1 Introduction 25
 - 6.2 Risk management procedure..... 25
 - 6.3 Summary of trends in Risk Assessment 25
 - 6.4 Conclusion..... 26
 - 6.5 Areas for improvement..... 28

7	Assets and Lifecycle management	29
7.1	Introduction	29
7.2	Asset descriptions	29
7.3	Asset Management Systems	32
7.4	Asset assessment rating	33
7.5	Financial forecast	35
7.6	Maintenance	35
7.7	Renewal / Replacement Plan	36
7.8	Critical assets.....	39
7.9	Disposal plan	40
7.10	Improvement Plan	40
8	Financial Projections	41
8.1	Financial Strategy	41
8.2	Past expenditure	41
8.3	Depreciation.....	42
8.4	Insurance coverage	43
8.5	Forecast finances	43
8.6	Assumptions and confidence levels.....	44
8.7	Finance summary (including rates requirements).....	45
9	Improvement plan and monitoring	48
9.1	Improvement plan	48
9.2	Monitoring and review	49
10	References	50

Table

Table 1:	Plan Framework	8
Table 2:	Carterton District Council Stormwater Assets	10
Table 3:	How Council activities relate to the Community Outcomes.....	14
Table 4:	Levels of Service, used for performance measures and targets (2021 LTP).....	18
Table 5:	Improvement plan.....	20
Table 6:	Two-stage global stormwater consent framework.....	23
Table 7:	Expected impacts of Demand Changes for Stormwater Services.....	23
Table 8:	Stormwater Work required meeting Growth and Demand	24
Table 9:	Improvement plan.....	25
Table 10:	Carterton Risk Improvement Plan – District-Wide Risks	26
Table 11:	Risk Improvement Plan	27
Table 12:	Areas for improvement.....	28
Table 13:	Length of pipework by size and material (excludes laterals & open drains).....	30

Table 14: Improvements planned – LTP 2021 (year 1)	37
Table 15: Stormwater data confidence levels	38
Table 16: Possible significant negative effects	39
Table 17: Improvement plan.....	40
Table 18: 2019 Stormwater and Drainage Assets Valuation Summary.....	42
Table 19: Infrastructure assets covered by the LAPP fund (2021)	43
Table 20: Forecast revenue and expenditure included in LTP.....	46
Table 21: Capital expenditure included in LTP	47
Table 22: Recommendations for Refining the Asset Management Plan.....	48

Figures

Figure 1: Projected Operational Expenditure and Capital Expenditure	6
Figure 2: Stormwater assets network - Urban Carterton	10
Figure 3: Results of the 2008 -2021 Residents survey for the stormwater network	17
Figure 4: Layout of urban pipes and channels.....	31
Figure 5: Total pipe length by age	31
Figure 6: Stormwater assets by age.....	32
Figure 7: Assets by age.....	34
Figure 8: Planned 30 year renewal Stormwater map.....	50
Figure 9: Urban stormwater catchments.....	51

Revision history

Plan Version and Control		
Date	Revision	Checked by:
From Doc 39333		
March 2018	Version 1	D Gittings
August 2019	Version 2	T Pritchard
November 2021	Version 3 – Doc 90784	T Pritchard

1 Executive summary

What we do

The Council manages street kerb stormwater collection, 19.3km of piped drains, 11km of open channel, and over 477 sumps as part of its stormwater services in the urban area of Carterton. Stormwater management is not limited to only reducing the adverse effects of ponding or flooding but also improving the water quality of the receiving water bodies that may, or could be, adversely affected by discharges from the Councils stormwater network. In addition, the Councils water race systems (the Taratahi and Carrington) play a role in the rural areas adjacent to the Carterton Township by providing secondary pathways which carry excess water during high rainfall events.

Why we do it?

Leaving standing water could be potentially unhealthy and preventing ponding water as effectively as possible provides preventative health benefits. There is additional property and roading infrastructure damage prevention in being able to mitigate potential flooding events. The Council is driven by the community's expectations of service delivery at the best possible cost for the required level of service.

Levels of service

The public expects that for all but the heaviest of rain events the stormwater will not damage property within the Carterton urban environment. How the customer regards the level of service provided by CDC for stormwater is gathered from surveys, meetings, trend analysis, annual plan submissions, service request analysis and general customer responses.

From this evidence we have established that the community is generally satisfied with what we are doing and how we are delivering the service.

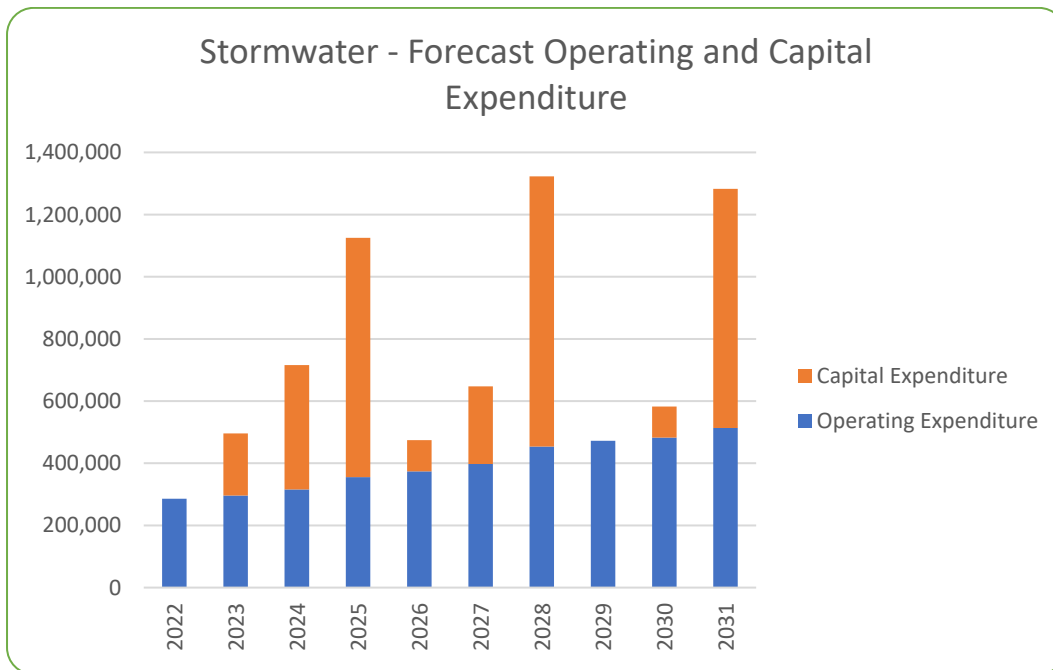
What does it cost?

The estimated replacement cost (i.e. value) of CDC's stormwater assets is approximately \$12.1 million based on the 2019 Opus asset valuation. Maintenance and upgrading of those assets to provide the current levels of service to the community is forecast at around 370k per year in the next ten-year period with the split between operational expenditure and capital expenditure graphically displayed below in Figure 1

A capital outlay had been previously planned for but has since lapsed for a possible bypass of the Waikākāriki Stream. This project would have been undertaken by the Greater Wellington Regional Council.

Eastern growth development as well as possible consenting conditions (including catchment and treatment of stormwater) that will occur from Greater Wellington Regional Council's Natural Resources Plan.

Figure 1: Projected Operational Expenditure and Capital Expenditure



Growth and demand

Data for the AMP's is based around the Wairarapa Population Projections – June 2020 report from Infometrics Limited.

Population growth in Carterton District has been strong over the past decade, aided by significant net migration flows in the past five years. Carterton District's current estimated population is 9,690. In Carterton District, growth is more evenly distributed across urban and rural areas, reflecting the historic propensity for rural lifestyle developments in the district and by 2051 the projected population will be approximately 13,098. Growth is expected to slow however in the next term with international net migration falling away due to COVID-19.

Council has however prepared a draft urban growth strategy that would increase the designated urban area with associated water supply demands.

Identified issues

Urban development

The Urban Growth Strategy is currently being refined into an Urban Growth Plan to provide more detailed planning and costings to accommodate growth on the eastern side of Carterton CBD. The plan will incorporate new stormwater requirements for rezoned residential and light industrial areas.

Condition rating knowledge

Stormwater assets (pipes, channels, sumps etc.) have been condition graded based on age, material and anecdotal local knowledge.

However, age alone does not necessarily portray an accurate assessment of assets. A good knowledge of the assets condition flows into consistent delivery of the aimed for levels of service as well as increased accuracy for long term financial planning.

Council records asset condition assessed from maintenance works and undertakes inspection procedures to be able to gain better a knowledge of asset condition.

Seismic Risk

Earthquake engineers are always learning. The Christchurch 2011 sequence of earthquake events have provided a wealth of information and data and emphasised that the current state of knowledge of regional seismicity has far outweighed the design and construction knowledge at the time of building many of Council's critical facilities such as pump stations, reticulation and treatment plant.

Pipeline networks include extensive use of non-ductile (inflexible) materials, such as earthenware and asbestos-cement (AC) pipe, which tend to fail during strong ground motion. Pipelines are especially vulnerable to failure from permanent ground deformation (resulting from liquefaction), because the deformation causes push-on pipe joints to separate.

Resilience planning of our infrastructure is to be incorporated into this plan.

Climate change

Climate change is likely to result in both more extreme storm and drought events. It may require Council to re-consider the capacity of all three waters. Stormwater services are somewhat different to other Council services in that the generation of stormwater is dominated by meteorological conditions, and hence particularly susceptible to cyclical weather patterns and climate change.

Climate change predictions suggest that there is a likelihood increase in the number of extreme rainfall events. This clearly has an effect on the stormwater system, as there is finite flow capacity for any particular aspect of the system.

Three Waters Reform

The New Zealand Government has initiated a wide-ranging reform of the three waters sector which will be ongoing from 2021 and is intended for implementation 1 July 2024.

This is a three-year programme of reform of local government water service delivery arrangements, and includes support for the establishment of Taumata Arowai, the new Waters Services Regulator. A report by Water Industry Commission of Scotland estimated that New Zealand would need to invest between \$120 billion to \$185 billion in our three waters infrastructure over the next 30 years to meet drinking water and environmental standards to provide for future population growth. It is thought though that the Water Industry Commission of Scotland modelling may well underestimate the necessary investment costs and could give overly optimistic timeframes for implementation.

Once Taumata Arowai is fully functional, it will oversee and administer an expanded and strengthened drinking water regulatory system, new drinking water standards and oversee the environmental performance of wastewater and stormwater networks. This is expected to improve the sector's performance, and to put greater focus on infrastructure performance.

Carterton would belong to 'Entity C' of the Water Service Entities (WSE), along with 22 other Councils. The boundaries have been set with consideration of rohe/takiwā, water catchments, population, economic benefits and the needs and interests of local communities.

WICS has estimated efficiencies of 45% over a 30-year period, roughly 2% per annum achieved through improved and aggregated capability, procurement, governance, scale and economic regulation, ultimately delivering lower costs for communities.

An indicative amount of \$6,797,415 has been allocated from this "better off" funding should Carterton Council continue to be involved in the three waters reform programme.

The future investment risk is real and manifesting in the legislative changes such as the drinking water Regulator (Taumata Arowai), the Water Services Bill, the changes to the Drinking water standards and Environmental Regulation (Proposed Natural Resources Plan, National Policy Statement on Fresh Water Management, and the Natural and Built environment Act).

2 Introduction

The purpose of this Plan is to provide Carterton District Council with a range of tools to assist with the management of its assets. The Asset Management Plans combine management, financial, engineering and technical practices and is intended to:

- Ensure that an agreed level of service is provided to defined standards at optimum cost.
- Be sustainable in the long term.
- Comply with regulatory requirements.
- Help the Council to achieve the outcomes the community has defined.

The Stormwater Asset Management Plan has been in use since 1992 and has been reviewed regularly, becoming handbooks for management and planning for the Council's assets. The last review was carried out in 2019 and included a substantial increase in the forecasting of forward works from 10 years to 30 years in line with the statutory requirement to prepare an Infrastructure Strategy in support of CDC's Long term plan.

2.1 Linkages

The plan (described in Table 1 below) is an integral input into the Council's Long term plan (LTP) and contributes to meeting the identified community outcomes and desires for its expected levels of service.

This plan is a live document, and that through its life it will be modified to include information and policies that improve or enhance the Council's ability to effectively manage assets on behalf of the community.

Table 1: Plan Framework

Items	Detail
Introduction	Executive summary

Description of activity	<p>Description of assets, goals, frameworks, responsibilities, the asset management systems, and the service.</p> <p>Translates higher level aspirations into meaningful service level items.</p>
Levels of Service	Linkage between agreed community outcomes and specified Levels of Service.
Demand Management	Forecasting future demand based on relevant influencing factors.
Risk and resilience	<p>Identifying opportunities or avoiding loss.</p> <p>The assessment and mitigation against failure to deliver levels of service, with mitigation measures provided.</p> <p>Funding and associated justification. Clearly presented funding requirements, linked directly to delivering levels of service.</p>
Assets and Lifecycle management	Prudent acquisition, operation, maintenance, renewal and disposal of assets which optimise asset use in delivering a service to the community throughout its lifecycle
Financial Projections	Existing data is used to estimate the financial implications of the asset management
Improvement Plan and monitoring	<p>Improvement in data collection and application, clear lines of responsibility, and creation of a practical working document.</p> <p>To enable asset management plans to be reviewed and then improved upon.</p>

3 Description of Activity

3.1 What is involved?

The stormwater infrastructure for Carterton District is a reticulated network of pipes, channels, pump stations, and swales required to drain rainwater from residencies, commercial/industrial properties and surrounding land. The service is focused predominantly on the urban area where the density of buildings and urban infrastructure disrupt the natural flow-paths and soakage of surface water.

3.2 Summary of Stormwater Assets

The stormwater system consists of 18.2km of pipe reticulation and 11km of open channels. The stormwater network is summarised in Table 2 below.

Table 2: Carterton District Council Stormwater Assets

Asset type	Unit	Quantity	Comments
Pipes	Km	18.2	Diameter from 100 – 1200mm
Manholes	No.	206	
Soak pits	No.	62	
Catch pits	No.	477	Commonly referred to as 'sumps'
Open channel	Km	11	A variety of widths used

There is 18.2km of the pipe reticulation is of a concrete construction or concrete material, the remainder of the pipe materials is a mixture of PVC (polyvinyl chloride), earthenware, and AC (Asbestos-Cement). The more common diameter of pipe used is 300mm diameter at approximately 8.2km in total length.

Most of the surface stormwater that is intercepted from streetscapes in the urban area are directed to catch pits, manholes, and forwarded from there to the pipework associated with the stormwater network.

There is approximately 11km of open drain within the urban area with the more significant lengths of open channel being locally referred to as the 'eastern' stormwater diversion.

In accordance with the Wairarapa Combined District Plan, disposal of stormwater from private dwelling roof run-off and hard stand areas are directed to tanks or on-site soakage pits.

Two recent subdivisions have provided stormwater infrastructure to channel stormwater away from the development areas to nearby natural watercourses. Developers have incorporated secondary paths to direct additional flows away from the developments to nearby natural watercourses.

Figure 2: Stormwater assets network - Urban Carterton



3.3 Stormwater and Related Council Assets

The Carterton districts roading network utilises approximately 2350 culverts (25km), 95 bridges, and substantial open channels/swales for the mitigation surface catchments and the drainage carriageways. For the purposes of this Plan these components are not included in this document as they are included in the separate plan for Roothing Asset Management.

The rural water supply is comprised of the Taratahi (271km) and the Carrington (39km) water races. Both water race networks are a combination of natural and manmade channel formations built over 100 years ago for the distribution of water to rural properties across the Carterton District.

Both water race networks contribute to the performance of the drainage of the outer perimeter of the Carterton urban area and are included in the Water Asset Management plan.

3.4 Why does CDC provide this Activity?

Council operates the stormwater scheme to ensure the efficient, safe and continuous removal of stormwater to minimise the effects of flooding to property and risks to human life. Council undertakes this activity because of statutory obligations and public demand. Under Section

130(2) of the Local Government Act 2002, Council must continue to provide stormwater services to those communities which are being serviced.

3.5 Management of Activity.

This section covers the operation, renewal and improvement of the asset base, and the service delivery mechanisms required to deliver the stormwater service to the stated levels of service

3.5.1 Operations and maintenance

Day to day operations and maintenance are covered by in-house delivery. Operations covers day to day service delivery required to deliver the agreed level of services. Maintenance covers the actions necessary for retaining the assets at as near as practicable to its original condition, but excludes rehabilitation or renewal.

Private streams and natural waterways are in general maintained by those property owners whose waterway it passes through. Council maintains the section of Booths Stream where it owns reserve land on either side at Feist Street. Council periodically maintains the number one eastern stormwater diversion, which is a modified open channel previously forming a part of the water race network.

3.5.2 Renewals

Renewals cover the progressive replacement of existing assets as they reach the end of their useful life. The rate of asset renewal is intended to maintain the overall condition of the asset system at a standard that ensures the community's investment is maintained. If existing assets are not replaced with assets of similar standard the ability of the service to deliver the required level of service is reduced.

Identification of renewal needs are through staff knowledge of individual assets and associated analysis maintenance records (asset failure and expenditure history), service requests records, and observations.

Through the Council's Asset Management System there is an identified asset renewal program for the next 30 year period.

3.5.3 Service Improvement – Levels of service driven

Service driven improvements provide for infrastructure development to enable Council's drive to achieve its predetermined levels of service (see section 5). The need for these capital works can result from changes in the operating environment, changes to mandatory or council prescribed levels of service, compliance issues and/or changes in existing demand.

3.5.4 Service Improvement – Growth Driven

Growth related projects relate to the development that occurs as a consequence of population, commercial or industrial growth. Growth can result in changes in demand for infrastructure, and changes in the pattern of demand.

Carterton is currently experiencing relatively high population growth (approximately 2%+) and will require investment into the stormwater infrastructure to enable further industrial and residential re-zoning to occur. Capital works identified as being driven by growth are funded retrospectively through development contributions.

3.6 Significant negative effects and how they are mitigated.

In general, providing Stormwater services to the community has public health and environmental benefits. There are however possible negative effects in providing this service.

- The cost of providing the service on rate payers, especially smaller communities
- Any future costs of keeping up with increasing environmental standards that may require significant capital investment
- Long term renewal cost of aging infrastructure

3.6.1 Mitigating Measures

The cost of providing new stormwater infrastructure is on the whole funded by new developers, the maintenance requirements is funded by general rates thus the cost is spread across the community. Capital works are funded by loan to make sure that the cost is spread across generations of ratepayers.

3.7 Significant changes to Activity.

During the term of this plan the following unknowns are likely to have significant implications on this activity:

- Implementation of the National Policy Statement for stormwater management.
- Increased levels of water flow due to climate change potentially impacting upon required infrastructure upgrades.
- Changes to legislative requirements
- Three waters reforms

3.8 Goals and Objectives of Asset Ownership

The Carterton stormwater activity aims to provide an effective reticulated collection and environmentally sustainable disposal system for its community. This supports community wellbeing and health values by providing a reticulation system capable of meeting the required performance targets and consent conditions.

Council has statutory obligations under the Local Government Act 2002 to continue to provide existing stormwater services and a general authority to construct public drains and undertake land drainage, recognising the requirement to take a sustainable development approach that takes into account:

- the social, economic and cultural wellbeing of people and communities; and
- the need to maintain and enhance the quality to the environment; and
- the reasonably foreseeable needs of future generations

3.9 Community Outcomes

Council's levels of service contribute to achieving community outcomes.

As part of the development of the Consultation Document for the LTP, the Council reviewed its existing vision and community outcomes to confirm whether they were still relevant to the community. The community were satisfied that the vision and community outcomes were generally still relevant and refined the vision and outcome priorities as can be seen from Table 3 below.

Table 3: How Council activities relate to the Community Outcomes

Community outcome, Council group of activities	A strong community	A prosperous economy	A healthy natural and built environment	Quality fit-for-purpose infrastructure	A strong and effective Council
Governance	✓				✓
Community services	✓	✓	✓		✓
Regulatory and planning		✓	✓	✓	✓
Roads and footpaths		✓	✓	✓	
Rural water races		✓	✓	✓	
Sewerage and the treatment and disposal of sewage			✓	✓	
Stormwater drainage			✓	✓	
Waste management			✓	✓	
Water supply			✓	✓	

3.10 Local Context

3.10.1 Assessment of water and sanitary services

Under the Local Government Act 2002 Councils must, from time to time, assess the provision of water supply, wastewater and stormwater services, and sanitary services in its district.

CDC last completed its water and sanitary services assessment in 2016. The assessment informed the development and ongoing review of the related asset management plans and is consequently reflected in CDC's Long term plan.

3.10.2 Financial Strategy

Section 101A of the Local Government Act 2002 requires all local authorities to prepare and adopt a financial strategy for each of the 10 consecutive financial years covered by its Long term plan. The purpose of the financial strategy is to:

- facilitate prudent financial management by the local authority by providing a guide for the local authority to consider proposals for funding and expenditure against; and
- provide a context for consultation on the local authority's proposals for funding and expenditure by making transparent the overall effects of those proposals on the local authority's services, rates, debt, and investments

3.11 Regional Context

Greater Wellington Regional Council (GWRC) - Natural Resources Plan (NRP):

GWRC has reviewed the existing regional plans for the Wellington Region. It has identified the effects of human activity on the region's natural and physical resources and has worked closely with communities and individuals to develop rules that "*protect the right things, in the right places*". As a result of this review, the NRP for the Wellington Region was developed. The NRP was approved by GWRC for public notification on 31 July 2015. It combines coastal and regional plans, as well as incorporating regulatory and non-regulatory methods. The Plan identifies five distinct catchment areas (Whaitua) within the region. The Whaitua process provides a decentralised approach to establishing priorities and programmes within each Whaitua through catchment groups called Whaitua committees. These committees work collaboratively and use an integrated approach to resource management. GWRC is currently working through the hearing process on issues that may be resolved or require clarity.

3.11.1 Regional Council Policies and Plans Affecting This Activity

- Regional Policy Statement for the Wellington Region
- Regional Fresh Water Plan
- Natural Resources Plan

4 Level of Service

4.1 Introduction

This plan intends to match the level of service the assets provide with the customers' expectations given financial, technical and legislative constraints. Asset management plans can be readily co-ordinated with strategic financial planning. Allied to which, adoption of formalised asset management systems and practices provide Council with key benefits which, though acknowledged as understood in broad terms, are repeated here in detail:

- Improved understanding of service level options and requirements
- Minimum life cycle (long term) costs for an agreed level of service
- Better understanding and forecasting of asset related management options and costs
- Managed risk of asset failure
- Improved decision making based on costs and benefits of alternatives
- Clear justification for forward works programmes and funding requirements
- Improved accountability over the use of public resources
- Improved customer satisfaction and organisation image

The pursuit of improved asset management planning will enable Council as owner of a comprehensive range of assets to demonstrate to their customers and other stakeholders that services required to be provided are being delivered in the most effective manner.

4.2 Service statement

The provision of physical infrastructure provides an important foundation for the role Council performs in achieving community well-being. Council is therefore committed to its role as manager of the range of valuable and essential assets that ensure the wellbeing of our community. These services include the provision of safe and efficient stormwater disposal systems, considered by Council to be strategic assets.

Council delivers stormwater services because:

- There are legislative mandates requiring the provision of these services
- In-house delivery reduces the risk to Council of failing to meet legislative requirements
- Council has an interest in ensuring the health, well-being and safety of our community, and these functions contribute to this
- Council currently owns the assets relating to this activity

4.3 Customers and Stakeholders

Council's stormwater service customers include:

- Ratepayers
- Residents
- Local industries and businesses
- Health and educational institutions
- Emergency services

Council's stormwater service stakeholders include:

- Greater Wellington Regional Council.
- Rangitāne o Wairarapa Inc
- Kahungunu ki Wairarapa
- The Department of Conservation
- Wairarapa Public Health
- Ministry for the Environment
- Ministry of Health
- Ministry of Agriculture and Fisheries

4.4 Defining levels of service

The adopted levels of service for stormwater reflect current industry standards and are based on:

- **Customer Research and Expectations.** Information gained from the community on expected quality and services.
- **Legislative Requirements.** Environmental standards, regulations and acts that impact on the way assets are managed (i.e. resource consents, building regulations, health and safety legislation, Local Government Act).

- **Strategic and Corporate Goals.** These provide guidelines for the scope of current and future services offered the manner of service delivery and define specific levels of service that the organisation wishes to achieve.

4.5 Customer Research and Expectations

Council’s knowledge of customer expectations is based on:

- Annual Residents Survey conducted by ‘Key Research’
- Public meetings on specific projects
- Consultation via Annual Plan/ Long term plan process
- Feedback from the elected members and community boards
- Analysis of customer service requests and complaints

4.5.1 Annual residents survey

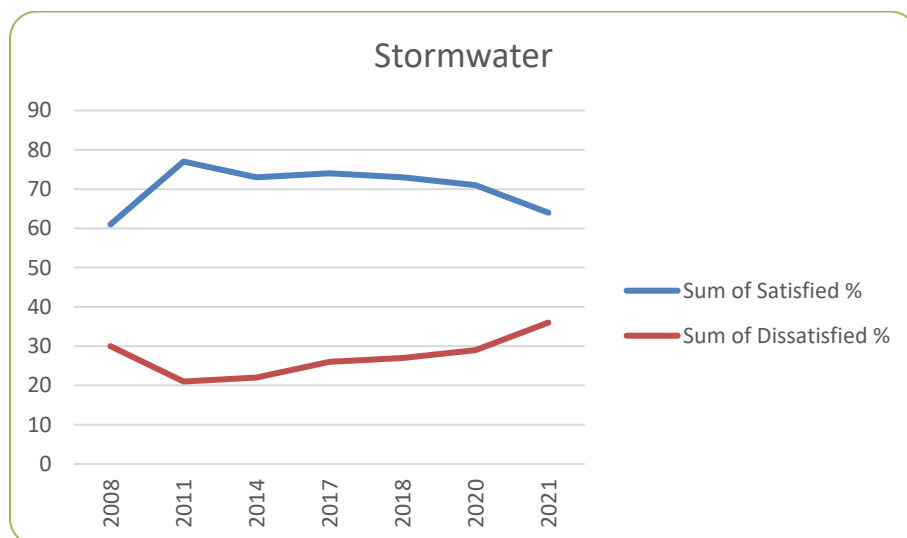
Council undertakes regular resident’s satisfaction surveys to gain feedback on the communities’ perceptions of Carterton District Council’s delivery of services. Market research consultants are engaged to poll and measure the Council’s effectiveness at providing services for their residents and customers. The survey results provide comparisons for Council to measure the services performance and to be able to make adjustments to those levels of service when indicated.

Previous survey results are tracked for comparison purposes.

The survey shows most are satisfied, although perceptions of the reliability of the system have progressively declined in relation to previous surveys. Rural residents remain less satisfied than those living in urban areas

Figure 3 below shows the proportions of satisfied and unsatisfied respondents for all who took part in the previous Residents Survey.

Figure 3: Results of the 2008 -2021 Residents survey for the stormwater network



4.5.2 Public Meetings on Specific Projects

Council's current policy is to ensure public consultation when undertaking any major projects; however, no major stormwater projects that required public meetings and consultation have occurred in recent years.

4.5.3 Consultation via Annual Plan Process and Long-Term Planning

The draft Annual Plan and Long-Term Plan (3 yearly) are released for public submissions and consultation as a part of the plan reviews. Council then finalises Plans by reviewing and utilising submissions.

4.5.4 Feedback from Elected Members and Community Boards

Feedback from the Councillors is taken into account in order to provide a better levels of service.

4.5.5 Analysis of Customer Service Requests and Complaints

Customer service requests and complaints received through Councils call centre, letters and direct phone calls are considered and appropriate actions are undertaken for improving the service level.

4.6 Service Levels and Performance Measures

Monitoring of performance standards is an integral part of service management. Regulatory changes to performance standards require an alignment of Councils monitoring and reporting in order to meet regulatory requirements.

Council developed the current water asset levels of service, performance measures and targets from the Long-Term Plan shown in Table 4, to reflect:

- Industry standards
- Customer research and expectations
- Legislative and other requirements
- Strategic and corporate goals

Table 4: Levels of Service, used for performance measures and targets (2021 LTP)

The service broken down into measurable components	Performance measure	Target for year ending June					How it will be measured
		2020 Actual	2022	2023	2024	2025 to 2031	
System and adequacy	Number of flooding events ¹	None	≤1	≤1	≤1	≤1	Operational records

	For each flooding event, the number of habitable floors affected, per 1000 properties connected.	None	≤1	≤1	≤1	≤1	Operational records
Management of environmental impacts (compliance with resource consent conditions)	Number of abatement notices	0	0	0	0	0	Operational records
	Number of infringement notices	0	0	0	0	0	Operational records
	Number of enforcement orders	0	0	0	0	0	Operational records
	Number of convictions	0	0	0	0	0	Operational records
Response to stormwater system issues	The median response time ² to attend a flooding event	None	≤ 3 hours	≤ 3 hours	≤ 3 hours	≤ 3 hours	Operational records
Customer satisfaction	Total number of complaints ³ received per 1000 properties connected	2	≤10	≤10	≤10	≤10	Operational records
	Residents' satisfaction with the district's stormwater systems	60%	≥ 60% rate 7–10	≥ 60% rate 7–10	≥ 60% rate 7–10	≥ 60% rate 7–10	Annual survey of residents

¹ an overflow of stormwater from the Council's stormwater system that enters a habitable floor

² measured from the time that the Council receives notification to the time that service personnel reach the site

³ total number of complaints received about faults or blockages, expressed per 1000 customers charged in their rates for council stormwater services.

4.7 Potential changes in Levels of Service

4.7.1 Waikākāriki stream

There was a plan proposed in 2006 to modify the flow path of the Waikākāriki stream diverting high flows from the Mangatarere River away from the township. The modification of the river/stream flow paths would have reduced the flooding risk potential to the eastern part of the urban district. Although originally budgeted to occur in 2015/16, the approved consent has since lapsed and would need to be reapplied for if this modification were to proceed.

Should there be a plan in the future to modify this stream it would have to be undertaken by the Greater Wellington Regional Council.

4.7.2 Three Waters Review

Changes to the Drinking Water Standards for New Zealand may necessitate improvements to water quality, for example, increased treatment requirements.

The Government is reviewing how to improve the regulation and supply arrangements of drinking water, wastewater and stormwater (three waters) to better support New Zealand's prosperity, health, safety and environment.

The Review team, including representatives from the Ministry of Health, the Ministry for the Environment and the Department of Internal Affairs, will be undertaking engagement on those related emerging high-level proposals.

4.8 Levels of Service Improvements

To maintain current levels of service, with specific, minor variations by exception, and to formally review levels of service at least every three years. Engagement with the community on their satisfaction with the levels of service provided and improvements desired will be undertaken periodically.

- Consultation on options will be undertaken for specific, significant projects. The level of service review will inform the levels of service adopted by the Council.

Table 5: Improvement plan

Improvement Action	Responsible person	Budgeted \$	Proposed completion date	Notes
Undertake stormwater assessment	Asset Manager	63,750	2021/22	Assessment of urban catchments and predicted flows to be undertaken by consultancy. Create monitoring plan.

5 Demand Management

5.1 Climate change

Stormwater services are somewhat different to other Council services in that the generation of stormwater is dominated by meteorological conditions, and hence particularly susceptible to cyclical weather patterns and climate change.

Climate change predictions suggest that there is a likelihood increase in the number of extreme rainfall events. This clearly has an effect on the stormwater system, as there is finite flow capacity for any particular aspect of the system.

In addition, secondary flow paths are activated when primary disposal mechanisms cannot cope, and it is foreseeable that an additional load on the reticulated system could occur due to capacity of individual systems being insufficient to meet the new demands initiated by a changing climate.

Climate change projections¹ for Wairarapa are there will be significant impacts to the Wellington Region by 2090 if global emissions are not significantly reduced. They include:

- warmer temperatures (+3⁰ C)
- significant increase in the number of hot days (>25⁰ C) from 24 days now to 94 days
- frosts in the high elevations of the Tararua Ranges are likely to disappear
- spring rainfall will reduce by up to 10% on eastern areas
- the risk of drought will increase in Wairarapa
- more extreme rainfall events.

More frequent, high intensity rainfall will challenge the existing capacity of the urban stormwater drainage network and downstream drainage channels.

Council employed Worley consultants in 1992 to investigate and produce a stormwater management plan. It is recommended that a review of this original plan be carried out to a) assess its currency, and b) to extract information on system capacity that can be added to the GIS and asset register to paint the picture of the system capacity. This would also assist in informing the asset management strategy.

The Council's overall approach in response to climate change effects is to manage through mitigation of causes and adaptation to effects. Policies and responses will need to be robust to a range of possible futures, rather than relying on a single "forecast".

5.2 Demand for improvement in the Level of Service

This can result from:

- Advances in available technology
- Improving standards of living
- A greater understanding of customers' perceptions and expectations
- Changing legislative requirements, including resource consent conditions

¹ Greater Wellington Regional Council's Climate Change Report (June 2017)

- Change in the strategic management of assets by the Council
- Change in community demographic driving different service levels

The demand for improvement in the service level can be determined by:

- Reviewing the current level of service through public consultation
- Monitoring customer feedback through surveys e.g. Key Research
- Analysing submissions to annual plans

In addition to the quantitative demands placed on the stormwater system, there is an issue of stormwater quality. As stormwater flows over land it can pick up, and carry in suspension, particles of soil, metal, rubber or other contaminants from roads or roofs. Whilst historically these issues have not received scrutiny there is increasing pressure to ensure that the stormwater discharged is of suitable quality for the receiving environment to assimilate any contaminants. It is foreseeable that during the term of this plan (most likely at the expiry of the current resource consent), there could be a change in service level required. This is therefore a budget risk item.

Feedback from customers and consultation processes suggest that, in general, the community is happy with the current level of service provided by Council. However, Council will continue to monitor community feedback and incorporate this into its planning processes.

5.3 Changes to Customer Expectations

Customer expectations may influence service levels. Changes that are likely to impact on services include increasing emphasis on sustainability issues and greater demand for enhanced environmental outcomes, improved preservation of waterways etc.

Opportunities may be identified via the strategic infrastructure and levels of service reviews.

Changes in customer expectations can be determined through community consultation (e.g., the Key Research Survey) and feedback processes. Customer expectations will be monitored and assessed. Trends will be monitored, and these plans will be updated accordingly.

5.4 Natural resources plan

The Natural Resources Plan (NRP) signifies a significant shift towards management of stormwater, including potential requirements for detention and treatment of stormwater.

A key requirement of the NRP is the development of a Stormwater Strategy; this will likely be the focus in the near future and will guide level of service requirements. There are two significant elements to the strategy development.

The effects of stormwater discharges on the environment

Stormwater affects water quality as it contains contaminants that are carried by rainfall runoff. Wastewater can also enter the stormwater network during heavy rainfall if the wastewater drains become overloaded.

These contaminants then enter waterways and the coastal environment. Contaminants in stormwater can cause negative effects on aquatic ecosystems, human health, mauri, people's enjoyment of the area, the suitability of water for recreation and shellfish gathering.

The framework for managing stormwater discharges from local authority networks

The Natural Resources Plan aims to achieve a progressive reduction in the negative effects of stormwater discharges from local authority networks to fresh and coastal water.

This is to be achieved through two stages: stage one is to gather information about the effects of stormwater discharges over five years, and stage two is implementing a longer term action plan to achieve progressive improvements.

The framework includes a 'global' approach to managing stormwater discharges, meaning that discharges are considered and managed in a holistic way.

Table 6: Two-stage global stormwater consent framework

Stage 1 - Years 1-5	<p>Monitoring to identify the negative effects from the stormwater network</p> <p>Review and update of a Stormwater Monitoring Plan annually</p> <p>Management of acute effects on human health</p> <p>Development of a Stormwater Management Strategy to prioritise progressive improvements under stage 2</p>
Stage 2 - From year 6	<p>Implementation of a Stormwater Management Strategy to meet water quality objectives</p> <p>Reducing impacts of untreated wastewater on fresh and coastal water</p> <p>Improving existing stormwater and wastewater infrastructure</p> <p>NRP water quality objectives, including whaitua specific objectives, also feed into stage 2</p>

5.5 Demand forecast and Response Strategy

Overall demand drivers are expected to have a low impact on future demand for stormwater services. The impact of demand drivers on future stormwater services are summarised below in Table 7.

Table 7: Expected impacts of Demand Changes for Stormwater Services

Demand Driver	Future Impact	Future Demand (for the next 10 years)
Population	Low	Negligible
Climate changes	Moderate	More frequent, high intensity rainfall that will challenge the existing capacity of the urban stormwater drainage network and downstream drainage channels.
Demand for improvement in services	Low/moderate	Outcomes from public consultation and annual plan submissions will be considered

Changes in customer expectations	Low/moderate	Outcomes from public consultation will be considered
----------------------------------	--------------	--

5.5.1 Cost of responding to Growth and Demand changes

As noted, no specific work has been identified at this time. The key actions and issues identified in this section that may require attention and/or intervention, and the costs associated with the proposed work, are outlined in Table 8.

Table 8: Stormwater Work required meeting Growth and Demand

Action/Work	Driver for Action	Estimated Cost	Scheduled For	How this will be funded
Climate Change	It is possible that climate change impacts will require future work to mitigate and/or adapt. At this stage the extent and impact of climate change is unknown.	Potential project costs are unknown.	On going	Investigative work around network capacity will be covered by existing budgets.
Urban growth strategy	Planning for growth in the eastern area, whether our infrastructure has capacity.	Potential project costs are unknown.	On going	Investigative work will be covered by existing budgets.
Stormwater quality	Sample monitor contaminate loading in Urban stormwater discharges to gain an indication of possible environmental effects.	Potential project costs are unknown.	2017 -	Investigative work will be covered by existing budgets, and is ongoing

5.5.2 Growth and Demand improvement summary

The existing stormwater system, at optimal flow, has sufficient capacity to accommodate changes in demand discussed in this section. Trends and potential impacts will continue to be monitored and this Plan will be updated accordingly.

Further research is recommended to assess:

- Stormwater Strategy, monitoring of discharges and a framework for managing discharges from the authorities' network
- Council developed strategies for the various possible projections as to the likely outcomes of climate changes.
- Asset capacity to accommodate the GWRC 50- and 100-year flood prediction modelling.
- Effects of the Draft Growth Strategy planning on the eastern catchment areas.
- Review the recommendations in the Worley stormwater management plan 1992.

Table 9: Improvement plan

Improvement Action	Responsible person	Budgeted \$	Proposed completion date	Notes
Climate change	Asset Engineer	260,750	2021/22	Investigate security and sustainability of water supply
Urban Growth Strategy - Option B	Not assigned	769,605.59 769,605.59 769,605.59	2024/25 2027/28 2030/31	Estimated utility costs. Dependant on the hydrology modelling and further design work for capacities to be gauged accurately
Undertake stormwater assessment	Asset Manager	63,750	2021/22	Assessment of urban catchments and predicted flows to be undertaken by consultancy. Create monitoring plan.

6 Risks and Resilience

6.1 Introduction

Risk management is the term applied to a logical and systematic method of establishing the context, identifying, analysing, evaluating, treating, monitoring and communicating risks associated with any activity, function or process in a way that will enable organisations to minimise losses and maximise opportunities. It is as much about identifying opportunities as avoiding or mitigating losses.

6.2 Risk management procedure

The process followed for this Plan involved a Strategic Level Risk Assessment:

- Initiation of the Waugh Risk Management Project (reviewed on 04/11/2021) to support Council's asset management planning processes and the long-term plan
- Introduction of Council staff to concepts of risk management via training workshops in March 2017
- Production of a report: Carterton District Council Asset Management Processes Risk Management (Waugh Consultants, 2017)

6.3 Summary of trends in Risk Assessment

6.3.1 Asset information & Staff Opinions

The risk results presented in the Waugh Report were a combination of opinions of individual staff and the current extent of 'hard' asset data that is held.

Specific asset risk parameters such as systematically assessed failure probabilities and impacts (including risk costs) are not available to justify risk scores. Staff have undertaken targeted

investigations and condition assessments as resources allow, and therefore have more certainty about their assessments where such work has been completed.

The results of the report are reviewed as necessary within the wider corporate context and whenever additional asset information is obtained. Improvement items identify the need to undertake criticality and risk assessments.

6.3.2 GWRC Natural Resources Plan

The Greater Wellington Regional Council is in the process of preparing a Natural Resources Plan (to replace the Regional Plan) that sets targets and rules for all activities in the Wellington Region that have the potential to affect the natural environment, biodiversity and landscape values.

The plan has potentially significant impact on Council’s infrastructure requirements, especially on the potable water, rural water (water races), and the wastewater treatment plant. In preparing the asset management plans and infrastructure strategy we have allowed for what we believe to be the most likely requirements when the Natural Resources Plan is in place.

6.4 Conclusion

The Waugh Report showed that there were a number of risk themes that were common to many activities. These themes are outlined in the Waugh Report and are identified in Table 10 below.

Table 10: Carterton Risk Improvement Plan – District-Wide Risks

Item	Description
Changes in Demographics not effectively managed by District Plan.	Population and demand changes forecast at least 30 years forward, for individual communities served. District Plan needs to recognise effects of contraction as well as growth, directing infrastructure decisions.
‘Physical-Risk-Readiness’	Responsibilities under the CDEM Act: Plans exist for emergency response, recovery, and continuity. Exercises to be held regularly to rehearse and check viability.
Incorrect Information	Where information is not ‘defensible’ or data confidence is low, it is not revealed. Executive support for information gathering and management, including asset information. All information held is locatable.
Council Property (Buildings/Facilities)	Corporate Facilities and Offices are managed as part of infrastructure (Building compliance, internal Levels of Service agreements, demand management, maintenance, renewal, additions, disposals etc) and covered by AMP.
Current, changing or new Legislation, National or Regional policy changes Regional Development Strategies and Studies Industry structure and governance arrangements, Shared Services	Monitor developments across NZ and Region: When Strategy developed by GW, assess impacts on Council planning, demand management and asset acquisition/renewal. Shared services model has been implemented already for Rooding. Opportunities for any shared services to be explored as and when these become available

Item	Description
Land Use Changes / Rural Technology changes	Monitor and assess effect of changes in crop types (dairy, viticulture, forestry) and life style blocks on asset requirements and usage patterns.
Community Group Viability	Policy is desirable regarding accepting or declining of proposals from community groups, based on risk and mitigation of current/future sustainability by the proposer.
Climate Change	CDC proposes to adopt Wellington Regional Council policy, and investigate climate change impacts.
Covid response	COVID 19 outbreak through Council Staff, affecting staff or their families or a pandemic response preventing staff from being at their workplace

The utilities risk assessment covered the water, wastewater and stormwater utilities that are managed by Carterton District Council. It is generally assumed that the risks involved in utilities assets are manageable. However, some of the risks involved in this asset have been identified and assessed on the basis of existing conditions. The utilities risk improvement plan is shown below in Table 11.

Table 11: Risk Improvement Plan

Item	Description
Succession plan	Ensure systems, data, records are of good quality.
Risk register and asset risk plan	Review regularly the risk control and criticality schedule for Utilities
Corporate Risk Policy	Actively promote Utilities risk assessments, mitigation measures and processes corporately to assist with a Corporate Policy development.
Council policy document	The council has a corporate policy manual that records all policies. Ensure staff know of the manual's existence and it is being actively used. More policies are required in the Utilities / Waters chapter.
Special agreements (incl. Leases)	Adequate service agreements are in place. Departments in the organisation know "what, how and when" is expected. (e.g. revenue/water liaison re connected properties)
Staff Resources	Staffing levels low and considered appropriate due to level of plant automation. Intermittent high project/consent/reporting workload is handled economically with consultants.
Financial assistance (external sources) being taken advantage of.	Council to actively seek Government Assistance
Optimisations- Renewals	Optimisation approach is currently least cost. Complete data attribute update for risk-based optimisation.
Operations Manuals	Maintenance and operation manuals updated when equipment changes and reviewed at 5-year intervals. Risk higher since no succession plans to be made. Licensed operator is essential. Private property access agreements in place where required
Legislative compliance	All legislative requirements that impact on Utilities Waters services being complied with.

Item	Description
Climate Change	Climate change is predicted to bring more intense wet periods and stormwater infrastructure will need to be able to cope with greater short-term influx. New stormwater and replacement stormwater infrastructure needs to cater for these changes.
Natural Events (severe storms, seismic activity, bush fires, coastal or river erosion.	CDC has an approach for managing damage; assessing the risks (Lifelines), and exercises have been held in the past. Limited earthquake and emergency response plans held, also SARS operator quarantine plan. The Lifelines planning/assessments are now old. Review; prepare additional ERP's.
Damage by others (excavations, accidents, illegal discharges to system, vandalism etc)	Reactive response when events detected.
Growth	3 yearly projections are provided corporately, and the impacts allowed for in AMPs. 30-year projections are made; impact of declining communities provided for in District Plan and AMP.
Seismic Assessment of Structures	Policy on Assessment Priority and programme urgency. Then AMP/LTP to show budget for works.
Inflow/Infiltration	Management Plan developed. Programme to be implemented
Consent renewal 2016	Budget allowance for investigation work.

6.5 Areas for improvement

Review of the Wairarapa Engineering Lifelines Associations publication (2003) is underway. Further work on identification of climate change risks specific to the area should be undertaken using data sourced through existing government research and applied to the Carterton District. Could also involve a secondary flow path strategy for the town to mitigate flood damage in extreme rainfall events.

Possible modifications by GWRC for the Waikākāriki stream to reduce the risk of potential flooding in the western area of the urban district.

Identify catchment capacities and the relevance of data collected for future structure planning input.

Assessment of the effects of Carterton District Council stormwater discharges to be carried out to provide a basis on which to make future judgements and to substantiate resource consent applications.

Table 12: Areas for improvement

Improvement Action	Responsible person	Budgeted \$	Proposed completion date	Notes
Wairarapa engineering lifelines review	Asset Engineer	30,000	2021/22	Review the engineering lifelines hazards and responses

7 Assets and Lifecycle management

7.1 Introduction

Over time a network of culverts, pipes, drains and sumps has been established to assist in the timely removal of stormwater. In rural areas these are largely open drains but in urban areas a network of both piped and open drains are formed. Council's role is to ensure that the reticulation continues to operate in a manner that minimises the effects of stormwater on property.

This AMP covers the stormwater assets in the Carterton urban area that Council owns and maintains. This includes:

- Pipes
- Service connections
- Manholes and soak pits
- Open channels

The stormwater system has traditionally relied on the small streams, creeks, etc which flow in a general direction from west to east across the district as a means of disposing of stormwater. Piped sections used to transfer water from swales or other gathering points to these outlets. Council requires building owners to dispose of roof water on the sections via soak pits in the first instance before discharging to the stormwater system.

Historically, flooding of dwellings has not occurred largely due to the presence of secondary flow paths (i.e., roads).

Note:

- Road channels, sumps and sump leads are considered roading assets and as such their maintenance and operation is covered in the Roding Asset Management Plan.
- Maintenance of the open channels within the Carterton urban area has traditionally been the responsibility of the individual property owner. This still applies to most open channel drains and creeks/streams, the exception being the eastern cut off drain to which Council undertakes maintenance when required.

7.2 Asset descriptions

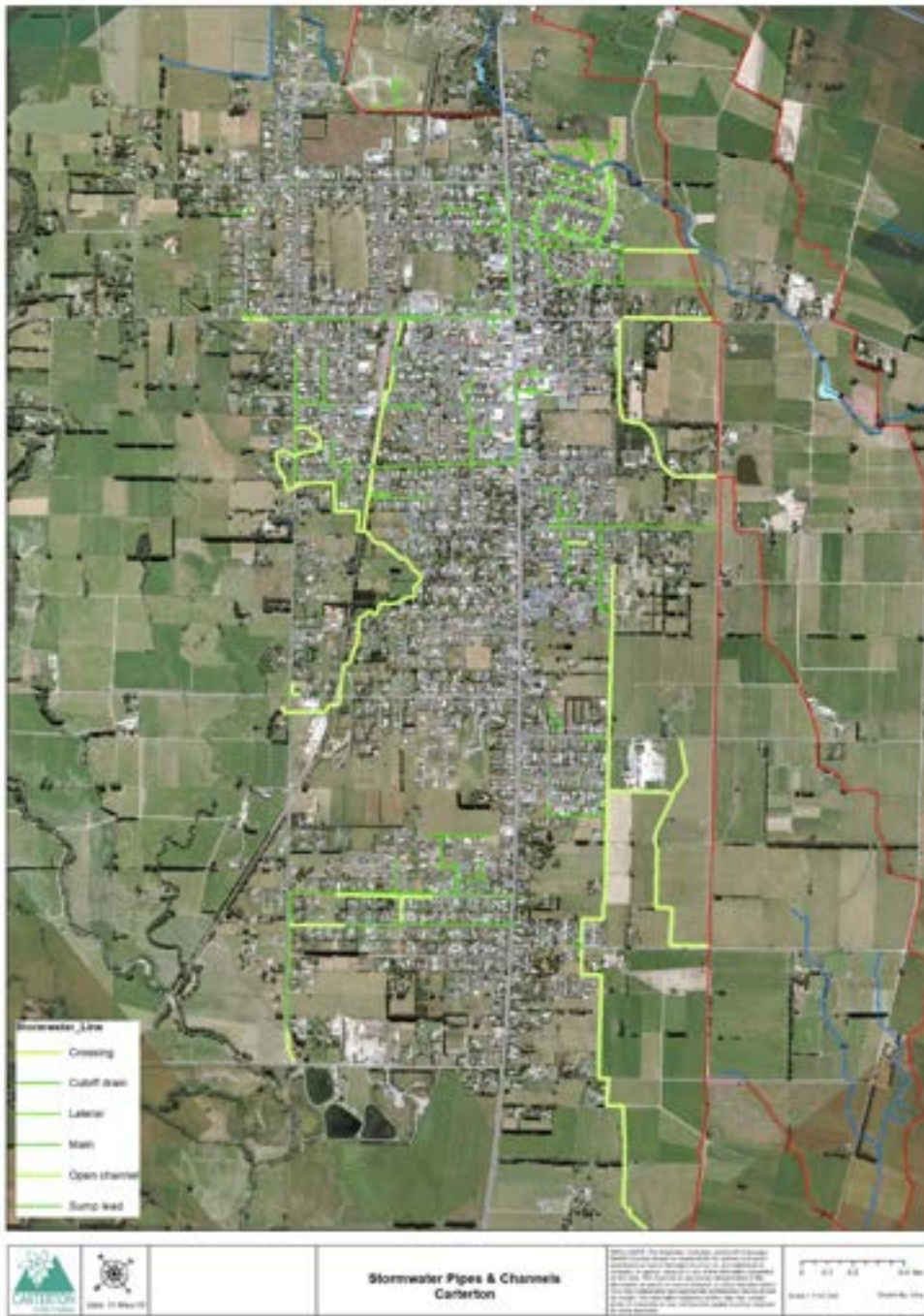
7.2.1 Pipework and open channel

The stormwater reticulation pipework, as displayed in Table 13 below, varies in size from 100mm diameter up to 1200mm diameter and uses pipes made of earthenware, asbestos concrete, concrete, and PVC (polyvinyl chloride). Overall length of pipework is approximately 19,399m excluding open drains and lateral connections. The earliest pipes were laid in the 1950s and the most recent in 2021. Carterton's open channel network is approximately 11,025m long and is comprised of modified and constructed watercourses.

Table 13: Length of pipework by size and material (excludes laterals & open drains)

Diameter (mm)	A/C	Concrete	E/W	PVC	Total
100	39.13			1721.27	1760.40
150	15.24		151.27	110.19	276.70
200				192.49	192.49
225		2010.03	27.25	236.04	2273.32
250		56.53			56.53
300		6647.13	166.55	1456.56	8270.24
375		1017.16	133.83	454.74	1605.73
420				128.87	128.87
450		1613.11			1613.11
525		284.60		59.41	344.01
600		837.71			837.71
750		418.15			418.15
825		778.69			778.69
900		266.28			266.28
1050		13.40			13.40
1200		563.66			563.66
Total	54.37	14506.45	478.90	4359.57	19399.29

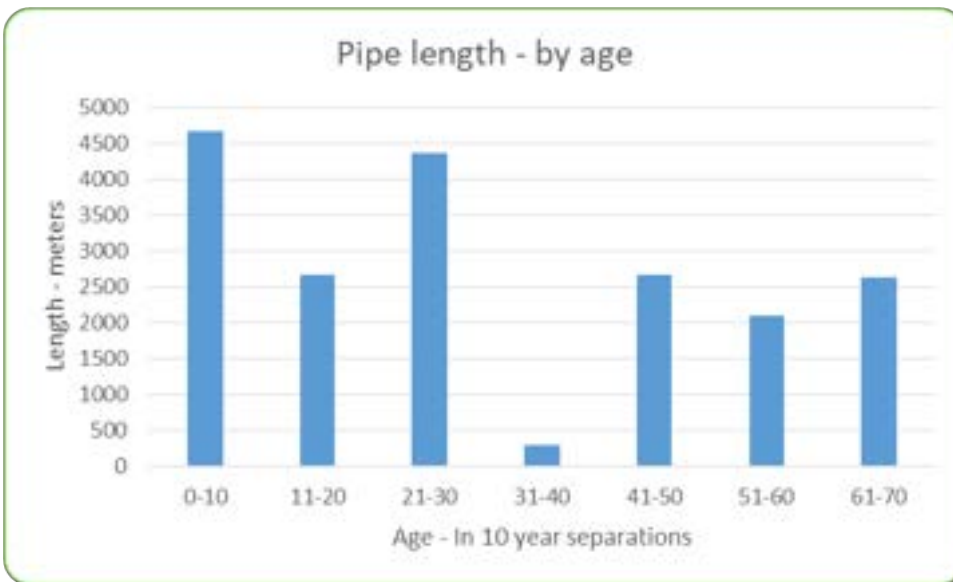
Figure 4: Layout of urban pipes and channels



7.2.2 Pipe work and open channel asset condition

Figure 5 below shows the pipe asset grouped in 10 year age brackets. When grouped in this way 4.3km of the total 19.3km are 20-30 years old and while 2.6km is the oldest at 60-70 years old. (The figures exclude open channels).

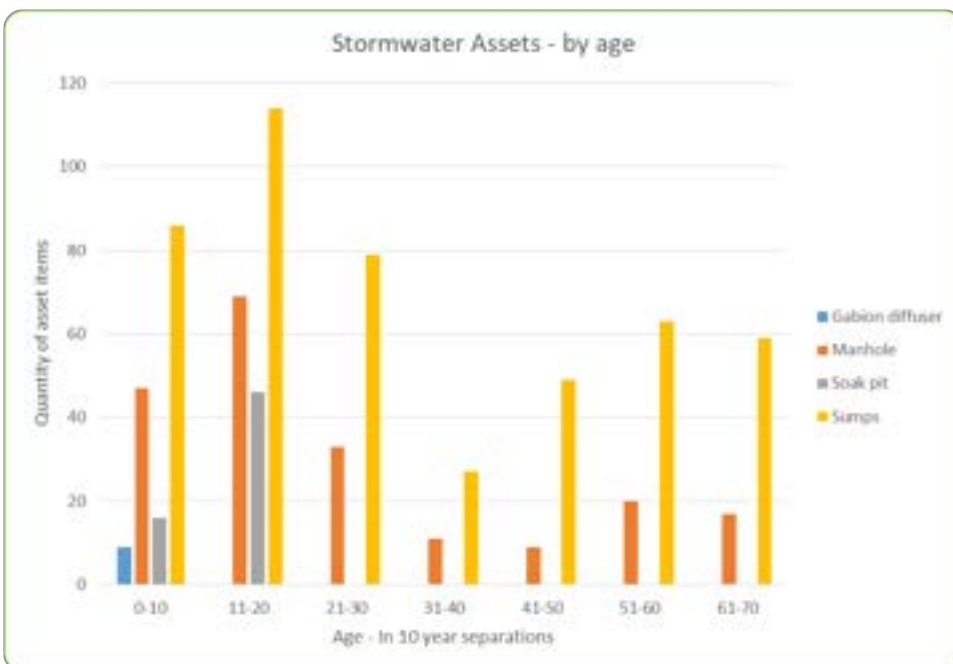
Figure 5: Total pipe length by age



7.2.3 Manholes, soak pits, and sumps

Figure 6 below sets out the construction year of each of the 9 gabion diffusers, 206 manholes, 62 soak pits, and 477 sumps in the residential Carterton district.

Figure 6: Stormwater assets by age



7.3 Asset Management Systems

Council retains plans and records for the assets servicing the Carterton area, information from these documents has been summarised into an asset inventory.

Council's operational services monitors the maintenance of works recording alterations, removals and asset details required for a complete asset management system.

Council uses asset AssetFinda as its chosen management system. AssetFinda is capable of storing asset data in a format that can be consumed by financial, forward planning, and condition performance scaling.

The asset management system inventory contains information such as:

- Asset type
- Age
- Specification
- Condition grading
- Service life
- Valuation
- Associated documentation
- Work tickets

Council developed in conjunction with neighbouring Councils an Engineering Lifelines Plan, which identifies vulnerable components of the water supply network and ways of mitigating the degree of disruption likely to be incurred in a civil emergency. A review of this document along with current mitigating work identified in the plan will be undertaken as an improvement project

Council utilises the following electronic information systems to store and analyse asset data for these services:

- An asset management system called “AssetFinda” which is a central strategic register and asset management system for all asset classes. It includes as-built reporting, works tracking and life-cycle costing. It is integrated with prediction model for a complete Strategic Asset Management planning and operational system capable of holding all stormwater asset information.
- Inventory, including replacement cost, depreciated replacement cost, annual depreciation, and condition assessment based on age (i.e., date installed/built).
- ArcMap 10.8 Geographical Information System (GIS).
- Councils GIS shows the location of the water reticulation, with some information on the assets (e.g., diameters, year of installation, etc.). It is subject to development involving digitisation of existing plans plus utilisation of aerial photography to identify services. It is linked directly to the AssetFinda asset management software package.

The demand for data is expected to increase significantly in the future, especially for resource consent compliance and to contribute to improving decision-making processes.

7.4 Asset assessment rating

The assessment of assets should not be carried out in isolation. Related issues need to be considered, such as:

- Risk Management.
- Maintenance Management Planning
- Data Collection Techniques

There are other factors that can determine useful life;

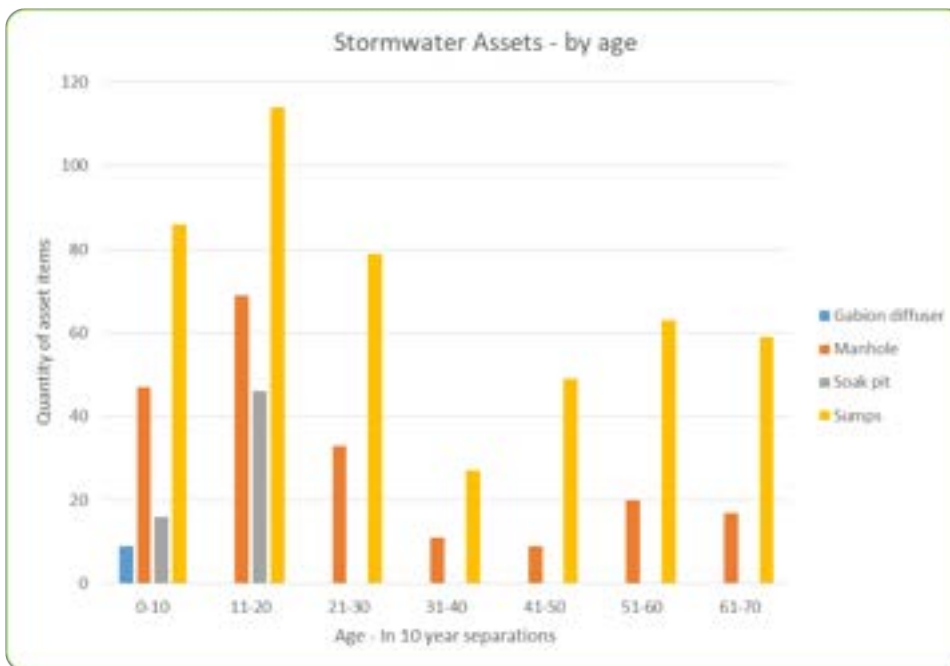
- Technical advances which might make the existing asset obsolete.
- Changes in community expectations meaning that the asset no longer has the capacity to meet community standards.
- Growth impacts meaning that the asset’s capacity falls short of the new demands.
- Compliance - changing standards mean the asset becomes non-compliant.

- Economic life - whereby the costs of continuing to operate the asset warrant it now being replaced.

Condition assessment though is a key factor in gauging the remaining life of a Stormwater asset, there is slightly less known about the condition of the stormwater pipes than the wastewater or water networks as Stormwater only flows intermittently and has in practice necessitated lesser levels of maintenance.

There are other key measures recorded for each Pipe and Asset item such as Performance, Criticality, the Accuracy of data, and the Risk rating of the asset within the Stormwater asset group for overall resilience.

Figure 7: Assets by age



The graph above shows pipes by age, Carterton does not have any recorded stormwater pipes that are older than 70 years and the majority of pipes are expected to perform adequately up to their expected asset life of 80 years. It would prove uneconomic to base renewal or replacement for these pipelines' decisions solely on an assumed expiry date when most times the performance of pipes has not diminished. Continued assessments and monitoring by Council Staff of pipelines and assets assists with the renewal replacement programme considerations.

Assessment has confirmed that the surveyed dimensions for length and width and the condition grading of Carterton's open channel network are correct. However, surveys specifically using CCTV assessment would add to the confidence of the Councils Stormwater data.

Figure 8: Stormwater Pipes Condition Rating

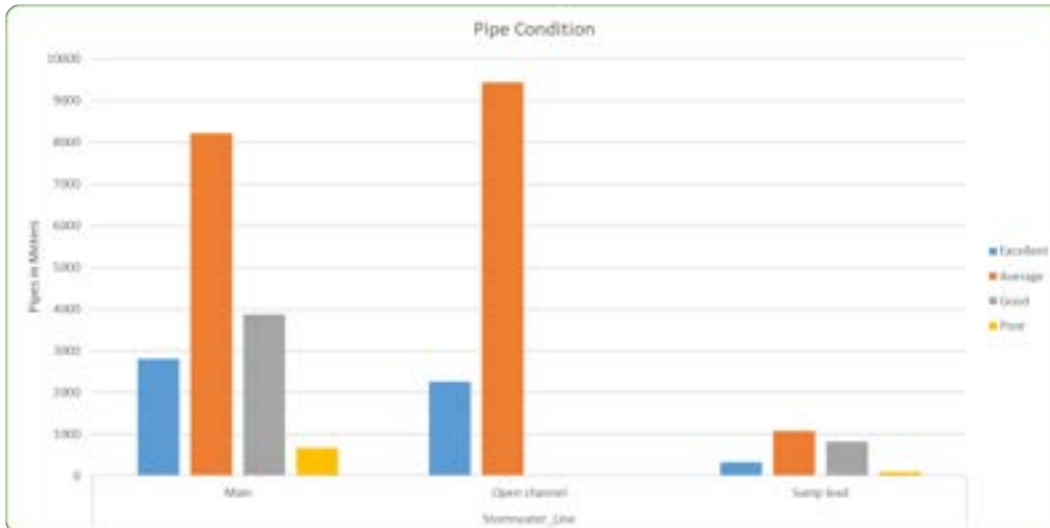


Figure 8 above demonstrates the condition grading of stormwater pipes and assets in the network has been recorded, from excellent to poor (1-4). The assessment was made using age and material type to accrue an initial grading.

The stormwater asset grades based on the NZ Pipe Inspection Manual (2006) place the majority of assets in condition average & good (2 and 3). A condition assessment has been conducted and this is a true reflection of the Stormwater asset stock.

It is recommended that condition grading is continued with and that additional information is incorporated into the asset management system and also into this Asset Management Plan.

7.5 Financial forecast

Council has made a strategic decision to maintain the current levels of service for this activity. Renewal and new work identified in this section to enable maintenance of current Levels of service is outlined below in section 8.7 Renewal expenditure is work that does not increase an asset's design capacity but restores, rehabilitates or renews an existing asset to its original capacity. Capital works are those that create new assets or works that upgrade or improve an existing capacity. They may result from growth, social, or environmental needs.

Capital expenditure in this group of activities in the next ten years are shown in table below.

7.6 Maintenance

Maintenance of the piped stormwater system in Carterton is carried out in-house by the Council's Operations Unit and includes the following items:

- Blockage clearance
- Stormwater pipe CCTV and cleaning
- Outlet inspections and clearing
- Weed and debris monitoring and clearing

Property owners are responsible for maintenance of open channels in private property with the exception of the eastern cut off drain and parts of the Booths Stream to which Council has agreed to assist with maintenance along with the Greater Wellington Regional Council.

Council's Operations Unit carries out reactive maintenance as required including stormwater pipe CCTV and cleaning.

It is recommended though that a proactive stormwater maintenance plan be drafted and actions from this be undertaken.

7.6.1 Design Standards

Council's stormwater design standards are as described in NZS 4404:2010 with reference to primary and secondary systems where.

- The primary system is designed to accommodate a 1 in 5 annual recurrence interval (20% Annual Exceedance Probability - AEP) specified design rainfall event and,
- A secondary system designed to accommodate a 1 in 100-year annual recurrence interval (1% AEP) to ensure that the effects of stormwater run-off from events that exceed the capacity of the primary system are managed, including occasions when there are blockages in the primary system.

Levels of service apply to stormwater provision, while levels of protection apply to flood protection systems.

The level of service for residential property is to design stormwater infrastructure to cope with a 20% Annual Exceedance Probability (AEP), whereas the level of protection for residential floors is for a 1% AEP.

In the case of a major flood event, the expectation is that the roads and grounds of properties may become flooded, provided that floor levels are not inundated.

7.6.2 Resource consents

Council does not currently hold any resource consents pertaining to stormwater reticulation in the District.

However, the Natural Resources Plan (NRP) signifies a significant shift towards the management of stormwater, including requirements for detention and treatment of stormwater.

Carterton Council is to monitor for the effects of stormwater discharges for 5 years and also develop a framework for the management of those discharges.

7.7 Renewal / Replacement Plan

The renewal/replacement programme of stormwater assets is based on forecasted estimates to replace or repair key assets, and to other components or structures, based on historical performance data and cost. These estimates are based on incorporated asset condition assessment work to be done and the asset management plan.

Renewal expenditure is work that does not increase an asset’s design capacity but restores, rehabilitates or renews an existing asset to its original capacity. Capital works are those that create new assets, or works that upgrade or improve an existing capacity. They may result from growth, social, or environmental needs.

Capital expenditure in this group of activities in the next ten years are shown in table below.

Table 14: Improvements planned – LTP 2021 (year 1)

Capex type	Action	Estimate
Renewals	Nobel Street - renew services	41,500.00
Renewals	SW Consent investigation and confirmation	63,750.00

7.7.1 Decision making

All project work priorities regarding timing of renewal or replacements are based on the optimised renewal decision-making (ORDM) framework.

The ORDM process is a risk-based methodology which assesses the probability of each failure mode (including structural, hydraulic capacity, performance, operational and performance) and the consequence of the failures.

A scoring system of 1 to 5 is employed to quantitatively assess the risk components. This is derived from a system that is scaled to the International Infrastructure Management Manual (IIMM) 2015. As an example, structurally failed sections will attract a failure mode probability of 5. The risks of failure (for each failure mode) of each section are assessed and calculated by quantifying the product of their probability and consequence of failure. Sections with a high risk of failure are then ranked and the top group is included in the priority 1 list.

However, it must be noted that the on-going programme of collecting further asset information and the variation of market prices for renewal/replacement, as well new technology advances in the industry, mean that the priority list is provisional and will be subject to change with new information.

Currently the ORDM for stormwater reticulation failure probability assessment include the following factors:

- Structural consideration based on CCTV (number and major/nature of faults, etc)
- Capacity considerations (current observation, future subdivision potential)
- Performance considerations (ponding/flooding, dips etc)
- Maintenance considerations (blockage, frequency of flooding, tree roots etc)

The above probability rating is then multiplied by the consequence of failure rating to obtain the overall risk score.

7.7.2 Data confidence

The data confidence levels for this asset are shown in Table 13 where.

- A = Highly Reliable
- B = Reliable

- C = Uncertain
- D = Very uncertain

Note that some assets have variable confidence levels spread across the asset description and therefore appear across the attribute range.

Table 15: Stormwater data confidence levels

Attribute	Very uncertain	Uncertain	Reliable	Highly reliable
Physical Parameters			X	
Asset Capacity		X		
Asset Condition			X	
Valuations			X	
Historical Expenditures				X
Design Standards			X	

7.7.3 Asset renewal modelling

AssetFinda has two different modelling options for the Council’s Stormwater network, there is an optimized budget model using the long-term plan renewal amounts and there is an asset driven model.

The ‘optimized budget renewal’ can predict the renewal schedule based on a combination of factors such as budgeted annual expenditure, condition, age, risk, and performance. These scenario options show assets due for renewal over the next 30-year period and will assist Council Staff in accurately identifying assets likely to require attention in the Council’s Works Program.

The ‘calculate predictive model’ is not constrained by budget and uses the assets end of life to determine the renewal scenario.

An assumption has been made that the associated ancillary point asset items such as the pipeline fittings and terminations can be included within the long-term budgets for assets. The Councils long term plan identifies ten years of predicted budget for the upgrade of existing assets, but to achieve a utility forecast out to thirty years figures have been entered into the Infrastructure Strategy.

Optimize Budget Renewal - The first option the model provides a replacement program, firstly taking budget into account then the replacement requirements. The model will identify if there is enough budget to maintain a desired level of service (condition).

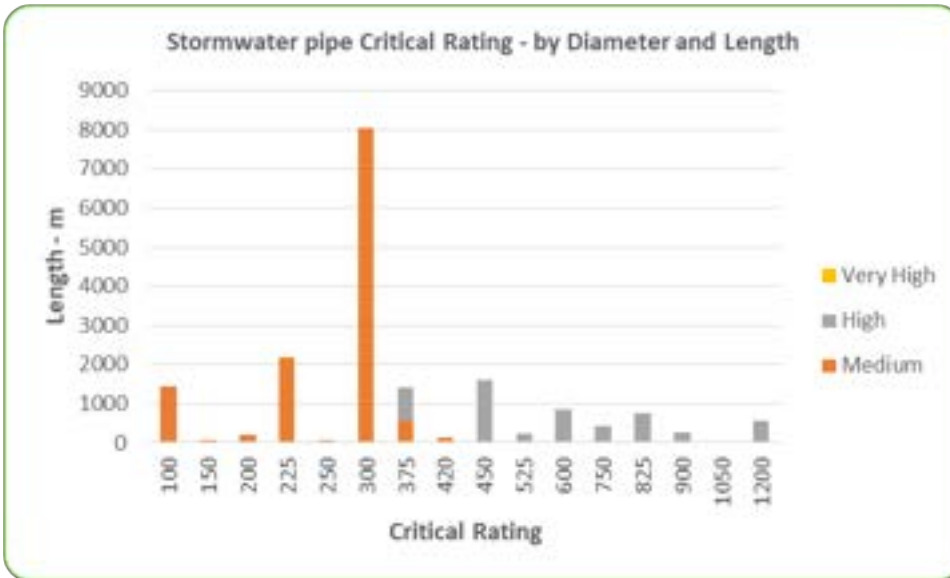
Predictive Model - This model displays a basic budget for assets that are due for replacement over the next 30 year time-frame. It is based on the estimated replacement date of the asset. It should be noted that the Stormwater Open Channels are in reasonable structural condition and

that they have a design life of 200 years, so very little degradation occurs within the thirty-year predicted period.

Catchments for stormwater have been identified, but modelling has not been undertaken yet but will be undertaken once the water network modelling has been completed as an aid for the process of optimised decision making in the future.

7.8 Critical assets

Within the asset management system Council has identified criticality for all Stormwater assets.



The effects of contaminated stormwater could impact on groundwater and river water values. There may be community concerns about waterway health and associated values arising from the disposal of stormwater containing contaminants.

Possible significant effects and how Council could mitigate these are show in Table 14 below.

Table 16: Possible significant negative effects

	Significant Negative Effects	How We Do/Will Mitigate This
Social	Failure or blockages could contribute to overloading and potentially contribute to flooding.	Maintenance and renewals aim to minimise failures and blockages
Cultural	Contaminated stormwater restricts enjoyment of downstream rivers and creeks	Monitoring of the stormwater outflow has begun to evaluate if there is contaminated stormwater flowing into the rivers and waterways.
Environmental	Failure or blockages could contribute to overloading and potentially contribute to flooding.	Maintenance and renewals aim to minimise failures and blockages

	Climate change is predicted to bring short ore intense wet weather patterns during the wet periods.	New or replacement infrastructure and earthworks needs to allow for at least a minimum of 20% greater flow than normal peak flows to meet design standards.
Economic	Failure or blockages could contribute to overloading and potentially contribute to flooding.	Maintenance and renewals aim to minimise failures and blockages

7.9 Disposal plan

Council does not have a disposal plan for its stormwater assets, and this is not considered necessary currently given the nature and usage of the assets involved.

7.10 Improvement Plan

In order to meet increased environmental demands, asset development will be required in conjunction with the outcomes from the GWRC Natural Resources Plan. The likelihood of asset development to meet the GWRC Natural Resources Plan requirements are unknown to date and will not be predicted by Council without improved knowledge of the stormwater effects.

- Council will carry out sampling of selected stormwater outlets to ascertain the potential effects and Identify catchment capacities and the relevance of data collected for future structure planning input.
- Catchment and stormwater discharge mapping undertaken
- Stormwater hydrology and discharge predictive modelling

Table 17: Improvement plan

Improvement Action	Responsible person	Budgeted \$	Proposed completion date	Notes
Condition assessments of assets	Operations Manger	Within operational budgets	Immediate	As maintenance is undertaken condition assessments will be recorded with 'as built' data and stored in the AssetFinda system against the asset assessed.
Undertake stormwater assessment	Asset Manager	63,750	2021/22	Assessment of urban catchments and predicted flows to be undertaken by consultancy. Create monitoring plan.

8 Financial Projections

This section sets out financial statements, funding strategy, depreciation forecast and charges for the Stormwater asset activity for Carterton District Council.

All forecasts are presented as the amounts for inclusion in the Long term plan, which include forecast inflation as required by the Local Government Act 2002.

8.1 Financial Strategy

This plan provides the substantiation for budget forecasts put forward in the LTP for the Stormwater assets. CDC will:

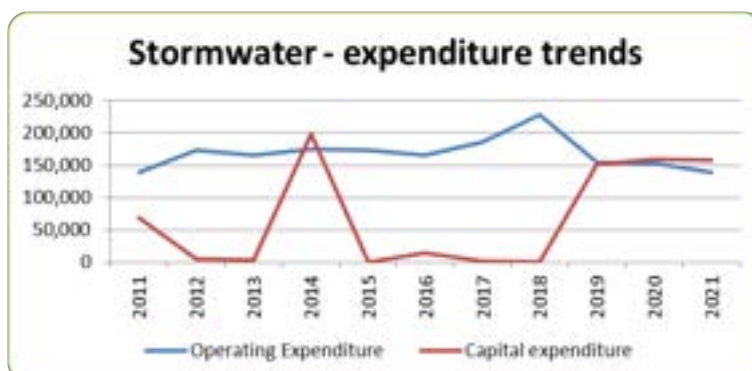
- Implement an improvement approach to asset management planning. A ten year improvement plan will be developed and included in each asset management plan. Improvement projects will be monitored as a part of Council's performance reporting system
- Prepare, maintain and periodically review an AMP outlining sustainable long-term asset management strategies. Annual amendments or updates may be undertaken if significant asset management changes occur
- Report variations in the adopted annual plan budgets against the original asset management plan forecasts and explain the level of service implications of budget variations

8.2 Past expenditure

8.2.1 Historical expenditure

Council's annual reports provide the following summarised information on the historical operating and maintenance costs of the stormwater network. Figure 10 below demonstrates the previous 11 years operating and capital expenditure.

Figure 10: Historical costs (sourced from Council's Annual Reports)



8.2.2 Stormwater valuation

Council's stormwater assets were last valued as at 30 June 2019 by Opus International Consultants Ltd. The components valued are shown in table (Table 18) shows a summary of the 2019 valuation results for Carterton District Council's storm water assets. Of the three asset

types valued in the Opus (2019) report, Stormwater comprises 19.9% of the total overall optimised replacement cost for the three waters at the time of valuation (\$54,146,564.00). The 2019 valuation was a 21% increase (optimized replacement cost) on the 2016 valuation and that is partially attributable to increased data confidence and the contributions over three years of urban developments. Opus assessed the valuation to have an overall confidence rating of B (i.e. ±10% - 15%) for the 2019 values. Next valuation is due to be undertaken in 2022. Next valuation is due in 2022.

Table 18: 2019 Stormwater and Drainage Assets Valuation Summary

Asset Type	Optimized replacement cost	Optimized depreciated replacement cost	Annual depreciation
Reticulation	\$8,410,511	\$5,641,109	\$86,985
Open Drains	\$447,433	\$324,798	\$2,237
Manholes	\$1,039,942	\$794,871	\$10,399
Sumps	\$564,612	\$394,542	\$5,646
Soak Pit Chambers	\$314,519	\$284,488	\$3,145
Total	\$10,777,017	\$7,439,808	\$108,413

8.3 Depreciation

Depreciation is an annual expense to reflect the reduced economic potential of an asset. Because revenue (cash) covers this expense (non-cash) a cash reserve builds up over an asset's life to help fund the asset's replacement at the end of its life. This depreciation reserve is the principal funding mechanism for asset renewals.

Depreciated replacement cost is determined using a number of significant assumptions set out below.

- The replacement asset is based on the replacement cost of the specific assets as at the date of valuation less an allowance for any physical and economic obsolescence to date and for any over-design
- The replacement cost is derived from recent construction contracts of similar assets, recent costing obtained from construction details and Property Institute of New Zealand cost information
- The remaining useful life of assets is an estimated figure using the expected life of an asset, asset maintenance frequencies, and known condition rating.
- Straight-line depreciation has been applied in determining the depreciated replacement cost value of assets.

Stormwater infrastructural assets are valued using the depreciated replacement cost method. There are a number of estimates and assumptions exercised when valuing infrastructural assets using the depreciated replacement cost method. These include:

- Estimating any obsolescence or surplus capacity of the asset

- Estimating the replacement cost of the asset.
- Estimates of the remaining useful life over which the asset will be depreciated. These estimates can be affected by the local conditions. For example, weather patterns and traffic growth. If useful lives do not reflect the actual consumption of the benefits of the asset, then the Council could be over-or under-estimating the annual depreciation charge recognised as an expense in the statement of comprehensive revenue and expense. To minimise this risk, infrastructural asset useful lives have been determined with reference to the NZ Infrastructural Asset Valuation and Depreciation Guidelines published by the National Asset Management Steering Group, and have been adjusted for local conditions based on past experience. Asset inspections, deterioration, and condition-modelling are also carried out regularly as part of asset management planning activities, which provides further assurance over useful life estimates.

8.4 Insurance coverage

The Council is a member of the Local Authority Protection Programme (LAPP). LAPP is a mutual insurance fund which provides for disaster insurance cover over Council’s underground and generally uninsurable assets, to the extent of 40% of their value. The Government’s Disaster Recovery Fund is expected to cover 60% of the replacement cost of assets in the event of a declared civil defence emergency arising from an adverse weather or seismic event.

2021 LAPP replacement costs are on average 30% greater than those of 2019.

Table 19: Infrastructure assets covered by the LAPP fund (2021)

Description	Covered by LAPP	2021 Value (ORC)	2021 Value (ODRC)
Stormwater reticulation	LAPP	\$13,448,234	\$9,263,134
Open channels	No	\$582,519	\$422,859

8.5 Forecast finances

The Council has an Infrastructure Strategy to help the Council to make informed decisions to deal with the major decisions and investment opportunities that will occur over the next 30 years and to comply with section 101B of the Local Government Act 2002.

8.5.1 Forecast loan repayment and loan interest costs

The LTP financial model includes interest costs and provision to make loan repayments. The level of debt related to the urban stormwater infrastructure is relatively low. All capital renewals are expected to be funded from depreciation funds but where these are part of a broader project involving other infrastructure funded by loans, this activity will contribute to loan repayment and interest impacts.

The Council has set limits on the level of borrowing. These are set out in its liability management policy. All three of the following conditions must be met:

- Total debt as a percentage of total assets will not exceed 15 percent

- In any financial year, gross interest paid on term debt will not exceed 12 percent of gross operating revenue
- In any financial year, gross interest expense will not exceed 50 percent net cash inflow from operating activities.

New capital expenditure and the renewal of existing capital items for the water activity will be funded by way of the annual depreciation provision and/or loans.

8.5.2 Forecast operational revenue

Operational revenue forecasts are incorporated into the LTP. Assumptions include low growth in the number of properties, so rates increases will be absorbed by the existing ratepayer base. Stormwater activities do not generate revenue so all revenue comes from property rates.

8.5.3 Forecast expenditure required

The forecasted capital expenditure for the urban and rural water supply services over the next thirty years. The key items are;

- Waikākāriki Stream bypass channel, undertaken by the Greater Wellington Regional Council
- Possible Stormwater consents
- GWRC's Natural Resources Plan
- Expected rezoning to the east of the CBD

8.5.4 Stormwater asset renewals forecast

Renewal expenditure is work that does not increase an asset's design capacity but restores, rehabilitates, or renews an existing asset to its original capacity.

Council has made a strategic decision to maintain the current levels of service for this activity.

8.5.5 Changes in service potential

Council maintains the assets so as to retain their condition and overall value at nationally accepted levels. A programme of routine maintenance, where and when required, is used to achieve this.

8.6 Assumptions and confidence levels

8.6.1 Basis of preparation

The financial information in this plan has been prepared following the provisions of Public Benefit Entity (PBE) Standard - Financial Reporting Standard 42 'Prospective Financial Statements' (PBE FRS 42).

8.6.2 Basis of assumptions

Prospective information is based on a number of assumptions. Risks and uncertainties surround these assumptions. The basis of the assumptions surrounding the information is found in Planning Assumptions in the LTP. The information should therefore be used carefully, with this best endeavours purpose in mind. The Local Government Act 2002 Schedule 10 (1)(e) requires that information relating to levels of service, estimated expenses and revenue be provided in detail for three financial years, and indicative for the subsequent seven financial years. Over time, information becomes increasingly indicative from the time it was first prepared.

The approach taken to budget development has been that of preparing ‘forecasts’ on a best estimate basis. In this case, a forecast refers to financial information based on assumptions on future events the Council expects to occur and on the basis of Council’s expected response to these events.

The Council has not taken an approach where hypothetical “what-if” projections are used.

The major limitation of the forecasting approach, as with any approach, is that events may change over time and undermine the accuracy of assumptions made. The actual financial results achieved for the period are likely to vary from the information presented and the variations may be material.

The review of assumptions underlying the financial information was undertaken in preparation of the Long term plan (LTP). However, the assumptions themselves were adopted by Council resolution to approve the Draft LTP for public consultation in 2021.

8.6.3 Assumptions and Risk Assessments

A number of assumptions were made in preparing the Long term plan (LTP). These assumptions are necessary as the planning term is for ten years and the stating of assumptions ensures that all estimates and forecasts are made on the same basis. There are four categories of planning assumptions in this document:

- Demand Assumptions
 - Resident population
 - District growth
- Political Environment
 - Policies
 - Governance
- Operating Environment
 - Resource consents
 - Natural disasters
 - External factors
- Financial Assumptions

(Please see the full LTP document for the assumptions detail.)

8.7 Finance summary (including rates requirements)

Operating costs are to be funded by rates and user charges as per the Council’s Revenue and Financing Policy, the general approach to funding of the annual net services is that those who benefit (either directly or indirectly) should pay.

Capital renewals should be funded from depreciation reserves (to the extent that the reserve funds can sustain the renewals programme). Upgrade projects should be loan funded to ensure intergenerational equity i.e. those receiving the benefits should pay.

New capital expenditure and the renewal of capital items for the stormwater activity will be funded by way of the annual depreciation provisions and by loans.

Table 20: Forecast revenue and expenditure included in LTP

	Annual Plan 30 June 2021	LTP 30 June 2022	LTP 30 June 2023	LTP 30 June 2024	LTP 30 June 2025	LTP 30 June 2026	LTP 30 June 2027	LTP 30 June 2028	LTP 30 June 2029	LTP 30 June 2030	LTP 30 June 2031
	\$	\$	\$	\$	\$	\$	\$	\$	\$	\$	\$
Sources of Operating Funding											
General rates, UAGC, rates penalties	25,945	29,381	31,164	32,235	34,607	38,314	39,862	43,098	45,505	46,556	49,062
Targeted rates	233,504	264,425	280,478	290,117	311,465	344,823	358,759	387,885	409,545	419,000	441,554
Subsidies and grants for operational purposes	-	-	-	-	-	-	-	-	-	-	-
Fees and charges	-	-	-	-	-	-	-	-	-	-	-
Internal charges and overheads recovered	-	-	-	-	-	-	-	-	-	-	-
Local authorities fuel tax, fines, infringement fees and other	-	2,799	2,911	3,073	3,392	3,719	4,057	4,389	4,736	5,072	5,402
Total operating funding	259,449	296,605	314,553	325,425	349,464	386,856	402,678	435,372	459,786	470,628	496,018
Applications of Operating Funding											
Payments to staff and suppliers	75,237	79,590	81,182	83,347	85,261	87,172	89,185	91,272	93,540	95,964	98,545
Finance costs	18,472	-	-	-	6,227	12,455	12,455	19,187	25,919	25,919	33,234
Internal charges and overheads applied	66,379	93,803	98,191	102,461	104,520	107,609	111,982	112,948	115,642	119,557	120,875
Other operating funding applications	-	-	-	-	-	-	-	-	-	-	-
Total applications of operating funding	160,088	173,393	179,373	185,808	196,009	207,236	213,622	223,406	235,100	241,439	252,654
Surplus/(deficit) of operating funding	99,361	123,212	135,180	139,616	153,455	179,620	189,056	211,966	224,686	229,188	243,364
Sources of Capital Funding											
Subsidies and grants for capital expenditure	-	-	-	-	-	-	-	-	-	-	-
Development and financial contributions	13,205	19,100	19,400	19,700	45,097	46,360	47,578	48,754	49,973	51,191	52,497
Increase/(decrease) in debt	(42,799)	-	-	-	788,813	(41,516)	(41,516)	811,177	(86,395)	(86,395)	840,227
Gross proceeds from sale of assets	-	-	-	-	-	-	-	-	-	-	-
Lump sum contributions	-	-	-	-	-	-	-	-	-	-	-
Other dedicated capital funding	-	-	-	-	-	-	-	-	-	-	-
Total sources of capital funding	(29,594)	19,100	19,400	19,700	833,910	4,843	6,062	859,931	(36,422)	(85,204)	892,724
Applications of Capital Funding											
Capital expenditure - meet additional demand	-	-	102,000	315,424	830,330	-	-	897,572	-	-	975,392
Capital expenditure - improve level of service	186,425	-	-	-	-	-	-	-	-	-	-
Capital expenditure - replace existing assets	133,375	363,750	102,000	105,141	-	110,639	283,961	116,628	-	123,205	-
Increase/(decrease) in reserves	(250,033)	(221,438)	(49,420)	(261,250)	157,036	73,824	(88,843)	57,697	188,263	70,779	160,697
Increase/(decrease) of investments	-	-	-	-	-	-	-	-	-	-	-
Total application of capital funding	69,767	142,312	154,580	159,316	987,365	184,464	195,117	1,071,897	188,263	193,984	1,136,089
Surplus/(deficit) of capital funding	(99,361)	(123,212)	(135,180)	(139,616)	(153,455)	(179,620)	(189,056)	(211,966)	(224,686)	(229,188)	(243,364)
Funding balance	-	-	-	-	-	-	-	-	-	-	-

Table 21: Capital expenditure included in LTP

Item	Carry Forward 30 June 2021 \$	LTP 30 June 2022 \$	LTP 30 June 2023 \$	LTP 30 June 2024 \$	LTP 30 June 2025 \$	LTP 30 June 2026 \$	LTP 30 June 2027 \$	LTP 30 June 2028 \$	LTP 30 June 2029 \$	LTP 30 June 2030 \$	LTP 30 June 2031 \$
Reticulation network	300,000	-	102,000	105,141	-	110,639	-	116,628	-	123,205	-
Urban Growth Strategy	-	-	-	-	830,330	-	-	897,572	-	-	975,392
Treatment	-	-	102,000	315,424	-	-	-	-	-	-	-
Resource Consent	63,750	-	-	-	-	-	283,961	-	-	-	-

Carry Forward reflects the potential underspend on approved projects that will be transferred to 2021/22 for completion

9 Improvement plan and monitoring

9.1 Improvement plan

In preparing this Plan there remains a number of areas where improvement to the level of detail is needed. This improvement will be phased in reflecting a process of continuous enhancement of the management confidence provided by the Plan. This further work will have the effect of:

- Enhancing analysis for planning purposes.
- Improving operational efficiency.

Table 22 below are recommendations for refining the Asset Management Plan data and budget forecasting.

Table 22: Recommendations for Refining the Asset Management Plan

Action	AMP Section	Responsibility	Completion Date
Develop a critical asset register, and investigations undertaken to report on the condition, possible risk mitigation measures, and alternative service/redundancy strategies in case of damage from significant natural events.	6	Asset manager	2023
Further work on identification of climate change risks specific to the area should be undertaken using data sourced through existing government research and applied to the Carterton District. Could also involve a secondary flow path strategy for the town to mitigate flood damage in extreme rainfall events. Identify catchment capacities and the relevance of data collected for future structure planning input	6	Asset manager / Project team	2023
Assessment of the effects of Carterton District Council stormwater discharges should be carried out to provide a basis on which to make judgements and to substantiate future resource consent applications (and NRP).	6	Asset manager / Project team	2021/2022
Identify and develop a contingency plan to mitigate the effects of possible hazardous chemical spills in the catchment.	6	Asset manager / Project team	2024
Modifications to the Waikākāriki stream flow path to reduce the risk levels of high flow inundation in the western area of the urban district	6	GWRC	Not specified

Review actual performance measures against reported measures, and re-assess accuracy.	4	Asset Manager	2022
---	---	---------------	------

9.2 Monitoring and review

The above 'Improvement Plan' should be monitored and reviewed at least once every 12 months. Appropriate actions then can be taken for further improvement. This Plan will be reviewed every three years.

10 References

Figure 8: Planned 30 year renewal Stormwater map

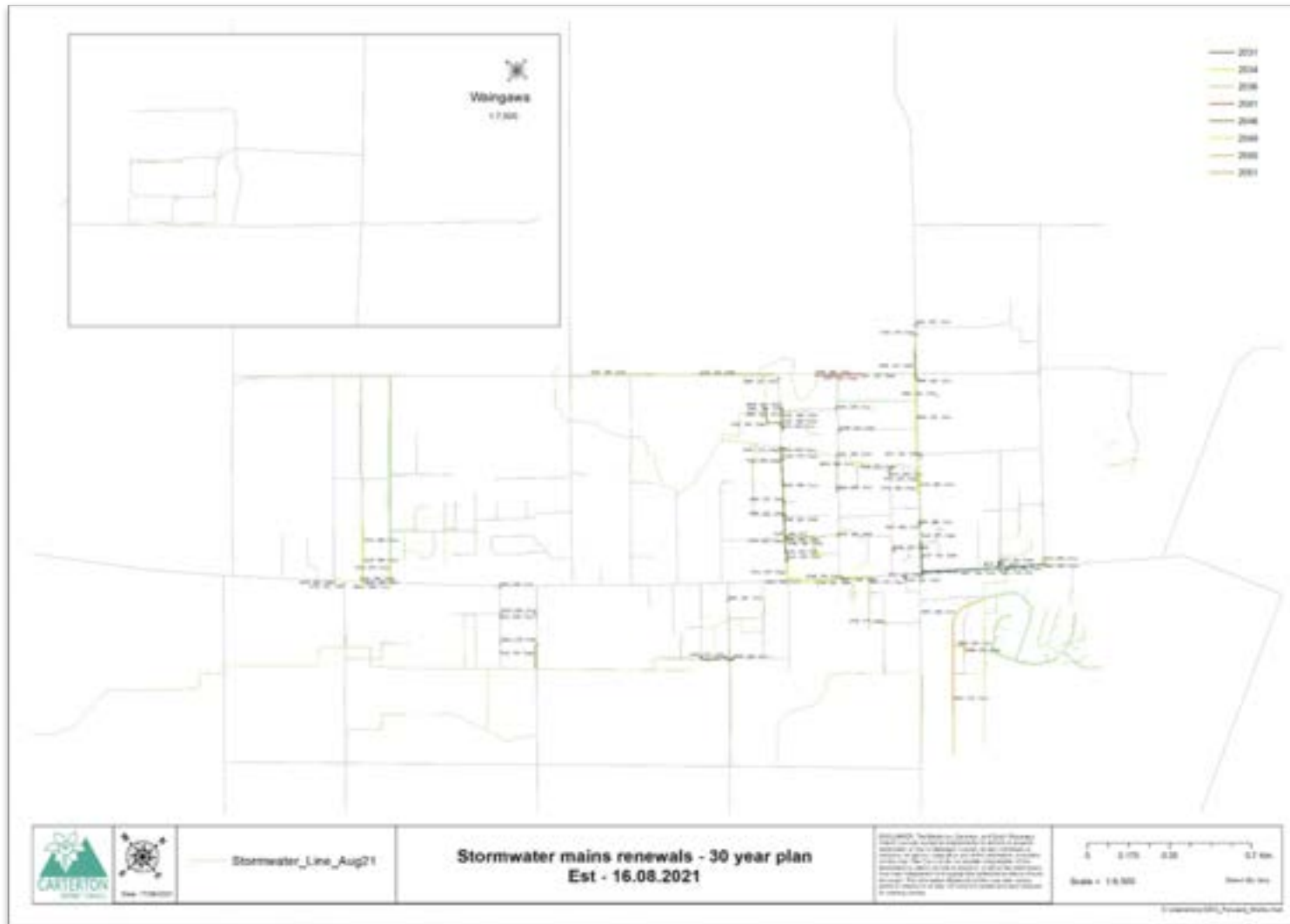


Figure 9: Urban stormwater catchments

